THE HIMACHAL PRADESH ELECTRICITY REGULATORY COMMISSION, SHIMLA

IN THE MATTER OF

Determination of generic levellised tariffs for Solar PV Projects under Regulation 17 of the Himachal Pradesh Electricity Regulatory Commission (Promotion of Generation from the Renewable Energy Sources and Terms and Conditions for Tariff Determination) Regulations, 2012.

CORAM
SUBHASH C. NEGI
CHAIRMAN

ORDER

1.0 Regulation 17 of the Himachal Pradesh Electricity Regulatory Commission (Promotion of Generation from the Renewable Energy Sources and Terms and Conditions for Tariff Determination) Regulations, 2012, notified by the Commission on 17th December, 2012 in the Rajpatra Himachal Pradesh (herein after referred to as "RE Tariff Regulations, 2012"), read with 1st amendment dated 19th February, 2015, published in the Rajpatra Himachal Pradesh, empowers the Commission to categorise the RE Projects (other than SHPs) and fix the technological specific parameters, other terms and conditions and consequently also to determine separate generic levellised tariffs for renewable energy projects, other than small hydro projects. The regulation 17 of RE Tariff Regulations, provides that :-

"17 (1)……….xxxxxxxxxxx…………

(2)Where the technological specific parameters and other terms and conditions, including the tariff period and useful life of the project, have not been specified, the Commission may, by an order, at any time and at such intervals as it considers appropriate to do so, fix the same.

……xxxxxxxxxx….

Provided further that the Commission may, by order, categorize the renewable energy projects, other than SHPs, under the respective renewable energy technologies specified in sub –regulation (1), based on the capacity of projects, the available subsidy schemes and such other factors as may be considered appropriate by it:

Provided further 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 MW for any such technology, the technological specific parameters, including capital cost, and other terms and conditions, as notified, or may be notified, by the Central Commission under the Central Electricity Regulatory Commission (Terms and Conditions for Tariff Determination for Renewable Energy Sources) Regulations, 2012, in respect of the relevant financial years of the control period ending on 31st March, 2017, for the relevant renewable energy technology, as may be considered appropriate by it."; and

Provided further that the financial norms, except for capital cost, as specified under Chapter-IV of these Regulations shall also be considered as ceiling norms.

(3) The Commission may, after having fixed the norms/ parameters and other related terms and condition as per sub-regulation (2), determine, by order generic levellised tariff(s) for any or all categories of such renewable energy technology (ies).
Provided that the Commission may, by order, fix, on annual basis, the ceiling rates and associated terms and conditions to be used by the licensee for reverse bidding for procurement of power from the projects based on such technologies.

(4) …….xxxxxxxxxx…………

(5) ………xxxxxxxxxx………..

The Commission came out, vide its proposal dated 16.06.2015, with the proposal for categorization of solar PV projects as well as for fixing the norms for technological specific parameters, other terms and conditions and determination of generic levellised tariffs for solar PV projects upto 5 MW capacity.

2.0 The Commission invited objections/suggestions from public on its aforesaid proposal, by way of insertions in two News Papers i.e. "The Tribune" and "Amar Ujala" on 18th June, 2015. The text of said proposal was made available on the Commission's website www.hperc.org.

3.0 Suggestions/Objections of stakeholders, analysis and findings of the Commission on important issues:

The Commission has received comments/suggestions on the aforesaid proposal from the following stakeholders:-

1. M/s Hindustan EPC Company Limited, 616 A (16A, 6th Floor), Devika Tower, Nehru Place, New Delhi- 110 019.
2. Himachal Pradesh Energy Development Agency (HIMURJA), SDA Complex, Kasumpti, Shimla-171009.
3. The Himachal Pradesh Power Corporation Ltd., Himfed Building, By pass Road (Panjri), Below Old MLA Quarters, Tutikandi, Shimla-171005.

The Commission now proceeds to discuss and analyse the relevant issues, arising out of the comments/suggestions received by it from the stakeholders on categorization, norms and tariff determination and firm up the views on the related issues as under:

3.1 Categorization:

The Commission in its proposal dated 16.06.2015 suggested the categorization of solar PV projects based on the capacity of such projects. No comments/suggestions have been received on the proposed categorization based on project capacities. The Commission accordingly categorizes the solar PV projects as under:-

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

3.2 Technology Specific Parameters:

The Commission, vide its proposal dated 16.06.2015, brought out the technological specific parameters relating to Capital Cost, Operation and Maintenance Expenses (O&M), Capacity Utilization Factor (CUF), other terms and conditions regarding applicability of Tariff as specified by the Central Commission under the Central Electricity Regulatory

Commission (Terms and Conditions for Tariff Determination for Renewable Energy Sources) Regulations, 2012 (hereinafter referred as "CERC RE Tariff Regulations, 2012") and expressed its intention to adopt the same with marginal changes for the solar PV projects falling under the first two categories as per para 3.1 (i.e. upto 5 MW capacity). The comments received from the stakeholders on these parameters have been analysed and findings of the Commission are as under:-

3.2.1 **Capital Cost:**

M/s Hindustan EPC Company Limited have suggested that normative capital costs should be fixed at levels higher than the proposed levels. The main issues raised by them are as under:-

(i) Even though the CERC norms may be the guiding factor but the same may not be adopted, ignoring the State specific constraints/requirements.

(ii) The Commission has ignored the State specific constraints such as higher transportation and labour cost while determining the tariff for solar PV projects. The State of Himachal Pradesh by and large has hilly areas and quite far from Major Ports of India, thus, making the transportation cost higher as majority of equipments and modules are imported from aboard. The cost of skilled labour would also be higher in the State due to scarcity of the same in the State. Due to hilly terrain, there would be additional cost in civil work to make the land area flat or have to use structures to keep the array of modules properly aligned.

(iii) The degradation should be taken as 2.5% for 1st year and 0.7% thereafter instead of what has been considered by CERC. It has been mentioned that the CERC has allowed for an additional 0.5% of the modules cost (i.e. 5 kW of module per MW), every year from 4th year to 25th year of operation even though the degradation starts from the very first year after the COD of the plant and that as a matter of fact, the degradation is highest in the initial years. It has also been stated that most of the manufacturers provide warranties with degradation of almost 2.5% in 1st year and 0.7% thereafter. It has also been mentioned that the actual degradation measured in a recent test conducted by them gave more than 5% actual degradation in first year.

(iv) The cost of the project line should also be included in the capital cost, keeping in view the fact that interconnection point in such cases would normally be at a point other than the plant site and energy losses for the flows on the project line have also been accounted for the purpose of computing net saleable energy.

The total capital cost (with imported modules) has been suggested as per the table given below:-

(figures in Rupees Crore per MW)

Sr. No.	**Head**	**CERC (2015-16)**	**Proposal of Stakeholder**
1.	Photovoltaic Modules	3.3235	3.8393
2.	Land Cost	0.25	0.80
3.	Civil and General works	0.50	0.50
4.	Mounting Structures	0.50	0.50
5.	Power Conditioning Unit	0.45	0.65
6.	Cables and Transformers	0.55	0.55
7.	Preliminary & Pre-Operating Expenses, IDC etc.	0.485	0.88
8.	Evacuation Cost upto Trans./Dist. System	-	1.15
	TOTAL	6.0585	8.8693

Commission Views:-

As acknowledged by the stakeholders also, the Commission has already proposed marginally higher capital cost as compared to the benchmarked capital cost of FY 2015-16, determined by the Central Electricity Regulatory Commission. The Commission also finds that CERC has, while determining the benchmarked capital cost for solar PV project as per its order dated 31.03.2015, already addressed/analyzed all such issues related to Capital Cost, as raised by the stakeholder. As far as, the impact of the conditions peculiar to State of Himachal Pradesh, also including the cost of project line, is concerned, the same has already been duly considered as per the position brought out in the proposal dated 16.06.2015 and the capital cost has been fixed at a level marginally higher than that fixed by the CERC in its order dated 31.03.2015. In view of above, the Commission does not find any justification for increasing normative capital cost over and above the norms proposed by it which are already higher than the normative cost fixed by the CERC. Accordingly, the Commission fixes the normative capital costs inclusive of all components as well as taxes/LADF (Local Area Development Fund), if any, etc. for solar PV projects upto 5 MW capacity for 2015-16, as under:-

Sr. No.	**Capacity of Solar PV Project at one site**	**Normative Capital Cost (Rs. Lakh Per MW)**
1	Upto 1 MW capacity	630.08
2	Above 1 MW to 5 MW capacity	620.99

The normative capital costs of solar PV projects for the financial year 2016-17 shall be fixed separately after the normative capital cost for such projects is notified, by the CERC.

3.2.2 **OPERATION AND MAINTENANCE EXPENSES:**

In pursuance to the provisions of CERC RE Tariff Regulations, 2012, the CERC has computed the normative O&M expenses for solar PV projects as Rs. 13.00 lakh per MW for the FY 2015-16. These charges are escalated @ 5.72% per annum, over the tariff period. The Commission in its proposal, expressed its intention to follow these norms for both the categories of solar PV plants upto 5 MW for the year 2015-16. No comments/suggestions have been received in the Commission on the proposed normative O&M expenses. Accordingly, the Commission fixes the normative O&M expenses for solar PV projects as Rs. 13.00 Lacs per MW for the FY 2015-16 with escalation @ 5.72% per annum over the tariff period for both the categories i.e. solar PV projects upto 5 MW capacity. The Commission shall follow this norm after providing escalation @ 5.72% while determining the generic levellised tariffs for financial year 2016-17 also.

3.2.3 **Capacity Utilization Factor (CUF):**

The CERC's RE Tariff Regulations, 2012 specify that the annual normative capacity utilization factor (CUF) of solar PV plant shall be 19%. The Commission in its proposal dated 16.06.2015, expressed its intention to adopt this norm with a slight variation that the annual net saleable energy shall be worked out by considering energy losses @ 0.7% of the generation, on normative basis, to cover the losses on the project line upto the interconnection point and annual CUF of 19%. M/s Hindustan EPC Company Limited have suggestions/objections on these norms on the following lines:-

(i) CUF of 19% as fixed by the CERC in RE Tariff Regulations, 2012 and now proposed to be adopted by HPERC, is actually based on the PAN India norm and that CERC has fixed the CUF of 19%, based on the maximum value of radiation data (5.8 $kWh/m^2/day$), considered for entire country. In support of the above, the comparison of average solar insolation data of Himachal Pradesh and Gujarat, of different sources is also referred by the stakeholder. It has been mentioned that the Global Horizontal Irradiation (GHI) data from different sources suggests a much lower CUF in State of Himachal Pradesh.

(ii) The Commission may remove the difficulty arising out of highest level of CUF of 19% by invoking Regulation 43 (Power to remove Difficulties) and Regulation 44 (Power to Relax) of RE Tariff

Regulations, 2012 and may specify CUF as 16.35% based on actual GHI data of the State and determine the tariff accordingly.

(iii) The Commission has not mentioned about Auxiliary Consumption in Solar PV Power Plants in its RE Tariff Regulations, 2012 or in the proposed Order. It has been mentioned that auxiliary consumption for solar PV projects ranges between 0.91% and 1.21% of the gross generation during different stages of useful life of the project. It has also been mentioned that the Auxiliary Consumption by Solar PV Power Plants has been duly recognised by the CERC in its Statement of Objects and Reasons to CERC (Terms and Conditions for Tariff determination form Renewable Energy Sources) Regulations, 2012. It has been suggested that in all fairness, when actual data of the Solar PV Plants is available, the Commission may go by that data and fix the Auxiliary Consumption at least @1% of gross generation by exercising powers under Regulation 43 (Power to Remove Difficulties) and Regulation 44 (Power to Relax) of RE Tariff Regulations, 2012.

(iv) The impact of generation due to degradation of solar PV panels should also be considered.

Commission Views:-

The Commission does not find any justification to deviate from the norms fixed by the CERC with regard the CUF of solar PV projects except for the energy losses on the Project Line for which provision has already been made. Similarly, since the CERC has not deducted any auxiliary consumption or any other losses while working out the tariff and the degradation effect has also already been duly considered by the CERC, the Commission does not find it appropriate to deviate from the CERC norms and methodology. Accordingly, the Commission fixes the annual normative capacity utilization factor (CUF) of solar PV plant upto 5 MW capacity as 19% for the current control period and the energy worked out on this basis shall be considered as available on normative basis, for tariff calculations on the incoming side of the project line after meeting entire consumption/losses upto said point. Energy losses @ 0.7% of the gross generation based on the normative CUF shall however be accounted for on normative basis to cover the losses on the project line upto the interconnection point.

3.2.4 Applicability of Tariffs:

The CERC determines the generic levellised tariffs for solar PV projects every year. However, such tariff for a year in case of a solar PV project remains applicable for the project during the immediately succeeding year also if the PPA is signed by the end of the year and entire capacity covered by the PPA is commissioned by the end of such succeeding year.

The relevant provisions of the CERC RE Tariff Regulations, 2012 are reproduced below:-

" (1) The Commission shall determine the generic tariff on the basis of suo-motu petition at least six months in advance at the beginning of each year of the Control period for renewable energy technologies for which norms have been specified under the Regulations.

(2) Notwithstanding anything contained in these regulations.

a) the generic tariff determined for Solar PV projects based on the capital cost and other norms applicable for any year of the control period shall also apply for such projects during the next year; and

b) ………xxxxxxxxxxxxxxxxxx…………

Provided that:-

(i) the Power Purchase Agreements in respect of the Solar PV projects and Solar thermal projects as mentioned in this clause are signed on or before last day of the year for which generic tariff is determined and

(ii) the entire capacity covered by the Power Purchase Agreements is commissioned on or before 31st March of the next year in respect of Solar PV projects and…..xxxxxxxxxxxxxxxx..".

The Commission felt that in view of the rapid technological advancement in case of solar PV technology, it may be appropriate for this Commission also to review the benchmarked capital cost every year. The Commission accordingly proposed to adopt the provisions of CERC RE Tariff Regulations, 2012 with regard to applicability in relation to solar PV projects. In the proposal/draft order dated 16.06.2015, it was envisaged that the Commission shall determine the generic levellised tariffs for solar PV projects every year for the control period under RE Tariff Regulations, 2012 and the tariff so determined in respect the current financial year shall apply for the FY 2016-17 also in cases where PPA is signed by 31.03.2016 and the entire capacity covered by the PPA is commissioned on or before 31.03.2017. The Commission however observed that since there can be situations in which the PPA for a particular capacity is signed by 31.03.2016, but the capacity covered by the PPA may not be commissioned fully or partly on or before 31.03.2017, it may be appropriate to address the matter as a part of conditionalties attached with the tariff. The Commission felt that in case, the PPA rate (tariff) is allowed beyond 31.03.2017 for delay in the Commissioning of the project, it may amount to incentivizing the inefficiencies, keeping in view the fact that the tariff of solar PV projects may witness a downward trend in next few years due to technological advancement. It was proposed that in case such a project is not commissioned by 31.03.2017, the developer shall be allowed the rate, determined for the year, preceding the year in which the commissioning of solar PV project takes place or the tariff given in the PPA, which ever is lower.

M/s Hindustan EPC Company Limited have suggested as under:-

"The Commission in the draft Order has mentioned that in case of delay in the commissioning of the project by 31.03.2017, the developer shall be allowed the rate determined for the year, preceding the year in which the commissioning of solar PV project takes place. We agree to the Commission's proposal, however, it is submitted that the Solar PV Project inherently comprise of a number of independent Units. Each individual inverter is called one unit and there could be typically 5-25 inverters, depending upon the size and capacity of project/inverters. Therefore, the part commissioning of the project (commissioning of some Units of the project), may be allowed and any penalty by way of reduced tariff due to delay in commissioning by the stipulated date may be imposed to that part of the entire capacity which has been commissioned after the stipulated date. Similar decision has been taken by the CERC wherein a large number of projects where part capacity was commissioned under one Order and other part capacity commissioned under subsequent Order. Hon'ble CERC, thus, allowed the part commissioning under different tariffs to the extent that the plant's capacity was commissioned under two different Orders. It may kindly be noted that this provision was introduced by the CERC in its Regulations, 2009, when the practical difficulties were not experienced. Thus, it will only be fair if the proposed tariff may be allowed on that part of capacity which is commissioned till 31.03.2017."

Commission Views:-

The Commission observes that the stakeholder has consented to the basic proposal and his comments are limited to the tariff in case of part commissioning of the project. The Commission agrees in principle with the proposal relating to part commissioning of the solar PV projects and decides as under:-

(i) The commission shall fix the normative capital cost(s) for the respective categories for solar PV projects for financial year 2016-17 after its determination by the CERC and upon fixing the same, shall also determine the generic levellised tariffs for the respective categories for the said financial year also, taking into account the capital cost(s) so fixed, O&M expenses and CUF as per preceding paras 3.2.2 & 3.2.3 and other norms as per RE Tariff Regulations, 2012.

(ii) In cases where PPA for sale/purchase of power from solar PV projects upto 5 MW capacity under RE Tariff Regulations, 2012, is signed by the parties on or before 31.03.2016, with the approval of the Commission, the generic levellised tariffs applicable for the relevant category of solar PV projects, based on the total capacity of the project as per this order shall be applicable for the total capacity of the project if the project is commissioned on or before 31.03.2017. However, if only a part of total capacity is commissioned by 31.03.2017, the generic levellised tariffs determined for solar PV project for the financial year in which the PPA is signed (2015-16), shall be applicable for part capacity so commissioned i.e. for the net saleable energy corresponding to the capacity, actually Commissioned in that year (2015-16) or by the closure of immediate succeeding year (2016-17).

(iii) For the net saleable energy corresponding to the balance capacity (i.e. Commissioned on or after 01.04.2017), the tariffs, as applicable in respect of the total capacity of the project for the respective year(s), preceding the year(s) in which commissioning actually takes place or the tariff for the year in which the PPA is signed, whichever is lower, shall be applicable. Necessary provisions in this regard shall be incorporated in the Model PPA for solar PV projects.

3.2.5 **Norms and tariff for category III Projects (Above 5 MW):**

The Commission has not fixed the norms for the category – III solar PV projects and it shall take appropriate steps as and when it finds expedient to do so.

4.0 Determination of Generic Levellised Tariffs:

After having categorized the solar PV projects based on the project capacities and also having fixed the technological specific parameters and associated conditions for the solar PV projects upto 5 MW, the Commission now proceeds further to determine the generic levellised tariffs for the first two categories of solar PV projects, based on the technological specific parameters fixed under para 3.2 of this order and other parameters already specified in RE Tariff Regulations, 2012. The comments/suggestions received on the related aspects and views of the Commission as well as main features of tariff determination have been outlined in the following paragraphs:-

4.1 Tariff Structure:

Regulation 11 of the RE Tariff Regulations, 2012 specifies that single part levellised tariff structure, comprising of the following normative components shall be followed, in case, where no fuel cost component is involved in power generation:-

(a) Return on equity;

(b) Interest on loan capital;

(c) Depreciation;

(d) Interest on working capital.

Accordingly, single part generic levellised tariffs have been worked out for the respective categories of solar PV projects for FY 2015-16.

4.2 Technological Specific Parameters:

The normative parameters for capital cost, O&M charges, CUF etc. and applicability of tariff as fixed under para 3.2 above have been followed.

4.3 Useful Life and Tariff Period:

Regulation 10, read with clause (a) of sub-regulation (1) of Regulation 2 of the RE Tariff Regulations, 2012, 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.

4.4 DEBT EQUITY RATIO:

The normative debt equity ratio has been considered as 70:30 in accordance with Regulation 22 of the RE Tariff Regulations, 2012.

4.5 RETURN ON EQUITY:

M/s Hindustan EPC Company Limited have suggested that pre-tax RoE may be allowed as 16% post tax or 20%/24% pre-tax for first 10 years/next 15 years. It has been mentioned that the norm provided by the Commission for return on equity in RE Tariff Regulations, 2012 as (a) Pre-tax 19% per annum for the first 10 years and (b) Pre-tax 22% per annum from the 11th year onwards, which is equivalent to post-tax return of 15.2% for first 10 years and 14.5% thereafter. It has been mentioned that CERC in its RE Tariff Regulations, 2012 allowed pre-tax return of 20% for first 10 years and 24% for 11th year onwards, which is equivalent to post-tax return of 16%. It has been submitted that in the proposed Order, the Commission has reiterated at several places to promote solar energy in the State but the RoE allowed is much lower than what is given to conventional plants in the Commission's 2011 Regulations for conventional/hydro plants. They have mentioned that on one hand to promote solar energy, the Commission is allowing higher Capital Cost than that allowed by the CERC to promote solar energy and on the other hand, it is allowing much lower return even less than that being allowed to conventional projects. It has been mentioned, as a measure of promotion, the RoE for solar technologies should be higher that what is allowed to conventional plants.

Commission Views:-

The rates for Return on Equity (RoE), as considered in the proposal/draft order are in conformity with the financial parameters already specified in the Regulation 25 of RE Tariff Regulations, 2012 and any suggestion for revision of these rates is not the subject matter of present regulatory process which relates to determination of generic levellised tariffs for the first two categories of solar PV projects for FY 2015-16. Accordingly, the Commission decides to account for the normative Return on Equity (RoE) at the rates already specified in the RE Tariff Regulations, 2012 which are as under:-

(a) 19% per annum for the first 10 years.

(b) 22% per annum from the 11th year onwards.

4.6 Interest on Loan:

As per the proviso to clause (b) of sub-regulation (2) of Regulation 23 of RE Tariff Regulations, 2012, the interest rate has been taken as 13%, based on the weighted average State Bank of India (SBI) Base Rate, prevalent during the first six months of FY 2014-15.

No comment has been received on the rates of interest proposed by the Commission. However, M/s Hindustan EPC Company Limited have stated that while allowing the debt repayment component, the Commission took annual installment payment during the mid of the year as provided in its Regulations and therefore, has taken simple average of opening and closing balance of the year even though the repayment of debt is generally done on quarterly basis with repayment at the end of each quarter. It has been suggested that for all practical purposes, the opening balance of every financial quarter should have been taken to arrive at the correct figure of loan in each quarter, which should have been averaged for all quarters for computation of interest. It has been requested that the Commission may, exercise powers under Regulations 43 (Power to remove difficulties) and 44 (Power to relax) in its RE Tariff Regulations, 2012 to decide the practical approach of computing repayment of debt by taking average loan, and interest thereon, by using quarterly opening loans for arriving at yearly average loan.

Commission Views:-

As confirmed by the stakeholders also, the computations of interest on loan as proposed by the Commission, are in line with the HPERC RE Tariff Regulations, 2012. The suggestion made by the stakeholder is not the subject matter of present regulatory process.

In view of above, the Commission fixes the interest rate as 13%, based on the weighted average State Bank of India (SBI) Base Rate, prevalent during the first six months of FY 2014-15, which has been worked out to be 10%, as shown in the table below:

Period	Interest Rate
1/04/2014 to 30.09.2014	10.00%
Average Base rate for six months of FY 2014-15	10.00%

Source: State Bank of India (www.statebankofindia.com).

As regards the computations of annual normative interest on loan, the same have been carried out in tariff, based on the average outstanding loan for the year. In this connection, it is worth mentioning that in case the interest on loan was to be compounded on quarterly basis, as suggested by the stakeholder, the annual requirement may also have to be discounted on monthly basis, keeping in view the fact that billing of net salable energy is done on monthly basis. The Commission accordingly decides to compute the interest liability, based on average outstanding loan for each year as per the methodology adopted in its proposal.

4.7 Depreciation:

(A) Regulation 24 of the RE Tariff Regulations, 2012 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 the normative capital cost (for generic tariff) or the capital cost of the project as admitted by the Commission (for project specific tariff), as the case may be;*
(b) the salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the capital cost of the asset;

(c) depreciation per annum shall be based on 'Differential Depreciation Approach'. For tariff purposes, the depreciation shall be allowed @ 5.83 % per annum till such time, the requirement for repayment of loan component of the capital cost as per Regulations 20, 22 and 23 after adjusting the amount of subsidy as per Regulation 21, 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;

The Commission has not received any comments on the proposed tariff calculations so far as these relate to depreciation rates. The Commission accordingly firms up the calculations in this regard. No adjustment has been made on account of subsidy in the tariff calculations and as such the rate of depreciation for the first 12 years has been considered as 5.83% and the rate of depreciation from the 13th 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 12 years (%)	5.83%
Rate of depreciation after first 12 years (%)	1.54%

4.8 Interest on Working Capital:

In accordance with sub-regulation (1) of the Regulation 26 of the RE Tariff Regulations, 2012, the working capital requirement of solar PV projects shall comprise of the following:-

"(a) Operation and maintenance expenses for one month;
(b) Receivables equivalent to 2 (two) months 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."

Sub regulation 4 of the said regulation 26 provides as under:-

"(4) Interest on working capital shall be the interest rate equivalent to average of SBI Base Rate (s), prevalent during the period of 6 months preceding the date of commencement of these Regulations, plus 350 basis points.

Provided that in cases where tariff is to be determined on financial year basis, in the control period, the Average Base Rate(s) of the State Bank of India (SBI), prevalent during the first six months of the previous year plus 350 basis points, shall be considered as the normative interest rate."

In view of the provisions brought out above and also the fact that the Commission has not received any comments or the tariff calculations on this aspect, the interest on working capital has been worked out, on normative basis, on the following basis:-

Details	Solar PV power plant
(i) O&M expenses (month)	1
(ii) Maintenance spares (%) of O&M expenses	15
(iii) Receivables (months)	2
Interest on working Capital @ 350 basis points above average base rate of 10% (see para relating to interest on loan)	**13.50**

4.9 SUBSIDY OR INCENTIVE OR GRANT/BUDGETARY SUPPORT BY THE CENTRAL/STATE GOVERNMENT:

The sub-regulation (1) of Regulation 21 of the RE Tariff Regulations, 2012 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 its agencies, including accelerated depreciation benefit under the Income Tax Act:

Provided that for tariff determination, 90% of the capital subsidy available to the project as per applicable scheme of the MNRE/ State Government shall be considered:

Provided further that the Commission may evolve suitable mechanisms for incorporating impact of the subsidy component for determination or adjustment of generic levellised tariffs for various categories of projects.

Provided further that the capital subsidy under the schemes of the Central or State Government or its agencies, shall, unless the circumstances otherwise warrant, be ordinarily adjusted against the principal component of the loan amount as additional reduction apart from the normal payment:

……………xxxxxxxx………………………..."

In accordance with sub-regulation (3) of Regulation 21 of RE Tariff Regulations, 2012, the amount of subsidy is to be considered for each renewable source as per the applicable policy of the MNRE/State Government.

No capital subsidy or incentive or grant /budgetary support has however been considered in the tariff determination calculations. In case a solar PV project is entitled to any incentive and/or subsidy and/or any budgetary support/grant/generation based incentive (GBI)/viability gap funding (VGF) etc., under the scheme(s) of the Central or State Government or their agencies, the same shall be adjusted by the distribution licensee, at the time of filing joint petition for approval/signing of the PPA, or at any appropriate stage based on entitlement of solar PV generator to any such subsidy/grant/ budgetary support etc. as per regulation 21 of RE tariff Regulations,2012. However the accelerated depreciation benefit has been taken into consideration in the tariff determination as per para 4.11.

4.10 **Discount Factor:**

The Commission, in its proposal dated 16.06.2015, has considered annual discount rate as 10.42% and determined the levellised tariffs on the basis of the same.

M/s Hindustan EPC Company Limited have suggested that the return on equity may be ensured by correct levellisation such that the proposed promotional treatment to solar projects is reflected in reality. Different formulae of discounted tariffs for the levellisation and discount factor have been suggested by the above stakeholder.

Commission Views:-

The discount factor has been computed as per the provisions of the RE Tariff Regulations, 2012. As far as levellisation of tariff with appropriate discount factor is concerned, the standard methodology adopted by this Commission as well as other Commissions has been followed. This is, in fact, also in line with the methodology adopted by the CERC for the purpose of computing levellised tariffs for solar PV as well as various other RE technologies. The Commission does not find any justification of adopting the methodology proposed by the above stakeholder. As such, in accordance with the sub-Regulation (4) of Regulation 11 of the RE Tariff Regulations, 2012, the discount factor equivalent to the post tax weighted average cost of capital is to be considered for the purpose of levellised tariff computations. The discount factor has been calculated on this basis by following the normative debt: equity ratio (70:30). For this purpose, the interest rate for the loan component (i.e. 70%) of Capital Cost has been considered as 13.00% (as explained in para 4.6) which has been adjusted for the corporate tax. For equity component (i.e. 30% of the capital cost), the post tax ROE has been computed as 14.72% by adjusting the normative ROE of 19% per annum for first 10 years with MAT and 22% per annum for the remaining period with corporate tax. The rates for MAT & Corporate tax have been taken as 18.50% and 30% respectively. The surcharge and education cess have also been considered @ 10% and 3% respectively. Based on above, the annual discount rate has been worked out as 10.42%.

4.11 **ACCELERATED DEPRECIATION BENEFIT:**

The sub-regulations 4 and 5 of Regulation 21 of the RE Tariff Regulations, 2012 provide as under:-

"(4)*The Commission shall determine two generic levellised tariffs or project specific levellised tariffs, as the case may be, one by considering accelerated depreciation and the other without it, and the tariff to any renewable energy generator shall be applicable as provided in succeeding sub-regulation(5):*

Provided that for ascertaining income tax benefits on account of accelerated depreciation for the purpose of tariff determination-

(a) assessment of benefit shall be based on normative capital cost or the cost admitted, as the case may be, accelerated depreciation rate, as per relevant provisions under the Income Tax Act and the Corporate Tax rate;

(b) in case of generic levellised tariff, capitalisation of renewable energy projects shall be considered during second half of the financial year and in case of project specific levellised tariff, the expected date of commencement of operation of the project shall be considered;

(c) per unit benefit shall be derived on levellised basis at the discount factor equivalent to the post tax weighted average cost of capital.

(5) It shall be assumed that the renewable energy generator shall avail the benefit of accelerated depreciation and accordingly the tariff, which accounts for the accelerated depreciation, shall be applicable unless the renewable energy generator establishes, to the satisfaction of the distribution licensee, that he has not availed or is not entitled to such a benefit."

The CERC in their calculations have compared the depreciation @ 5.28% as per straight line method with depreciation as per Income Tax rate i.e. 80% of the written down value method. Moreover, additional 20%

depreciation as extended to new assets acquired by power generation companies vide amendment in section 32, sub-section (1) clause (ii a) of the Income Tax Act, has also been considered in initial two years . The tax benefit on this account has been computed at applicable Income Tax rate @33.99 % (30% IT rate +10% surcharge +3% education cess). As the project is considered to be capitalized during the second half of the financial year as per clause (b), the depreciation for the first year has been calculated at the rate of 50% of the capital cost. Income Tax benefit has been worked out as per normal tax rate on the net depreciation benefit. The Commission in its proposal dated 16.06.2015, followed the methodology and pattern followed by the CERC in their calculations of generic levellised tariff for solar PV projects in their order dated 31.03.2015.

No comments have been received on the methodology followed by the Commission in this regard. The Commission accordingly determines the rates of per unit levellised accelerated depreciation benefit on the same line as discussed above by considering the annual discount factor of 10.42% as per para 4.10.

5.0 Other Suggestions/Comments:

5.1 Computation of Gross Generation:

M/s Hindustan EPC Company Limited have mentioned that the Commission has, while computing the Gross Generation in tariff calculations exercise (at Annexure to the draft Order), erroneously taken higher gross generation figure in every fourth year of tariff period, even though it has other wise been stated that the CUF of 19%, fixed by the CERC has been adopted. It is also been stated that whereas the gross generation reduces over the period of time due to natural degradation of modules & other equipments, the Commission has instead of taking degraded gross generation, has taken higher gross generation in every fourth year of useful life of the project in the tariff computation sheets at

Annexure to the draft Order. It has been suggested that this error may be corrected.

Commission Views:-

The annual net saleable energy has been computed based on the technological parameters fixed in para 3.2. Since the net saleable energy is a factor of time duration, the same works out to marginally higher level in every 4^{th} year of useful life in view of the fact that there are 366 days in every leap year. The calculations are other wise based on annual CUF of 19% and project line losses @ 0.7%. There is thus no error in the calculations. As regards degradation in energy, the matter has already been discussed in the earlier part of this order (para 3.2.3).

5.2 Tariff for Grid Interactive Solar PV Rooftop Generation:

Himachal Pradesh Energy Development Agency (HIMURJA) has suggested that the Commission should fix the tariff for grid interactive solar PV rooftop generators, those covered under net metering regulations, for their surplus power. In this connection, it is brought out that the Commission has already notified the regulations i.e. HPERC (Rooftop Solar PV Grid Interactive Systems, based on Net Metering) Regulations, 2015 which also specify the provisions for accounting, adjustment and payment for the surplus energy.

It is worth mentioning that the tariff being fixed under this order shall not be applicable in cases where solar PV plants are installed under the net metering scheme. In case the consumer wants to install solar PV plant at his premises under gross metering scheme, he shall have to get the connectivity to the distribution system from licensee in accordance with the RE Tariff Regulations, 2012 and other relevant provisions, which shall be at HT/EHT level.

5.3 Project Specific Tariff Determination:

Himachal Pradesh Power Corporation Limited (HPPCL) has suggested that the provision of project specific tariff determination should also be available to the solar PV project. In this connection, it is pointed out that the RE Tariff Regulations, 2012 already contain adequate provisions for project specific determination of levellised tariff. The solar PV generator shall accordingly be entitled to approach the Commission, as per the provisions of HPERC RE Tariff Regulations, 2012, for project specific tariff determination, if RE generator and distribution licensee have agreed for the same in the PPA, signed by them after approval of the Commission.

6.0 GENERIC LEVELLISED TARIFFS AND ASSOCIATED TERMS & CONDITIONS:

In light of the discussions made in the preceding paragraphs, the Commission hereby determines the generic levellised tariffs and the associated terms and conditions for Solar PV power plant in respect of FY 2015-16 which are determined as under:-

A. The generic levellised tariffs for Solar PV power plants in respect of FY 2015-16 shall be as under:

Category	**Generic Levellised Tariff in Rs. /kWh of Net Saleable Energy of solar PV plant.**	
	Without Accelerated Depreciation	With Accelerated Depreciation
Col.1	**Col. 2**	**Col. 3**
Capacity upto 1 MW (Category-I)	7.14	6.45
Capacity above 1MW and upto 5MW (Category-II)	7.05	6.37

B. These tariffs shall be subject to the RE Tariff Regulations, 2012 and the orders issued or as may be issued by the Commission thereunder from time to time.

C. These tariffs are applicable to solar photovoltaic (PV) power projects which directly convert Solar Energy into Electricity using the crystalline silicon or thin film technology or any other technology as approved by the Ministry of New and Renewable Energy and are connected to the Grid.

D. These tariffs shall be applicable for the solar PV projects where PPAs are signed on or before 31.03.2016, after approval of the Commission and the projects are commissioned on or before 31.03.2017. In case the PPA for a project has been signed on or before 31.03.2016 with the approval of the Commission but only a part of the project capacity is actually commissioned by 31.03.2017, the tariff applicable for the total project capacity as per PPA shall be applicable for the part capacity so commissioned i.e. for the net saleable energy corresponding to capacity actually commissioned on or before 31.03.2017.

E. These tariffs 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.

F. These tariffs shall not be applicable in case of the solar PV plants which are installed by the consumers within their premises (rooftop or ground mounted) under net metering scheme.

7. The detailed computations for generic levellised tariffs for categories of solar PV power projects for FY 2015-16 as well as illustrations thereof are attached as per Annexures – "A" & "B".

-Sd/-

Shimla: **(Subhash C. Negi)**
Dated: 08.09.2015 **Chairman**