HIMACHAL PRADESH ELECTRICITY REGULATORY COMMISSION, SHIMLA

Suo-Motu Petition No.: 07/2022
Date of Order: 28.03.2022

CORAM: Hon'ble Sh. Devendra Kumar Sharma, Chairman
Hon'ble Sh. Bhanu Pratap Singh, Member
Hon'ble Sh. Yashwant Singh Chogal, Member (Law)

IN THE MATTER OF:-
Determination of Generic Levellised Tariff for Solar PV Projects for FY 2022-23 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 14.02.2022 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 2022-23.

3. The Commission invited objections/suggestions from the public on its aforesaid proposal, by way of insertions in two News Papers i.e. "Times of India" and "Divya Himachal" on 20th February, 2022. The text of said proposal was also made available on the Commission's website www.hperc.org.

4. The Commission, vide letter dated 22.02.2022, 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 15th March, 2022. The public hearing in the matter was scheduled for 17th March, 2022.

5. Subsequently the public hearing was postponed to 22nd March, 2022. A public notice in this regard was published in the News Papers i.e. "The Tribune" and "Himachal Dastak" on 16th March, 2022. The same was also conveyed to the major stakeholders vide e-mail dated 15.03.2022.

6. In response, the written comments/suggestions were received from the following stakeholders:-

   (i) Sh. Roop Lal Sankhyan, VPO Dhar Tatoh, Tehsil Sadar, Distt. Bilaspur, HP.
   (ii) Sh. Abhishek Sankhyan,VPO Dhar Tatoh, Tehsil Sadar, Distt. Bilaspur, HP.
   (iii) Sh. Tilak Raj Sharma, Shop No. 1, Opposite SBI Bank, Damtal, VPO Indora, Distt Kangra, HP.
   (iv) Smt. Neelam Sharma, Shop No.-2, Opposite KCC Bank, Damtal, VPO Indora, Kangra, HP.
   (v) Sh Kartik Upadhyay (Hydro Consultants), VPO & Tehsil-Shahpur, District Kangra, HP-176206.
   (vi) Shri. Inderdeep Singh Khurana, (M/s Sunomatic Power Pvt. Ltd.), Village Sihan, PO-Gagal, Teh.-Bal, Distt.- Mandi, HP-175006.

7. The public hearing was held on 22nd March, 2022 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) The representative of M/s Sunomatic Power Pvt. Ltd. stated that by averaging the normative cost of Poly-Solar and Mono PERC Modules, the adoption of Mono PERC technology having higher cost compared to Poly-Solar modules is not beneficial to the Solar PV developer. The tariff for both the technologies may be determined separately. He further requested for providing the break-up of the impact of GST, Basic Customs Duty (BCD) etc. considered in arriving at the normative panel cost. He also suggested that Commission may consider providing an incentive on achievement of higher CUF compared to the benchmarked normative CUF.

   (b) Sh. Kamlesh Saklani, representative of HPSEBL stated that they have no objection on the proposal and the Commission may finalise the same.

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

(A) **CAPITAL COST.-**

(i) Sh. Roop Lal Sankhyan, Sh. Abhishek Sankhyan, Sh. Tilak Raj Sharma, Smt. Neelam Sharma and Sh. Kartik Upadhyay have submitted that the normative capital cost proposed in the current proposal is on the lower side. They have stated that even polycrystal modules will not be available at the proposed cost. They have pointed out that since the normative module cost has been taken on average basis, the generation should also be on average basis. It is further added that for a small capacity of 500kW or 1000kW, no international player will supply the modules on such price and as it is conventionally done, the project is installed through an EPC contractor who will charge for transportation, taxes and his profit, which gets reflected on the final cost of Modules. They have suggested that to arrive at normative capital cost, budgetary prices should be ascertained from premier players (EPC) in solar project installation like Adani, Waree, APS, Axitec etc. Thereafter adding the cost of Pre-operative expenses and Land Cost, the normative capital cost should be decided.

(ii) Sh. Kartik Upadhyay has submitted that the proposed 9% cost for misc. expenses is insufficient and that the prices of module arrived at by including taxes, transportation, insurance and contractor profit will be higher than the proposed cost.

(iii) Sh. Roop Lal Sankhyan and Sh. Tilak Raj have suggested that the cost of panels should be taken as Rs 268.80 lakh per MW. Sh. Roop Lal Sankhyan has quoted the cost of a project of 500kWp capacity to support his suggestion.

(iv) Sh. Roop Lal Sankhyan, Sh. Abhishek Sankhyan, Sh. Tilak Raj Sharma, Smt. Neelam Sharma and Sh. Kartik Upadhyay have submitted that the approximate power degradation of solar panels is 2.5% during 1st year and thereafter 0.68% every year up to 25 years and suggested that the same may be considered separately in the tariff calculations.

(v) Sh. Inderdeep Singh Khurana (M/s Sunomatic Power Pvt. Ltd) has submitted that the average price considered gives undue advantage to poly crystalline technology and is penalising mono-crystalline technology which is latest and more efficient. He has added that the CUF of various projects in Himachal Pradesh is coming out to be around 16% due to usage of old polycrystalline technology which can be improved by using mono crystalline technology. For this, he has requested to consider 0.234 USD/Watt as cost of panels instead of 0.215 USD/Watt or to have two separate rates based on these technologies so that proper adoption can happen.

He has requested for providing the break-up of the normative cost with regard to the impact of GST, Basic Customs Duty (BCD) etc on the same. He has further requested to consider the impact of increase in GST from 5% to 12%,

introduction of Basic Customs Duty (BCD), cost of civil works, mounting structure, extra wiring and protection equipment such as isolators and fuses, combining boxes and increase in transportation costs etc while arriving at the cost and has suggested that the normative capital cost of Rs 468 Lacs per megawatt may be considered by the Commission instead of Rs 424.53 Lacs.

Commission's View:-

Comments of similar nature were received from the stakeholders while finalizing the tariff for Solar PV plants for FY 2021-22 and Commission was 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. As far as de-gradation impact in the useful project life span is concerned, the same is envisaged to be met through O&M expenses. However, the normative capital cost takes into account, the initial spares to be procured for the purpose. The Commission also feels that with the advancement of technology, in future the requirement of such running maintenance spares shall also get reduced considerably.

In relation to the suggestion given by Sh. Inderdeep Singh Khurana to consider separate normative cost of Mono PERC Module in the tariff determination, the Commission also feels that the Generic Levellised Tariff is determined by considering normative parameters including normative capital cost and developer have a choice to adopt particular technology which may suit him. Using costlier technology may help the developer to achieve higher CUF meaning thereby more net saleable energy. The issue relating to determination of separate tariff for individual technology can be addressed in case of project specific tariff determination only.

With regard to the comment of Sh. Kartik Upadhayay in relation to 9% escalation for misc. expenses, the Commission observes that the contention of the stakeholder is not factually correct. As a matter of fact, an enhancement of 30% on the normative cost of Solar PV Modules is being considered by the Commission, out of which 15% escalation shall be subject to adjustment on account of changes in the tax rate.

As far as the suggestion relating to providing break-up of enhancement on account of GST and BCD on the panel cost, the Commission is inclined to reflect the component of additional GST and BCD under separate item which shall also facilitate adjustment in case of variation in the GST/BCD considered in this Order.

(B) **Power Generation/CUF/Net Saleable Energy:-**

(i) Sh. Roop Lal Sankhyan, Sh. Abhishek Sankhyan, Sh. Tilak Raj Sharma, Smt. Neelam Sharma and Sh. Kartik Upadhyay have submitted that the CERC in its

RE Tariff Regulations, 2020 has defined the Installed capacity of Solar PV Projects and floating solar projects as the sum of name plate capacities (Nominal AC power) of the inverters of the projects and has fixed normative Capacity Utilization Factor (CUF) for Solar PV projects as 21% whereas the installed capacity defined in the Model PPA for Solar PV Projects means summation of the name plate kilowatt capacity(ies) of the Solar PV cells of the projects and is actually the DC input being fed to the inverters of projects. They have submitted that any Solar PV project having Installed capacity of 1000 kW_{DC} will generate about 750 kW_{AC} during its peak generation period and its Capacity Utilization Factor (CUF) comes down to about 16%. These stakeholders have suggested that in the interest of all the stake holders, the installed capacity of projects be fixed as defined in the regulation of 'CERC' i.e. in kW_{AC} and normative cost per kW be suitably increased to account for the addition of Solar PV modules. It has further been submitted that the assumption of annual gross the generation of 18.40 lakh/MWp should only be adopted if the modules with 1.3MW DC capacity are allowed to achieve IMW AC power which will increase the capital cost. They have suggested that the gross generation for the purpose of calculation of tariff may be reduced from 18.4 lakh to 14.0 lakh to make the projects viable for the stakeholders. They have quoted the gross generation from various Solar PV projects and have suggested the gross generation figure should not be fixed more than 14.5 lakh units from 1 MW plant.

(ii) Sh. Abhishek Sankhyan has suggested that the CUF may be taken as 16 % instead of 21%.

(iii) Sh. Inderdeep Singh Khurana (M/s Sunomatic Power Pvt. Ltd.) has suggested during the public hearing that the Commission may introduce an incentive on account of achievement of higher CUF viz-a-viz benchmarked normative CUF.

Commission's View:-

Comments/suggestions of similar nature were received from the stakeholders while finalizing the tariff for Solar PV plants for FY 2021-22 and stand duly addressed. The Commission also 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. The suggestion to compensate the solar power developer in case the annual generation is lower than the value worked out in the tariff model, may not be acceptable since it may encourage inefficiency in the operation of the project.

As far as providing incentive for higher CUF is concerned, the Commission is of the view that higher CUF results in higher revenue on account of increased net saleable energy available to the developer and thus automatically provides an incentive to the developer.

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

(C). **Interest Rate.-**

Sh. Kartik Upadhyay has submitted that RBI considers interest rates every quarter. Due to Covid-19, RBI has reduced rates two times during 2020. After Covid-19 it will be increased by RBI. The interest rate while calculated by Banks at the time of giving loans, varies from individual to individual. If anyone has CIBIL somewhat less, his interest rate will be more. If one cannot afford 100% collateral security then his interest rate will be more by 1% approx. Interest rate of 9% as proposed in draft, is on lower side. Keeping in view time taken by PSU Banks for sanction of loans, developers manage funds from other Financial Institutions, so interest rate may please be kept as 11%.

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 in this regard, which is also in line with the Regulations of Central Commission. It is beyond the scope of this proposal to consider any other rate. Even otherwise, it is felt that 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) **Categorization**

Sh. Kartik Upadhyay has submitted that the Commission has categorized the Solar PV projects in its "RE Tariff Regulations, 2017" and fixed common tariff up to 1 MW. No Solar scheme of HP Govt. was available at that time and also there was no limit regarding installed capacity of Solar PV projects. As such, Categorization of capacity was quite reasonable. But thereafter Govt. of HP has announced two schemes (20 MW & 28 MW) to harness the solar system and restricted the capacity of projects between 250 to 500 kW.

He has further submitted that the cost of three components of projects viz. (i) PV Modules, (ii) Preliminary and Pre-operative expenses, Land Cost, Civil & General Works and Mounting structures and (iii) Power Conditioning Units is almost proportional to the capacity of project whereas the cost of 4th component of project which is Transmission Line system for evacuation of Generated Power upto interconnection point remains the same irrespective of the project capacity except the cost of transformer and its associated power cables which is about 10-15% of fourth component while other cost e.g. 11kV switchgear, transmission line and metering equipment remain the same as minimum size of HT conductor is sufficient to carry a current up to 1000 kW. As such, the cost of 4th component is quite substantial and will have considerable impact on per unit rates to be calculated. It has been suggested that to be more practical, the

normative capital cost of projects up to 500 kW may be considered separately as most of Solar PV projects being developed by the IPP in HP are of 500kW capacity.

Commission's View:-

The Commission has already proposed three separate categories. The first category includes the projects upto 1 MW capacity and the second category includes the projects above 1MW and upto 5 MW capacity. The projects with capacity of more than 5 MW are covered in the third category. The Commission feels that even though certain cost may be higher in case of smaller capacities, there could be some savings also in case of such projects. The Commission does not find it feasible to carve out more categories and as such declines to accept the suggestion for creating a separate category for the projects upto 500 kW.

9. 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 the financial year 2022-2023 and also to determine the generic levellised tariff for procurement of power by the distribution licensee from Solar PV plants, as detailed in the succeeding paragraphs.

10. **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 decides to retain similar categorization, as mentioned in the table below, for the Solar PV generation capacity for the purposes of normative capital cost and determination of levellised tariff for FY 2022-23:-

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 proposed to be limited to 5.00 MW, 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.

11. **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 levellised 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 decides to evolve 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.

11.1 **CAPITAL COST.-**

(a) As per the website of PV insights solarindia, the latest Solar PV Module Weekly support Price, as accessed on 19.03.2022, is as under:-

USD/Watt

Item	Average
Poly Solar Module	0.196
Mono PERC Module	0.234

The average of these prices works out to 0.215 USD/Watt. The Commission decides to consider the cost of Solar PV Module as Rs. 161.25 Lakhs/MW considering the exchange rate of Rs. 75.00/USD based on the average of six months, ending 21st March, 2022. 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. 19500 Crore provided for in the budget proposals for 2022-23. 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. 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 decides to-

(i) retain the escalation factor of 15% of the normative capital cost of Solar PV Module, on normative basis and on the pattern followed while determining the Generic Levellised Tariff for 2021-22, to cover various factors as well as taxes considered therein (i.e. 5% GST and 14.5% Safe Guard Duty(SGD)). As mentioned above, the applicability period of SGD of 14.5%, as considered in the said tariff expired during the course of 2021-22 and was not renewed by the Central Government so as to give duty free breathing space of about 9 months ending 31.03.2022. On the other hand, the GST rate on Solar PV modules was also increased from 5% to 12% from 1.10.2021. No adjustments on this account have been made in the Generic Levellised tariff for 2021-22. Accordingly for the purpose of this order also, no adjustment shall be made on this account. The Commission shall however consider making adjustments on this account if it subsequently decides to adjust the Generic Levellised Tariff for 2021-22 on this account; and

(ii) provide additional 15% escalation on the normative cost of the Solar PV modules so as to take into account, purely on normative basis, the net impact of the increase in the tax rate (i.e. from 5% to 12% and 14.5 % to 40%). This will however be subject to adjustment linked with the changes in the tax rate (GST and BCD/SGD) as detailed in paras 12.11. However, in case of the reduction in the tax rate considered in item (i) above the adjustment shall be carried out only to the extent of the rates considered under this item and no adjustment shall be carried out for the tax rate covered in item (i) above. The Commission would also like to clarify here that the escalation on account of additional taxes is being provided purely on normative basis after balancing the various factors affecting the marketing conditions as discussed above and shall be applicable irrespective of the actual channel of procurement of the Solar PV modules.

In fact, in case of procurement from indigenous sources the BCD/SGD will not be applicable at all. The Commission feels that this approach will not only enable the developers to procure the modules in most economical manner, but may also encourage procurement from indigenous sources. In view of the overlapping market conditions, the Commission neither intends, nor finds it appropriate, to provide full compensation for additional BCD/SGD.

The average normative price of Solar PV Modules on the above basis works out as follows:-

S. No.	**Particulars**	**Per MW normative Cost (in Lakh Rs.)**
1.	Cost of Solar PV Module	161.25
2.	15% Enhancement on account of Misc. factors including taxes up to the limit of 5% (GST) and 14.5% (SGD/BCD)	24.19
3.	15% Enhancement on account of additional taxes on normative basis (i.e. 7% increase in GST & imposition of about 25.5% increase in BCD/SGD) on Solar PV Modules.	24.19
	Total Cost	209.63

b) As regards, the normative cost of the other components which was proposed as Rs. 216.30 per/MW, the Commission decides to retain the same without any change.

c) On the above basis, the per/MW normative capital cost of the project for 2022-23 works out to Rs. 425.93 Lakhs/MW as detailed in the following table:-

Sr. No.	**Particulars**	**Normative Capital Cost (Rs. Lakh/MW)**
1	PV Modules	209.63
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	425.93

d) The normative capital cost for the Solar PV projects upto 1.00 MW was proposed to be fixed by allowing an increase of about 1.5% on the normative cost for the projects above 1.00 MW and upto 5.00 MW as fixed above. Accordingly, the Commission decides to fix the normative capital cost for the Solar PV projects upto 1.00 MW as Rs. 432.31 Lakh-per MW.

In line with the proposal, 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.

As such the additional capital cost for these area specific Solar PV project(s) is allowed as Rs. 10.00 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. 10.00 Lakh per MW shall however be further increased by 1.5% 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	432.31
(b)	Above 1.00 MW & upto 5.00 MW	425.93
2	**Projects to be set up in urban areas and industrial areas**	
(a)	Upto 1.00 MW	442.46
(b)	Above 1.00 MW & upto 5.00 MW	435.93

11.2 **OPERATION AND MAINTENANCE EXPENSES.-**

In line with the proposal, the Commission decides to fix the O&M expenses as Rs. 9.43 Lakh/MW for FY 2022-23. 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.

11.3 **NORMATIVE NET SALEABLE ENERGY.-**

The CUF shall be retained 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.

11.4 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 Regulations also and the same shall be followed accordingly.

12. After having fixed 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 same are as follows:-

12.1 **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.

12.2 **TECHNOLOGICAL SPECIFIC PARAMETERS.-**

The normative parameters for capital cost, O&M charges, CUF etc. as discussed in the para-13 above, have been followed.

12.3 **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.

12.4 **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.

12.5 **Return on Equity.-**

The normative return on equity has been 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 has been worked out as 16.96% by considering MAT @ 17.472% (15% MAT rate +12% Surcharge+ 4% Health and Education cess) and for the remaining 5 years the same has been grossed-up as 19.75% by considering corporate tax @ 29.12% (25% tax rate +12% Surcharge+ 4% Health and Education cess).

12.6 **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.

(d) 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 9.00% 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) prevalent during the last available six months as shown in the table below:-

Month to	**Tenor-wise MCLR of SBI**
September, 2021	
October, 2021	7.00
November, 2021	7.00
December, 2021	7.00
January, 2022	7.00
February, 2022	7.00
Avg. for last available 6 months.	**7.00**

12.7 **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

12.8 **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 10.50% 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.

12.9 **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."

12.10 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.

12.11 Adjustment in tariff on account of change in the tax rates.-

(i) As explained in item (ii) of sub para 11.1(a), the normative capital cost takes into account the impact, after duly balancing the various related factors on normative basis, the additional taxes i.e. GST from 5% to 12% and BCD/SGD from 14.5% to 40% on the normative cost of the Solar PV modules. This is however subject to adjustment in case of changes in the tax rate. In order to simplify the adjustment, the arithmetical sum of these two taxes i.e. (GST and BCD/SGD) on Solar PV modules (without any cascading effect) shall be considered. Similarly, for the purpose of adjustment also the arithmetical sum

of these two taxes shall be considered. Such arithmetical sums of these two taxes have hereinafter referred to as the composite tax rate. Accordingly, the composite tax rate of 52% (12%+40%) shall be considered to have been included in the normative cost.

(ii) The adjustments as per item (i) of this para shall be carried out only to the extent of the rates considered under item (ii) of subject para 11.1(a) above and no adjustment shall be carried out in respect of the rate by which the composite tax rate falls below 19.5% (5%+14.5%). Accordingly, in such cases the composite tax rate shall be considered as 19.5% even if the composite tax rate for the relevant period (as detailed in item (iii) below) actually falls below19.5%.

(iii) For the purposes of adjustment the weighted average of the notified rates of the GST and BCD/SGD, as applicable during the period of nine months immediately before the commissioning, shall be considered. In case the commissioning of the project capacity takes place in phases during the period(s) which attract the Generic Levellised Tariff determined in this Order, the adjustment shall be worked out separately for the capacity commissioned in each phase during the such period. Thereafter, the weighted average rate for the adjustment to be carried out at the end of each phase shall be worked out by taking into account the total capacity commissioned upto the end of each phase.

(iv) The Commission has worked out the rates for adjustment on account of changes in the composite tax rate separately for various categories and finds that such rates are, more or less, the same i.e. 0.52 paise/kWh. The Commission, therefore, decides to make the adjustment at a uniform rate. Accordingly, the adjustment in the generic levellised tariff shall be carried out @ 0.52 paise/kWh for every one percent change in the composite tax rate.

(v) BCD and Safe Guard Duty shall be considered as mutually inter changeable.

(vi) The adjustments if any in pursuance to item (i) of sub para 11.1(a) shall be carried out only if the Commission issues a separate order.

Illustrations:-

(A) If the GST rate is reduced from 12% to 6% and BCD gets reduced from 40% to 30%, the composite tax rate shall be considered as 36% and the tariff shall be reduced by considering 16% reduction in the composite

tax rate (52%-36%=16%). In such case the Generic Levellised Tariff shall be reduced by 8 paise/kWh (i.e. 8.32 paise rounded to 8 paise).

(B) If the GST rate is reduced from 12% to 6% and BCD gets reduced from 40% to 10%, the composite tax rate shall be considered as 19.5% (instead of 16%). Accordingly, the reduction in the composite tax rate shall be taken as 32.5% (52%-19.5%=32.5%) instead of 36% (52%-16%). In this case the Generic Levellised Tariff shall be reduced by 17 paise (i.e. 16.90 paise rounded to 17 paise).

(C) In case the GST gets increased from 12% to 14% and the BCD from 40% to 50%, the composite tax rate shall be considered as 64% and the Generic Levellised Tariff shall be increased by considering 12% increase in composite tax rate (i.e.64%-52%=12%). In this case the Generic Levellised Tariff shall be increased by 6 paise (i.e. 6.24 paise rounded to 6 paise).

(vii) The adjustments in Generic Levellised Tariff shall be carried out by the Distribution Licensee in accordance with this order.

(viii) The adjustments on account of changes in the composite tax rate shall be carried out in addition to those on account of incentive/subsidy etc. as per paras 12.9 & 12.10 of this order. Both these adjustments in the Generic Levellised Tariff shall be carried out independently i.e. without linkage with each other.

12.12 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 levellised tariff computation. The discount factor has been calculated on the basis of normative debt equity ratio (70:30) and weighed average of the post tax rate for debt and equity component. For this purpose, the interest rate on the loan component (i.e. 70%) of capital cost is 9.00%. 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 8.67%. The Corporate tax has been taken as 29.12% (25% IT rate+12% Surcharge+4% Health and Education cess).

12.13 ROUNDING.-

(i) 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 paise and fraction of less than 0.5 has been ignored.

(ii) The adjustment to be carried out in accordance with para 12.11 for total difference in the composite tax rate shall also be rounded to nearest paisa/kWh. The fraction of 0.5 paise/kWh or above shall be rounded to next higher paise and fraction of less than 0.5 shall be ignored.

13. **GENERIC LEVELLISED TARIFF AND ASSOCIATED TERMS & CONDITIONS.-**

In light of the discussions made in the preceding paragraphs, the generic levellised tariff and the associated terms and conditions for Solar PV project for FY 2022-23 under the RE Regulations, 2017 have been arrived at and are determined as under:-

A. The generic levellised tariff for Solar PV projects for FY 2022-23 shall be:-

Sr. No.	Capacity	Generic levellised 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	3.71
2	**Projects to be set up in industrial areas and urban areas**	
(a)	Upto 1.00 MW	3.82
(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 PV 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 lakh per MW subsidy have however been indicated in the tariff calculation sheets.

E. This tariff takes into account the composite tax rate of 52% (12%GST+40%BCD/SGD). In case of change(s) in this composite tax rate, necessary adjustments shall be carried out as per para 12.11 of this order.

F. 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 01.04.2022, but not later than 31.03.2023, this

tariff shall be applicable for such capacity(ies) as are commissioned on or before 31.03.2024.

(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 2022-23 is applicable in accordance with the provisions of the PPAs read with the applicable Tariff Order(s) of previous years**.** For this purpose, the tariff determined in this order and duly adjusted as per the provisions of this order, shall be considered and the generic levellised tariff for FY 2022-23.

G. 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.

H. 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.

14. The detailed computations for generic levellised tariff for FY 2022-23 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/-	**Sd/-**	**Sd/-**
(Yashwant Singh Chogal)	(Bhanu Pratap Singh)	(Devendra Kumar Sharma)
Member (Law)	**Member**	**Chairman**

Place: Shimla.
Dated: 28th March, 2022.

Annexure-"A"

List of the stakeholders/participants who attended the public hearing on 22nd March, 2022.

Sr. No.	Name
1	Er. Manoj Kumar (SE), Directorate of Energy
2	Shri Shanti Swaroop, Directorate of Energy
3	Er. Virender Kumar, Assistant Executive Engineer, Directorate of Energy
4	Er. Vinod Kumar Bhatti, Sr. Executive Engineer, HPSEBL
5	Er. Ashish Dhiman, Assistant Engineer, HPSEBL
7	Shri. Kamlesh Saklani, Law Officer, HPSEBL.
8	Shri Inderdeep Singh Khurana, M/s Sunomatic Power Pvt. Ltd.

Appendix - I

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	%	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	432.31
3	Project Financing	Debt Equity	Tariff Period	Year	25
			Debt	%	70
			Equity	%	30
		Debt Component	Loan Amount	Lakh Rs./MW	302.617
			Moratorium Period	Year	0
			Repayment Period	Year	15
			Interst Rate	%	9.00
		Equity Component	Equity Amount	Lakh Rs./MW	129.693
			Return of equity for first 20 Years	%	16.96
			Return of equity from 21st Years onwards	%	19.75
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	9.43
			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	%	10.50
8	Discount Factor		Discount Rate	%	8.67

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		9.43	9.792	10.17	10.56	10.96	11.39	11.82	12.28	12.75	13.24	13.75	14.27	14.82	15.39	15.98	16.60	17.23	17.89	18.58	19.29	20.04	20.81	21.60	22.43	23.30
Depriciation	Rs. lakh		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	20.19	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62	8.62
Interest on Term Loan	Rs. lakh		26.33	24.51	22.70	20.88	19.06	17.25	15.43	13.62	11.80	9.99	8.17	6.35	4.54	2.72	0.91	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		1.27	1.26	1.25	1.24	1.23	1.22	1.22	1.21	1.20	1.20	1.19	1.19	1.19	1.18	1.18	1.04	1.06	1.09	1.12	1.14	1.22	1.25	1.28	1.31	1.34
Return on Equity	Rs. lakh		22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	25.61	25.61	25.61	25.61	25.61
Total fixed Cost	Rs. lakh		79.21	77.75	76.30	74.87	73.45	72.04	70.66	69.29	67.94	66.61	65.29	64.00	62.73	61.48	60.26	48.26	48.92	49.60	50.32	51.06	55.49	56.29	57.12	57.98	58.88
Levellised CoG																											
Per unit CoG	Unit	**levellised**																									
O&M Expences	Rs/kWh	0.72	0.52	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	1.11	1.15	1.19	1.24	1.28
Depriciation	Rs/kWh	1.00	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Interest on Term Loan	Rs/kWh	0.74	1.45	1.35	1.25	1.15	1.05	0.95	0.85	0.75	0.65	0.55	0.45	0.35	0.25	0.15	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	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07
Return on Equity	Rs/kWh	1.23	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.41	1.41	1.41	1.41	1.41
Total CoG	Rs/kWh	3.75	4.37	4.2886	4.21	4.13	4.05	3.97	3.90	3.82	3.75	3.67	3.60	3.53	3.46	3.39	3.32	2.66	2.70	2.74	2.78	2.82	3.06	3.11	3.15	3.20	3.25
Discounted factor	%		1	0.92	0.85	0.78	0.72	0.66	0.61	0.56	0.51	0.47	0.44	0.40	0.37	0.34	0.31	0.29	0.26	0.24	0.22	0.21	0.19	0.17	0.16	0.15	0.14
Levellised Tariff	**Rs/kWh**	**3.75**	4.37	3.9464	3.56	3.22	2.91	2.62	2.37	2.14	1.93	1.74	1.57	1.41	1.28	1.15	1.04	0.76	0.71	0.67	0.62	0.58	0.58	0.54	0.51	0.47	0.44

Generic Levellised Tariff (without Subsidy) at Capital Cost of Rs 432.31 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
Adjustment to be made per 1% change in the composite tax rate as per Para 12.11 of the Order = 0.52 paise/kWh

Appendix - II

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	%	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	425.93
3	Project Financing	Debt Equity	Tariff Period	Year	25
			Debt	%	70
			Equity	%	30
		Debt Component	Loan Amount	Lakh Rs./MW	298.151
			Moratorium Period	Year	0
			Repayment Period	Year	15
			Interst Rate	%	9.00
		Equity Component	Equity Amount	Lakh Rs./MW	127.779
			Return of equity for first 20 Years	%	16.96
			Return of equity from 21st Years onwards	%	19.75
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	9.43
			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	%	10.50
8	Discount Factor		Discount Rate	%	8.67

Determination of Tariff for Solar PV Power Projects above 1 MW upto 5 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		9.43	9.792	10.17	10.56	10.96	11.39	11.82	12.28	12.75	13.24	13.75	14.27	14.82	15.39	15.98	16.60	17.23	17.89	18.58	19.29	20.04	20.81	21.60	22.43	23.30
Depriciation	Rs. lakh		19.89	19.89	19.89	19.89	19.89	19.89	19.89	19.89	19.89	19.89	19.89	19.89	19.89	19.89	19.89	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50
Interest on Term Loan	Rs. lakh		25.94	24.15	22.36	20.57	18.78	16.99	15.21	13.42	11.63	9.84	8.05	6.26	4.47	2.68	0.89	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		1.26	1.25	1.24	1.23	1.22	1.21	1.21	1.20	1.19	1.19	1.18	1.18	1.18	1.18	1.17	1.03	1.06	1.08	1.11	1.14	1.21	1.24	1.27	1.30	1.34
Return on Equity	Rs. lakh		21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	21.67	25.24	25.24	25.24	25.24	25.24
Total fixed Cost	Rs. lakh		78.19	76.75	75.33	73.92	72.53	71.15	69.80	68.45	67.13	65.83	64.54	63.28	62.03	60.81	59.61	47.80	48.46	49.15	49.86	50.60	54.98	55.78	56.61	57.47	58.37
Levellised CoG																											
Per unit CoG	Unit	**levellised**																									
O&M Expences	Rs/kWh	0.72	0.52	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	1.11	1.15	1.19	1.24	1.28
Depriciation	Rs/kWh	0.98	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Interest on Term Loan	Rs/kWh	0.72	1.43	1.33	1.23	1.13	1.04	0.94	0.84	0.74	0.64	0.54	0.44	0.35	0.25	0.15	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	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07
Return on Equity	Rs/kWh	1.21	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.39	1.39	1.39	1.39	1.39
Total CoG	Rs/kWh	3.71	4.31	4.2336	4.16	4.08	4.00	3.92	3.85	3.78	3.70	3.63	3.56	3.49	3.42	3.35	3.29	2.64	2.67	2.71	2.75	2.79	3.03	3.08	3.12	3.17	3.22
Discounted factor	%		1	0.92	0.85	0.78	0.72	0.66	0.61	0.56	0.51	0.47	0.44	0.40	0.37	0.34	0.31	0.29	0.26	0.24	0.22	0.21	0.19	0.17	0.16	0.15	0.14
Levellised Tariff	**Rs/kWh**	**3.71**	4.31	3.8958	3.52	3.18	2.87	2.59	2.34	2.11	1.90	1.72	1.55	1.40	1.26	1.14	1.03	0.76	0.71	0.66	0.62	0.58	0.57	0.54	0.50	0.47	0.44

Generic Levellised Tariff (without Subsidy) at Capital Cost of Rs 425.93 Lakh/MW = Rs. 3.71 /kWh
Indicative Generic Levellised Tariff by considering Subsidy/Incentive/Grant of Rs 10 Lakh/MW = Rs. 3.64 /kWh
Adjustment to be made per 10 Lakh of Subsidy/Incentive/Grant per MW= Rs. 0.07/kWh
Adjustment to be made per 1% change in the composite tax rate as per Para 12.11 of the Order = 0.52 paise/kWh

Appendix - III

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	%	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	442.46
3	Project Financing	Debt Equity	Tariff Period	Year	25
			Debt	%	70
			Equity	%	30
		Debt Component	Loan Amount	Lakh Rs./MW	309.722
			Moratorium Period	Year	0
			Repayment Period	Year	15
			Interst Rate	%	9.00
		Equity Component	Equity Amount	Lakh Rs./MW	132.738
			Return of equity for first 20 Years	%	16.96
			Return of equity from 21st Years onwards	%	19.75
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	9.43
			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	%	10.50
8	Discount Factor		Discount Rate	%	8.67

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		9.43	9.792	10.17	10.56	10.96	11.39	11.82	12.28	12.75	13.24	13.75	14.27	14.82	15.39	15.98	16.60	17.23	17.89	18.58	19.29	20.04	20.81	21.60	22.43	23.30
Depriciation	Rs. lakh		20.66	20.66	20.66	20.66	20.66	20.66	20.66	20.66	20.66	20.66	20.66	20.66	20.66	20.66	20.66	8.83	8.83	8.83	8.83	8.83	8.83	8.83	8.83	8.83	8.83
Interest on Term Loan	Rs. lakh		26.95	25.09	23.23	21.37	19.51	17.65	15.80	13.94	12.08	10.22	8.36	6.50	4.65	2.79	0.93	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		1.29	1.28	1.27	1.26	1.25	1.24	1.24	1.23	1.22	1.21	1.21	1.20	1.20	1.20	1.20	1.05	1.07	1.10	1.13	1.15	1.23	1.26	1.29	1.32	1.35
Return on Equity	Rs. lakh		22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	22.51	26.22	26.22	26.22	26.22	26.22
Total fixed Cost	Rs. lakh		80.84	79.34	77.84	76.37	74.90	73.46	72.03	70.62	69.22	67.85	66.49	65.16	63.84	62.55	61.28	48.98	49.65	50.33	51.05	51.79	56.31	57.11	57.94	58.80	59.69
Levellised CoG																											
Per unit CoG	Unit	**levellised**																									
O&M Expences	Rs/kWh	0.72	0.52	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	1.11	1.15	1.19	1.24	1.28
Depriciation	Rs/kWh	1.02	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	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Interest on Term Loan	Rs/kWh	0.75	1.49	1.38	1.28	1.18	1.08	0.97	0.87	0.77	0.67	0.56	0.46	0.36	0.26	0.15	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	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07
Return on Equity	Rs/kWh	1.26	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.45	1.45	1.45	1.45	1.45
Total CoG	Rs/kWh	3.82	4.46	4.3761	4.29	4.21	4.13	4.05	3.97	3.90	3.82	3.74	3.67	3.59	3.52	3.45	3.38	2.70	2.74	2.78	2.82	2.86	3.11	3.15	3.20	3.24	3.29
Discounted factor	%		1	0.92	0.85	0.78	0.72	0.66	0.61	0.56	0.51	0.47	0.44	0.40	0.37	0.34	0.31	0.29	0.26	0.24	0.22	0.21	0.19	0.17	0.16	0.15	0.14
Levellised Tariff	**Rs/kWh**	**3.82**	4.46	4.0270	3.64	3.28	2.96	2.67	2.41	2.18	1.96	1.77	1.60	1.44	1.30	1.17	1.06	0.78	0.72	0.68	0.63	0.59	0.59	0.55	0.51	0.48	0.45

Generic Levellised Tariff (without Subsidy) at Capital Cost of Rs 442.46 Lakh/MW = Rs. 3.82 /kWh
Indicative Generic Levellised Tariff by considering Subsidy/Incentive/Grant of Rs 10 Lakh/MW = Rs. 3.75 /kWh
Adjustment to be made per 10 Lakh of Subsidy/Incentive/Grant per MW= Rs. 0.07/kWh
Adjustment to be made per 1% change in the composite tax rate as per Para 12.11 of the Order = 0.52 paise/kWh

Appendix - IV

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	%	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	435.93
3	Project Financing	Debt Equity	Tariff Period	Year	25
			Debt	%	70
			Equity	%	30
		Debt Component	Loan Amount	Lakh Rs./MW	305.151
			Moratorium Period	Year	0
			Repayment Period	Year	15
			Interst Rate	%	9.00
		Equity Component	Equity Amount	Lakh Rs./MW	130.779
			Return of equity for first 20 Years	%	16.96
			Return of equity from 21st Years onwards	%	19.75
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	9.43
			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	%	10.50
8	Discount Factor		Discount Rate	%	8.67

Determination of Tariff for Solar PV Power Projects above 1 MW upto 5 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		9.43	9.792	10.17	10.56	10.96	11.39	11.82	12.28	12.75	13.24	13.75	14.27	14.82	15.39	15.98	16.60	17.23	17.89	18.58	19.29	20.04	20.81	21.60	22.43	23.30
Depriciation	Rs. lakh		20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36	20.36	8.70	8.70	8.70	8.70	8.70	8.70	8.70	8.70	8.70	8.70
Interest on Term Loan	Rs. lakh		26.55	24.72	22.89	21.06	19.22	17.39	15.56	13.73	11.90	10.07	8.24	6.41	4.58	2.75	0.92	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		1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.22	1.21	1.20	1.20	1.20	1.19	1.19	1.19	1.04	1.07	1.09	1.12	1.15	1.22	1.25	1.28	1.31	1.35
Return on Equity	Rs. lakh		22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	22.18	25.83	25.83	25.83	25.83	25.83
Total fixed Cost	Rs. lakh		79.79	78.32	76.85	75.40	73.97	72.55	71.15	69.76	68.40	67.05	65.72	64.41	63.13	61.86	60.62	48.52	49.18	49.86	50.58	51.32	55.78	56.58	57.41	58.27	59.17
Levellised CoG																											
Per unit CoG	Unit	**levellised**																									
O&M Expences	Rs/kWh	0.72	0.52	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	1.11	1.15	1.19	1.24	1.28
Depriciation	Rs/kWh	1.00	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Interest on Term Loan	Rs/kWh	0.74	1.46	1.36	1.26	1.16	1.06	0.96	0.86	0.76	0.66	0.56	0.45	0.35	0.25	0.15	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	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07
Return on Equity	Rs/kWh	1.24	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.42	1.42	1.42	1.42	1.42
Total CoG	Rs/kWh	3.78	4.40	4.3198	4.24	4.16	4.08	4.00	3.92	3.85	3.77	3.70	3.63	3.55	3.48	3.41	3.34	2.68	2.71	2.75	2.79	2.83	3.08	3.12	3.17	3.21	3.26
Discounted factor	%		1	0.92	0.85	0.78	0.72	0.66	0.61	0.56	0.51	0.47	0.44	0.40	0.37	0.34	0.31	0.29	0.26	0.24	0.22	0.21	0.19	0.17	0.16	0.15	0.14
Levellised Tariff	**Rs/kWh**	**3.78**	4.40	3.9752	3.59	3.24	2.93	2.64	2.38	2.15	1.94	1.75	1.58	1.42	1.28	1.16	1.04	0.77	0.72	0.67	0.62	0.58	0.58	0.54	0.51	0.47	0.44

Generic Levellised Tariff (without Subsidy) at Capital Cost of Rs 435.93 Lakh/MW = Rs. 3.78 /kWh
Indicative Generic Levellised Tariff by considering Subsidy/Incentive/Grant of Rs 10 Lakh/MW = Rs. 3.71 /kWh
Adjustment to be made per 10 Lakh of Subsidy/Incentive/Grant per MW= Rs. 0.07/kWh
Adjustment to be made per 1% change in the composite tax rate as per Para 12.11 of the Order = 0.52 paise/kWh