

**KARNATAKA ELECTRICITY REGULATORY COMMISSION**

No.9/2, 6<sup>th</sup>& 7<sup>th</sup> Floor, Mahalaxmi Chambers,  
M.G. Road, Bangalore-560 001

<b>Present:</b>	Shri M.R.Sreenivasa Murthy	Chairman
	Shri Vishvanath Hiremath	Member
	Shri K. Srinivasa Rao	Member

**In the matter of:**

**Determination of Tariff for grid interactive solar power plants including rooftop and small solar Photo voltaic power plants**

**ORDER**

**S/03/1**

Date: **10<sup>th</sup> October 2013**

**1. Preamble:**

- 1.1 Section 86.1(e) of the Electricity Act 2003 (the Act) mandates promotion of co-generation and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid. Section 61(h) of the Act provides that, while specifying the terms and conditions of determination of tariff, the Commission shall be guided by the objective of promotion of co-generation and generation of electricity from renewable sources of energy. Section 62(1)(a) read with Section 64 of the Act provides for determination of tariff for supply of electricity by a generating company to a distribution licensee.
- 1.2 The Commission in its tariff order dated 13<sup>th</sup> July 2010 had determined tariff for grid connected solar photovoltaic, solar thermal power plants and rooftop solar photovoltaic and other small solar power plants. The tariff determined in this order was valid for projects commissioned upto 31<sup>st</sup> March 2013.

- 1.3 The Commission had issued a discussion paper dated 21<sup>st</sup> June 2013 on determination tariff for grid connected solar photovoltaic plants, solar thermal power plants and small rooftop solar systems for the next control period from 1<sup>st</sup> April 2013 to 31<sup>st</sup> March 2015. In response eleven stakeholders have furnished their suggestions/comments on the discussion paper.
- 1.4 The Commission published a notice of public hearing in the newspapers dated 21.08.2013. Further, the Commission held a public hearing in the matter on 4<sup>th</sup> September 2013 in the Court hall of the office of the Commission, Bangalore, in which five stakeholders made their submissions.
- 1.5 The List of the stakeholders who have filed their comments/suggestions and those who have made oral submissions in the public hearing is given in the Annexure to this Order.
- 1.6 After duly considering the written & oral submissions received, the Commission, in exercise of the powers conferred under Section 62(1)(a) read with Section 64 and Section 86(1)(e) and other enabling provisions of the Electricity Act 2003 hereby passes the following Order:**

**2. Scope of the present Tariff determination:**

The Tariff determined in this order is applicable to all grid connected Solar PV generators, Solar Thermal power generators and Rooftop Solar Photovoltaic generators entering into power purchase agreements (PPA) on or after 01.04.2013 and during the control period as specified in this Order. The discussion and decisions on the operational and financial parameters, for determination of tariff for the above plants is given in the following paragraphs.

**3. Determination of Tariff for Solar Photovoltaic, Solar Thermal Power projects and Rooftop solar PV plants:**

**a. Life of the plant:**

The Commission had proposed to consider the useful life of the solar PV / Solar thermal plants at 25 years for the purpose of determination of tariff.

M/s TERI, BESCOM, M/s Astonfield, M/s Welspun Energy Ltd., and M/s Atria Power Corporation Pvt. Ltd., have agreed with the assumption of the useful life of 25 years. M/s TERI has suggested that the performance of thin film modules gradually drops with age and hence a performance warranty of 90% of the rated power in the first ten years and more than 80% in the subsequent 15 years has to be assured by manufacturers / developers. M/s Atria Power Corporation Pvt. Ltd., has suggested to consider 1% of the capital cost for every four years towards overhauling expenditure of solar thermal plants.

**Commission's Decision:**

The Commission notes that as of now there are no grid connected solar PV / Solar thermal plants of MW scale in India which have completed their assumed useful life. However considering the life assured by the manufacturers / developers and the life considered by other Commissions in the country, **the Commission decides that the useful life of the plant shall be taken as 25 years.**

**b. Term and Tariff Design:**

The Commission in its discussion paper had proposed to adopt levelised tariff so as to provide constant revenue streams duly considering the time value of money. M/s National Institute for Advanced Studies has suggested adopting two part tariff. M/s Atria Power Corporation Ltd., has suggested to consider 5% year on year decline for the first five years and a constant tariff thereafter in order to reduce the financial burden of the project in the initial period. M/s Welspun Energy Ltd., have supported the proposal of levelised single part tariff. BESCOM has suggested to adopt a weighted average tariff for a span of 25 years with due consideration to review the tariff after five years.

**Commission's Decision:**

Some of the stake holders have suggested adoption of a two part tariff or front loaded tariff. It is to be noted that there is no substantial component of variable charges involved in solar power generation and hence a two part tariff may not be justified. The main objective is to build in certainty of revenue flows to the generator and to enable the investor to recover his costs. The levelised tariff duly considers the time value of money for the period of tariff determination. In order

to provide certainty of annual revenue streams to the investors, **the Commission decides to adopt levelised single part tariff for a period of 25 years.**

**c. Capacity Utilization Factor:**

The Commission had proposed to consider CUF of 19% for Solar PV generation and 23% for solar thermal generation. The CUF for small scale rooftop solar PV plants was also proposed at 19%.

M/s TERI has suggested to adopt 18% CUF, or 20% CUF with 0.5% degradation from 2<sup>nd</sup> year onwards for Solar PV Plants. Further, they have suggested adopting 20% CUF, or 23% CUF with 0.25% degradation from 2<sup>nd</sup> year onwards for Solar Thermal Plants. In case of rooftop SPV CUF of 18% is suggested.

M/s Astonfield has agreed with the Commission's proposal of 19% CUF for solar photovoltaic. M/s First Solar has suggested considering 19% CUF with deration of 0.5% after second year. Sri G.G. Hegde Kadekodi has suggested CUF of 18% for solar photovoltaic and 23% for solar thermal plants with deration of 0.25% after third year for solar thermal plants.

Gadag DCCI has agreed with Commission's proposal of 19% CUF for solar PV and 23% for solar thermal plants. M/s Atria Power Corporation Pvt. Ltd., while agreeing with the proposal of the Commission, has suggested allowing deration of 0.5% per annum. Further they have suggested increasing CUF with provision for storage. They have stated that an additional capital expense of Rs.42.00 Crores / MW on a plant with 23% CUF can have an additional CUF of 69% with 24 x 7 operational capability.

M/s Welspun Energy Ltd., have suggested adoption of CUF at 17-18%. BESCO and PCKL have agreed with the Commission's proposal of 19% CUF for Solar PV and 23% CUF for Solar thermal. M/s Moserbaer has suggested considering 19% CUF with annual degradation of 1% for solar PV.

**Commission's Decision:**

Many of the stake holders have endorsed the proposals made in the discussion paper for adoption of CUF at 19% for Solar PV and solar rooftop PV plants, and

23% for Solar thermal power plants. However, some of the stakeholders have suggested that adoption of a Capacity Degradation Factor should be considered.

The Commission has not considered the adoption of the capacity degradation factor as suggested by some of the stake holders in the absence of adequate and reliable data. Further the tariff determination is on a generic basis and the CUF has not been considered with reference to any specific technology like concentrated Solar PV with Sun tracking systems.

As per the data published on the website of MNRE, the capacity utilisation factor for solar PV plants considered by CERC and most of the SERCs in the country is 19%. In the case of solar thermal plants the CUF considered by CERC and all the other SERCs in the country is 23%.

**In the light of the above, the Commission decides to adopt a CUF of 19% for Solar PV, 19% for solar rooftop PV and 23% for solar thermal plants.**

d. **Capital Cost:**

The following were the capital cost norms proposed in the discussion paper:

Particulars	Capital cost
Solar PV Plants	Rs.9.40 Crs. to 10.00 Crs. per MW
Solar Thermal Plants	Rs.12.75 Crs. to 14.00 Crs. Per MW
Solar rooftop PV plants	0.80 lakhs to 0.90 lakhs per kW

Further, the views of the stakeholders were also sought on whether separate tariff is required to be determined for projects availing capital subsidy, accelerated depreciation etc.

M/s TERI has suggested adoption of capital cost of Rs.8 Crore per MW for solar PV Plants, Rs.12.00 Crores per MW for solar thermal plants and Rs.1 lakh per KW for solar rooftop PV plants. M/s Atria Power Corporation Ltd., has suggested considering the capital cost based on the project size. They have suggested adoption of benchmark capital cost of Rs.14.00 Crores per MW for a 10 MW solar thermal plant and a reduction of Rs.0.25 Crores for every 10 MW increase in capacity with a limit of Rs.12.50 Crores per MW. M/s Welspun Energy Ltd., have suggested Rs.11.00 Crores per MW for solar PV plants citing steep decline in the

exchange rate of the Rupee. Sri G.G.Hegde Kadekodi has suggested capital cost of Rs.12.75 Crores per MW for solar PV and Rs.14.00 Crores per MW for solar thermal plants. M/s Moserbaer has suggested a capital cost of Rs.10.00 Crores per MW for solar PV. BESCO, citing CERC orders on petition No.242/2012 has suggested a capital cost of Rs.8.00 Crores per MW for solar PV Rs.12.00 Crores per MW for solar thermal plants. M/s Astonfield have suggested adoption of capital cost of Rs.8.00 Crores per MW for solar PV plants.

M/s TERI, Astonfield, Gadag DCCI,PCKL, BESCO and M/s Welspun Energy Ltd., have suggested adoption of separate tariff for projects availing capital subsidy and accelerated depreciation.

**Commission's Decision:**

The capital cost consists of the cost of equipment along with the cost of land and civil works. The Commission, in its earlier tariff order dated 13<sup>th</sup> July 2010 had considered a capital cost of Rs.15.50 Crs. per MW for Solar PV plants and Rs.13 Crs. for Solar thermal plants.

The Commission notes that the Stakeholders have suggested capital cost ranging from Rs.8.00 Crs to Rs.12.75 Crs for Solar PV Plants and Rs.12.00 Crs to Rs.14.00 Crs for Solar thermal plants. However, it is observed that no suggestions are supported with sufficient data.

CERC in its order dated 28<sup>th</sup> February 2013 in suo-moto Petition No.242/SM/2012 has decided a benchmark capital cost of Rs.8.00 Crores per MW for solar PV and Rs.12.00 Crores per MW for solar thermal.

In the absence of any reliable data made available by the stakeholders, the Commission has decided to go by the benchmark cost determined by CERC as the same is derived after a detailed analysis of the market prices of each element of the capital cost.

The cost of the solar PV modules at Rs.325.92 lakhs per MW has been derived by CERC at an exchange rate of Rs.54.32 per US\$ considering the module cost at 0.60 US\$/Wp. The present rate of exchange is Rs.61.405 per US\$ (as on 04.10.2013) and the average exchange rate in the last six months works out to

Rs.59.33 per US\$. Considering an exchange rate of about Rs.60 per US\$ and the module cost at 0.60US\$/Wp, the cost of the module would be Rs.360 lakhs per MW. Further, considering all other costs as per the benchmarked costs by CERC, the capital cost for Solar PV plants at the present rates would be about Rs.8.30 Crores per MW.

Thus, considering the changes in rupee's exchange rate as suggested by some of the stakeholders, the Commission decides to consider a capital cost of Rs.8.30 Crores per MW for Solar PV Plants.

As regards the solar thermal plants, the Commission notes that the benchmark cost derived by CERC indicates decline in capital costs of solar thermal plants to Rs.12.00 Crores per MW. While some stakeholders have suggested adopting CERC benchmark cost, others have suggested adopting 14 Crores per MW or link capital costs with the size of the plant. However, the claims of increased capital cost are not supported by any data. As such, the Commission decides to consider a capital cost of Rs.12.00 Crs per MW for Solar thermal plants

The capital cost of rooftop solar PV plants considered by other SERCs in the Country range from Rs.1.00 lakh to Rs.1.20 lakhs per kW. The Solar Energy Corporation of India, in its proposal for introducing the pilot scheme for large scale grid connected rooftop solar power generation, has estimated the system cost at Rs.0.80 to Rs.0.90 Crores for a 100 kWp solar rooftop PV system. MNRE in its proposal of solar rooftop generation under JNNSM, has stated that the cost of rooftop PV systems could reach 85000 to 90000 per kW when a developer is able to reach a cumulative capacity of 5MW.

Considering the above available data on capital cost, the Commission decides to consider a capital cost of Rs.0.90 lakhs per kW for Solar Rooftop and small kW scale Solar PV plants.

Thus, the Capital cost considered for determination of tariff is as follows:

Type of Solar plant	Capital cost
MW scale Solar PV plant	Rs.8.30 Crores/MW
MW scale Solar Thermal plant	Rs.12.00 Crores/MW
kW scale Solar rooftop and small solar plants	Rs.0.90 lakhs/kW

Further, in cases of projects availing capital subsidy of 30% the tariff with 30% reduction in capital cost as determined in this Order will be applicable.

e. **Debt Equity Ratio (DE Ratio):**

The Commission had proposed to adopt a Debt Equity Ratio of 70:30. Based on the Tariff Policy and the Industry norm, **the Commission decides to allow 70:30 Debt Equity ratio.**

f. **Tenure of Debt:**

The Commission had proposed a tenure of ten years for repayment of loans for capital investment. Only one Stakeholder i.e., M/s Welspun Energy Ltd., has suggested considering a tenure of 15 years for repayment of debt.

**Commission's Decision:**

The Commission is of the view that, considering 10 years as the normative tenure for debt repayment will enable the investor to recover its costs in a reasonable period. Considering a longer period for debt repayment will only increase the interest burden on the investor leading to higher tariff. The Commission is aware that most RE projects obtain loans for capital investment for a tenure of ten years. Therefore, **the Commission decides to adopt loan repayment tenure of ten years.**

g. **Interest on Term Loan:**

The Commission had proposed to arrive at interest rates considering the risk factors involved in the financing of solar power generation plants of different types. Only one of the respondents, i.e., M/s Atria Power Corporation Pvt. Ltd., has suggested considering an interest rate of 14% on the term loans.

**Commission's Decision:**

The Commission notes that the base lending rate of SBI is 9.80% (with effect from 19.09.2013). However, considering the fact that many of the stakeholders will be venturing into solar power generation for the first time and also many small



investor groups are likely to invest in solar rooftop systems, Capital financing at the base lending rate may not be possible. The interest rate considered for similar plants by other Commissions ranges from 12% to 13%. Considering the risk factors involved in financing such new projects, the Commission decides to allow 250 basis points over the base lending rate. However, in case of rooftop solar PV plants, the Commission is of the view that availing loans at 250 basis points over the base lending rate may not be possible and hence higher interest rates needs to be allowed.

**Thus, the Commission decides to adopt an interest rate of 12.30% p.a on long term loans for Solar PV and Solar thermal plants. In case of solar rooftop PV plants and small solar plants, the Commission decides to adopt an interest rate of 12.50% p.a.**

**h. Operation & Maintenance expenses:**

The Commission had proposed to consider O & M costs of Rs.9 lakhs per MW for Solar PV plants and Rs.13 lakhs per MW for solar thermal plants with an annual escalation of 5%. A nominal O & M expense for rooftop solar PV is also to be considered.

M/s TERI has recommended 1.5% of capital cost with an annual escalation factor of 5.72% towards O & M cost for solar PV and solar thermal plants. M/s Astonfield and M/s First Solar have suggested considering O & M expenses of 11.63 lakhs / MW with an escalation of 5.72% for solar PV. Sri G.G. Hegde Kadekodi has suggested adopting 0.7% of capital cost for solar PV and 1.5% of capital cost for solar thermal plants with an annual escalation of 5%.

Gadag DCCI has agreed with the proposal of the Commission. M/s Welspun Energy Ltd., have suggested considering O & M expenses of Rs.12 lakhs/MW. BESCO has suggested 0.75% of capital cost with 5% escalation for Solar PV, 1% of capital cost with 5% escalation for Solar Thermal and 0.5% of capital cost for rooftop plants. PCKL has suggested 1% of capital cost with 5.72% escalation. M/s Moserbaer has suggested considering Rs. 12.30 Lakhs per MW with an escalation of 5.72 %.

**Commission's Decision:**

The proposed O&M expenses of Rs 9 lakhs per MW works out to 1.125% of the capital cost for solar PV plants and Rs.13 lakhs per MW works out to 1% of the capital cost for Solar thermal plants.

While some of the stake holders have agreed with the proposal of the Commission, others have suggested O & M expenses of 0.75% to 1.5% of the capital cost for solar PV, 1.5% of the capital cost for solar thermal plants and 0.5% for solar rooftop PV plants. As regards the rate of annual escalation, some of the stakeholders have suggested adopting 5.72% annual escalation.

It is observed that while many stakeholders have suggested the levels of O&M expenses to be allowed but have not furnished any reliable information/data for such suggestions.

The Commission notes that as suggested by stakeholders, while 1.5% of capital cost would be sufficient for solar PV and solar thermal plants, the O & M cost for rooftop PV plants should be more than 1.5% considering the lower capital cost.

Considering the levels of O&M expenses suggested by the stakeholders, **the Commission decides to adopt O & M expenses of 1.5% of the capital cost for Solar PV plants and solar thermal plants and 2.0% of the capital cost for solar rooftop PV in all cases with an annual escalation of 5.72%.**

i. **Working capital:**

The Commission in its tariff order dated 13<sup>th</sup> July 2010 had considered two month's receivables for determining working capital requirement for both solar thermal and solar PV plants and had proposed to adopt the same norm for the present determination of tariff.

M/s First Solar and M/s Welspun Energy Ltd., have suggested to consider working capital equivalent to two months receivables, one month O & M and 15% of O & M cost towards maintenance spares.

**Commission's Decision:**

Payment security mechanism in the form of Letter of Credit (LC) is available to the generator to recover his monthly claims of fixed and energy charges. In view of this, provision of working capital equivalent to two month's receivables is considered reasonable. Hence, **the Commission decides to allow two month's receivables for determining working capital requirement for solar PV plants, solar rooftop PV and solar thermal plants.**

**J. Interest on working capital:**

The Commission in its tariff order dated 13<sup>th</sup> July 2010 had considered 12.5% as the rate of interest on working capital, and had proposed to adopt the same norm in the present order.

**Commission's Decision:**

As discussed under the para pertaining to interest on loans, the existing SBI base lending rate is 9.80% w.e.f. 19.09.2013. Allowing a cushion of 250 basis points, the Commission has decided to allow an interest rate of 12.30% for long term loans for solar PV and solar thermal plants. In case of solar rooftop PV plants, the Commission has decided to allow an interest rate of 12.50%. For financing working capital requirements which is on a short term basis, a marginally higher rate of interest would be necessary. Hence, **the Commission decides to allow 13% towards interest on working capital for solar PV, solar thermal plants and solar rooftop PV plants.**

**k. Return on Equity (RoE):**

The Commission had proposed to provide a RoE of 16% and to allow actual tax as a pass through. There have been no suggestions for adopting a different RoE received from any stakeholders.

**Commission's Decision:**

The Commission **decides to allow 16% Return on Equity.** Further, the Commission decides not to consider grossing up the RoE to include the tax element as the tax liability changes from time to time and between different generating companies. **Therefore, the Commission decides to allow the actual tax paid**

**annually as a pass through without factoring in the same for tariff computations. Thus, the tax paid will be claimed by the generators directly from the procurer (Distribution Licensees).**

**l. Depreciation:**

The Commission had proposed to allow 70% of the capital cost to be financed by debt component with a tenure of debt at 10 years. Considering this, the Commission had proposed to provide adequate depreciation to meet the loan repayment.

**Commission's Decision:**

Considering 70% of the capital cost to be financed by debt with loan repayment tenure of ten years, the Commission decides to allow depreciation of 7% for the first ten years and 1.33% for the remaining fifteen years on straight-line method on the capital cost of the asset.

**m. Discount Factor:**

A discount factor is required to be adopted to compute the time value of money. Since the financing of the capital cost is based on 70% debt and 30% equity. The Commission had in the discussion paper proposed to consider the weighted average cost of capital (WACC) as the discount factor.

**Commission's Decision:**

Considering the approved rate of interest on loan @ 12.30% and Return on Equity @ 16%, with normative debt equity ratio of 70:30, the discount factor works out to 13.41% **and the Commission decides to adopt a discount factor of 13.41% for determination of levelised tariff for 25 years.**

**n. Auxiliary Consumption:**

In its tariff order dated 13<sup>th</sup> July 2010, the Commission had considered nil auxiliary consumption for solar PV plants and 8% of generation as auxiliary consumption for solar thermal plants.

M/s TERI has suggested to allow auxiliary consumption of 10% for solar thermal and 0.25% for solar PV plants. M/s First Solar has suggested considering auxiliary consumption of 0.25% for solar PV plants towards power required for air conditioning of inverters and control room, cleaning, water softening and pumping system, security and yard lighting.

**Commission's Decision:**

Considering the suggestions of the stakeholders, the Commission agrees that the solar PV plants also require auxiliary power for air conditioning of inverters and control room, cleaning, water pumping system, security and yard lighting. Hence the Commission decides to allow auxiliary consumption of 0.25% of the generation.

As regards solar thermal PV plants, the Commission decides to continue with the auxiliary consumption of 8% of the gross energy generated.

Further the Commission decides not to allow any auxiliary consumption for rooftop solar PV systems.

**o. Other issues:**

**(i) Sharing of Clean Development Mechanism (CDM) benefits-**

The Commission decides to continue with the following mechanism for sharing of the CDM benefits between the generating company and the beneficiaries:

- a) 100% of gross proceeds on account of CDM benefit are to be retained by the project developer in the first year, after the date of commercial operation of the generating station,

b) In the second year, the share of beneficiaries shall be 10%, which shall be progressively increased by 10% every year till it reaches 50%, where after, the proceeds shall be shared in equal proportion by the generating companies and the beneficiaries.

**(ii) Grid Connectivity:**

The Commission decides that, the STU shall arrange necessary facilities to evacuate power from the interconnection point. Further, STU/ESCOs shall not collect any network augmentation charges towards system augmentation beyond the interconnection point. The developer shall be responsible for providing evacuation facility upto the interconnection point.

In the case of solar rooftop PV of kilowatt scale, the evacuation from 1 kW upto 5 kW installed capacity of solar rooftop PV shall be at single phase 230 volts, the evacuation from 5 kW upto 50 kW installed capacity shall be at 3 phase 415 volts level. Further, solar rooftop PV systems with installed capacity of 50 kW and above shall be connected at 11 kV distribution system. The maximum installed capacity of solar rooftop PV plant at any single location shall be limited upto 1 MW, for the purpose of applying the solar rooftop PV tariff.

The grid connectivity shall be arranged by the distribution licensee in accordance with the prevailing CEA (Technical Standards for Connectivity to the Grid) Regulations 2007, CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2012 to be notified by CEA and KERC grid code as amended from time to time. Further, the distribution licensee shall take adequate measures to install necessary protective devices to prevent the possibility of any feedback to the grid in the event of failure of grid power supply to ensure safety of personnel working on the distribution system. Further, safety precautions as stipulated in the CEA (Measures Relating to Safety and Electricity Supply) Regulations 2010 shall be complied with.

**(iii) Metering:**

Metering shall be in compliance with the CEA (Installation and Operation of Meters) Regulations 2006 as amended from time to time.

In the case of solar rooftop PV systems connected to LT grid of a distribution company, the concept of net metering shall be adopted and the net energy pumped into the grid shall be billed.

In the event of energy generated exceeding the energy consumed during a billing period, the ESCOMs shall pay the rooftop consumer for the surplus energy injected into the grid at the tariff determined in this Order.

In the event of energy consumed by rooftop consumer exceeding the energy generated during a billing period, the rooftop consumer shall pay the ESCOM for energy consumed at the retail supply tariff applicable for that category as per the prevailing Tariff Orders of the Commission. Further, there shall be no change in billing the demand charges.

**(iv) Applicability of Merit Order dispatch:**

All grid connected solar power plants inclusive of Kw scale rooftop plants and small solar plants shall be considered as 'Must Run' and shall not be subjected to Merit Order Dispatch principles.

**(v) Applicability of Wheeling and Banking Charges and Cross Subsidy Surcharge :**

During the course of the hearing, it was submitted that as the cost of power to be generated is high, if the generators are made to pay Wheeling and Banking charges and the Cross-Subsidy Surcharge, they will not be able to sell the electricity generated in the open market as the rates to be realized in the market will not be adequate to cover the cost incurred in setting up of the Plant and its operation. Thus, the solar power generators will be able to sell power only to ESCOMs within the limited scope of solar power to be purchased to fulfil their RPO.

The Commission has considered the above submission. It is observed from the prevailing market that the power sold by the RE generators to consumers directly can fetch them only rates comparable to the retail tariff applicable to such consumers. Retail tariff applicable to consumers is generally lower than the solar tariff. If the wheeling and banking charges and the cross-subsidy surcharge is deducted from the rates realized from the third party sales, the net price realized by the generators is not adequate to make solar generation financially viable.

As noticed above, the Commission under Section 86(1)(e) of the Electricity Act, 2003 has a mandate to promote the RE generation by providing suitable measures for connectivity and sale of electricity (emphasis supplied). Therefore, as a promotional measure, considering the high cost of generation of Solar power and to enable Solar power generators to sell the electricity generated in the market, the Commission decides not to levy any Wheeling and Banking charges, or Cross-Subsidy Surcharge on the Solar generators who sell electricity on open access within the State.

**(vi) Control Period:**

In its tariff order dated 13<sup>th</sup> July 2010, the Commission had considered control period beginning from 13.07.2010 to 31.03.2013. In the present discussion paper, the Commission had proposed a control period of two years beginning from 01.04.2013 to 31.03.2015.

It is observed that though the gestation period for solar power plants is less than a year, a longer time would be required for an investor to identify and acquire land, achieve financial closure of the proposed project and enter into contract for procurement and commissioning of the plant. Further, sufficient time is also required for creation of infrastructure for evacuation of power. As such, the Commission decides to adopt a control period of five years beginning from 01.04.2013 upto 31.03.2018.



#### 4. Abstract of cost parameters approved by the Commission:

Based on the above decisions of the Commission, the following is the abstract of the parameters considered for determination of tariff:

Particulars	Approved Parameters			
	Solar PV	Solar Thermal	Solar Rooftop PV/Small Solar Plants	Solar Rooftop PV/Small Solar Plants (with 30% capital subsidy)
Capital Cost/MW- Rs. Lakhs	830	1200	0.90/kW	0.63/kW
Debt: Equity Ratio	70:30	70:30	70:30	70:30
Debt-Rs. Lakhs/MW	581	840	0.63/kW	0.441/kW
Equity- Rs. Lakhs/MW	249	360	0.27/kW	0.189/kW
Debt Repayment Tenure in Yrs.	10	10	10	10
Interest charges on Debt-%	12.30%	12.30%	12.50%	12.50%
Capacity Utilisation Factor (CUF)	19%	23%	19%	19%
ROE-%	16%	16%	16%	16%
Discount Factor -%	13.41%	13.41%	13.41%	13.41%
Auxiliary consumption-%	0.25%	8%	0.00	0.00
O & M expenses in Rs. Lakhs per MW	1.5% of CC (12.00)	1.5% of CC (18.00)	2% of CC (0.018/kW)	2% of CC (0.018/kW)
O & M Escalation p.a.	5.72%	5.72%	5.72%	5.72%
Working Capital	2 months receivables	2 months receivables	2 months receivables	2 months receivables
Interest on Working Capital-%	13.00%	13.00%	13.00%	13.00%
Depreciation for first 10 yrs	7.00%	7.00%	7.00%	7.00%
Depreciation for next 15 yrs	1.33%	1.33%	1.33%	1.33%

**5. Tariff for grid connected Solar PV, Solar Thermal power plants and Roof top Solar Photovoltaic plants:**

On the basis of the approved parameters, the following is the approved tariff:

Type of Solar Plant	Approved Tariff in Rs/Unit
Solar PV Power Plants	8.40
Solar Thermal Power Plants	10.92
Rooftop and Small Solar PV Plants	9.56
Rooftop and Small Solar PV Plants with 30% capital subsidy	7.20

The above approved tariff is applicable to solar power generators entering into power purchase agreements (PPA) on or after 01.04.2013 and upto 31.03.2018 other than those where the tariff is discovered through bidding process.

This order is signed and issued by Karnataka Electricity Regulatory Commission on this 10<sup>th</sup> day of October 2013.

  
M.R. Sreenivasa Murthy  
Chairman

  
Vishvanath Hiremath  
Member

  
K. Srinivasa Rao  
Member

**Annexure to Tariff Order on Solar Power Generation FY14-18****LIST OF MEMBERS WHO HAVE FURNISHED WRITTEN COMMENTS / SUGGESTIONS**

<b>SL.NO.</b>	<b>NAME &amp; ADDRESS OF THE STAKEHOLDERS</b>
1	Sri P.R.Dasgupta, IAS (Retd.) Distinguished Fellow & Director Southern Regional Centre The Energy and Resource Institute Darbari Seth Block, IHC Complex Lodhi Road NEW DELHI – 110 003.
2	Astonfield 29, Free Press House 215, Free Press Journal Marg Nariman Point MUMBAI -400 021
3	First Solar Power India (P) Ltd., 902, Eros Corporate Towers, Nehru Place NEW DELHI – 110 019.
4	Sri D.P.Sen Gupta National Institute of Advanced Studies Indian Institute of Science Campus BAGNALORE – 560 012.
5	Sri G.G.Hegde Kadekodi President Balakedarara HitarakshakSangha C.P.Bazar SIRSI – 581 401.
6	The Honorary Secretary Gadag District Chamber of Commerce & Industry A.P.M.C. Road GADAG – 581 101.
7	Atria Power Corporation Pvt. Ltd., No.1, Palace Rod BANGALORE – 560 001.
8	The Manager Welspun Energy Ltd., PTI Building, 3 <sup>rd</sup> Floor 4, Parliament Street, Connaught Place NEW DELHI – 110 001.
9	Sri Dinesh J Kagathi All Green Energy India Pvt. Ltd., 15, Theme House, Krishnanagar Industrial Area Off Hosur Main Road BANGALORE – 560 029.
10	The General Manager Bangalore Electricity Supply Company Ltd., Corporate office, K.R.Circle BANGALORE – 560 001.
11	Moser Baer Engineering & Constructions Ltd., 235, Okhla Industrial Estate Phase-III, NEW DELHI – 110 020.
12	The Managing Director Power Company of Karnataka Ltd., Room No.501, 5 <sup>th</sup> Floor, KPTCL Building Kaveri Bhavan BANGALORE – 560 009.

**LIST OF MEMBERS WHO HAVE PARTICIPATED IN THE PUBLIC HEARING HELD ON 4<sup>TH</sup>  
SEPTEMBER 2013**

<b>SL.NO.</b>	<b>NAME &amp; ADDRESS OF THE STAKEHOLDERS</b>
1	Balakishore, Astonfield Renewables
2	R.Shan Raj, Suntrack Solutions
3	D.P.Sengupta, NIAS
4	Prakash Magal
5	Ananth Rao,Welspun