

KARNATAKA ELECTRICITY REGULATORY COMMISSION

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

Present: Sri. M.R.Sreenivasa Murthy Chairman
Sri Vishvanath Hiremath Member
Sri K. Srinivasa Rao Member

In the matter of:

Determination of tariff for grid connected Solar PV, Solar Thermal power plants (other than demonstration projects) and Rooftop Solar Photovoltaic and other small solar power Plants connected to Distribution network at voltage levels below 33KV.

ORDER

No.S/03/1/

Dated: 13.07.2010

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) of the Act provides for determination of tariff for supply of electricity by a generating company to a distribution licensee.

- 1.2 Clauses 5.12.1 & 5.12.2 of the National Electricity Policy issued by the Ministry of Power, Government of India on 12th February 2005 envisage promotion of generation of electricity from non-conventional energy sources, biomass and cogeneration.
- 1.3 Clause 6.4 of the Tariff policy issued by the Ministry of Power, Government of India on 6th January 2006 also emphasizes the need to give preferential tariff for renewable sources of energy.
- 1.4 The Ministry of New and Renewable Energy, Govt of India, vide Resolution dated 11th January 2010, has launched the "Jawaharlal Nehru National Solar Mission" with the objective of ramping up capacity of grid connected solar power generation to 1000MW within 3 years i.e., by 2013. This mission also envisages creation of additional 3000MW capacity by 2017 through mandatory use of renewable purchase obligation by utilities backed with a preferential tariff, and 20,000 MW installed capacity of solar power by the end of the 13th Five-year plan in 2022.
- 1.5 Further, the MNRE GoI has issued guidelines for "Rooftop PV and Small Solar Power Generation Programme (RPSSGP)" on 16.06.2010.
It is proposed to develop solar capacity of 100 MW under these guidelines. This capacity addition is envisaged under the following categories:

Sl. No.	Project Category	Capacity Limit
1.	Projects Connected at HT Level of Distribution Network with installed capacity of 100Kw and upto 2 MW	90 MW
2.	Projects Connected at LT Level of Distribution Network with installed capacity lower than 100Kw	10 MW

The projects under this programme should be designed for completion before March 31, 2013.

- 1.6 The Government of Karnataka, in its Renewable energy policy dated 19.01.2010 and corrigendum dated 06.05.2010, has envisaged a capacity addition of 126 MW of solar power in the next five years. The Policy also envisages installation of rooftop solar panels of 5KWp to 100KWp capacity to be connected at 11kv and LT distribution system. The GoK, vide its Order dated 10.05.2010, has also designated KREDL as competent authority to issue certificate required for registering the projects with IREDA and to review and report on the progress of these projects to the Central Government.
- 1.7 M/s Solitaire Powertech Pvt Ltd, has filed a petition before the Commission on 13.04.2010 for determination of tariff for their proposed 50MW Solar Photovoltaic power plant in Chickaballapur District. Similarly, KPCL has filed two petitions on 19.04.2010 for determination of tariff for its already commissioned Solar Photovoltaic power plants of 3MWp (Megawatt Peak) capacity each at Yelesandra village in Kolar District and Itnal village in Belgaum District. Further, BESCOM , in its letter dated 02.06.2010, has requested for determination of tariff in respect of Solar PV and Solar thermal projects in Karnataka State
- 1.8 In the above background, the Commission circulated a discussion paper on determination of tariff for grid connected solar power plants on 27.05.2010 and invited comments/suggestions. The Commission had also issued a press note on 09.06.2010 in this regard. The last date for receipt of comments/ views/suggestions was 30.06.2010.
- 1.9 In response to the discussion paper, the Commission has received 27 responses. A list of the persons who have responded to the discussion paper is enclosed vide Annex-1 of this Order.
- 1.10 The Commission decided to hold a public hearing in the matter on 12.07.2010 at the Commission's Court hall. Accordingly notice for public hearing was issued on

09.07.2010 to elicit the views of the stakeholders/ general public. The Notices was published in the following newspapers:

- a. Times of India dated 10.07.2010.
- b. Deccan Herald dated 10.07.2010.
- c. Kannada Prabha dated 10.07.2010.
- d. Praja Vani dated 10.07.2010.

1.11 In response to the above public hearing, 7 persons representing developers, ESCOMs, STU and KPCL besides consumers and consumer representatives participated in the proceedings and made their oral submissions before the Commission. The list of persons who attended the public hearing and those who made oral submissions before the Commission are enclosed as **Annex-2**.

1.12 **After duly considering the written & oral submissions placed, the Commission, In exercise of the powers conferred under section 86.1(e), section 61(h) and section 62.1(a) of the Electricity Act 2003 hereby passes the following Order:**

2. Scope of the present Tariff determination:

- a) The Tariff determined in this order is applicable to all grid connected Solar PV, Solar Thermal power plants (other than demonstration projects) and Roof top Solar Photovoltaic and other small solar power Plants connected to Distribution network at voltage levels below 33KV which are entering into power purchase agreements (PPA) on or after the date of this Order with the distribution licensees of the State before 31.03.2013.
- b) This Order shall also be applicable to the solar power plants already commissioned by KPCL at Yelesandra in Kolar District and Itnal in Belgaum District

3. Determination of Tariff for Solar Photovoltaic, Solar Thermal Power projects and Rooftop solar PV & other small solar power plants connected to Distribution network at voltage levels below 33KV:

The following are the discussions and decisions on the operational and financial parameters, for determination of tariff:

a. **Life of the plant:**

As proposed in the Discussion Paper:

The Commission had proposed to consider the life of the plant as 25years.

Comments/Suggestions from Stakeholders:

KPCL, Solitaire Powertech Pvt Ltd, BESCOM, GMR Group, HESCOM and majority of the stakeholders have suggested that the life of the plant be considered as 25 years. M/s Consumer Care Society, Bangalore, have stated that, International Energy Agency predicts that by 2012, the Solar PV could attain competitive parity with grid power. In such a situation, there could be marked reduction in kwh costs and as such, the life of the plant be taken as 10 years.

Commission's Decision:

KPCL in their petition-dated 16.04.2010 and M/s Solitaire Powertech Pvt Ltd in its petition-dated 09.04.2010 have considered the useful life as 25 years. There is no valid basis for reducing the period to ten years as that would lead to inflating the tariff for the consumers. **The Commission, therefore decides that the life of the plant shall be taken as 25 years.**

b. **Term & Tariff Design:**

As proposed in the Discussion Paper:

Since there is no significant variable cost and solar plants are capital intensive, the Commission had proposed to adopt a single part levelised tariff for a period of 25 years for all grid connected solar power plants.

Comments/Suggestions from Stakeholders:

KPCL and Solitaire Powertech Pvt Ltd have proposed to adopt a levelised tariff for a period of 25 years. GMR Group has suggested that, since it involves technology risk and being at nascent stage, pioneering projects should be incentivised with preferential tariff for the entire useful life of the plant i.e., 25 Years. Sri. G.S.Rajamani, Former Member, CERC has stated that, Single part tariff has to be considered as intermediate introductory step which should be reasonable to both producers and consumer. Sri B.G.Rudrappa, Former Chairman, KEB and Member Advisory Committee, KERC, has stated that, Single part tariff is justified as these solar plants deliver only energy and not power. M/s Millenium Synergy Ltd, Bangalore has suggested that, since there is considerable difference in cost of energy and project cost, there has to be two part tariff. Gadag District Chamber of Commerce and Industry, Gadag have suggested that, tenure should not exceed 10 years. Most of the other stakeholders are generally of the view to adopt Single part Levelised tariff for a period of 25 years.

During the public hearing held on 12.07.2010, Sri Sridhar Prabhu, suggested that tariff should be determined on a case to case basis as there is large variation in capital costs. Sri B. Ganesh, Moser Baer, suggested that the term of tariff shall be 25 years.

Commission's Decision:

The purpose of the tenure of tariff is to build in certainty of revenue flows to the generator and to enable the investor to recover his costs. As regards the type of tariff, the levelised tariff considers time value of money for the period of tariff determination. Considering the views of the majority of the stakeholders and in order to provide certainty of revenue to the investors, **the Commission decides to adopt levelised single part tariff for a period of 25 years.**

c. Capital Cost:**As proposed in the Discussion Paper:**

Since solar power projects in India are at a nascent stage and definite data on the capital cost is still not available, based on the available data, the Commission had proposed to consider the capital cost at Rs 1300 Lakhs per MW for both Solar PV plants and Solar thermal plants.

Comments/Suggestions from Stakeholders:

G.S.Rajamani, Ex. Member, CERC has stated that, Considering Rs 13 Crs per MW seems to be out of step. Further, some differential has to be made between Solar PV and Solar Thermal in view of technological and cost differences. Sri B.G.Rudrappa, Former Chairman, KEB and Member Advisory Committee, KERC, has stated that, the cost per MW of Solar PV plant near Kolar is far higher than that in other locations and for the present the assumption of Rs. 13 Crs per MW is reasonable.

GMR Group has suggested that, to kick-start the solar energy revolution in India, it is critical that the first few "showcase" projects are set up for success, both commercially and technologically. Therefore, it is advisable not to be unduly aggressive with the capital cost norms. While there may be technologies at development stage which may deliver significantly lower capital costs, it is important that we focus on established technologies which have already been commercially deployed for the first few "showcase" projects, Therefore, it is proposed that the capital cost norm should not be less than Rs 15 Crs per MW in case of Solar PV and not less than Rs. 13.5 Crs per MW in case of Solar Thermal.

G.G. Hegde Kadekodi, Sirsi, has suggested that, considering the cost of solar panels, mounting cost and cost of power conditioning unit, the final capital

cost for both Solar PV and Solar Thermal plants can be fixed at Rs. 12 Crs per MW.

M/s Consumer Care Society, Bangalore, have stated that, there seems to be no rationale to have same capital costs for both Solar PV and Solar Thermal. It is suggested that, capital cost for Solar PV should be Rs. 17 Crs and for Solar thermal it should be Rs. 15 Crs.

Mohan Murali, Sun Technics Energy Systems Pvt Ltd, Bangalore, has stated that, for Solar PV plants, the capital cost should not be less than Rs. 16.90 Crs per MW as per CERC.

Welspun Renewable Energy Ltd, Mumbai, have opined that, the capital cost is always linked to the technology adopted and hence it is suggested that a capital cost of Rs 16 Crs per MW be considered.

M/s Prayas, Pune, has opined that, as yet in India, sufficient data to precisely determine appropriate capital costs is not available. The Commission should consider competitive bidding as per Tariff policy. The capital cost considered by various commissions varies from Rs. 13 Crs to Rs. 16.90 Crs per MW.

Astonfield, Mumbai, have suggested to adopt Rs.16.90Crs per MW for Solar PV and Rs.15.30 Crs per MW for Solar Thermal plants. Ranga & Co, Bangalore and AES Solar Energy Pvt Ltd, Gurgaon, have suggested to consider Rs 15 Crs per MW.

During the public hearing held on 12.07.2010, KPCL suggested to consider actual project cost of 62.05 Crs for each of its already commissioned 3 MW units at Kolar and Belgaum. Further, KPCL submitted that in future, capital cost of Rs. 13 Crs per MW would be acceptable. Sri B. Ganesh, Moser Baer opined that for the present, a capital cost of Rs. 16.90 Crs per MW may be considered and the same would come down over a period of time. Sri R.V. Girish, Meredian Green Energy, suggested to consider a capital cost of Rs. 18 Crs. Per MW for concentrated solar PV with sun tracking system. Prof. Kishore N. Koka , PEC, suggested that capital cost should be at Rs. 19 Crs. Per MW.

Commission's Decision:

The Commission notes that most of the stakeholders are not in favor of adopting Rs 13 Crs per MW as capital cost for Solar PV and Solar thermal power plants. The Stakeholders suggest that since technology is different, there should be different capital costs for Solar PV and Solar Thermal.

As regards the suggestion to introduce competitive bidding for solar power plants, the Commission is of the view, that, the solar power generation is in the nascent stage and developers are yet to establish themselves. In this situation it is felt that the time is not yet ripe for competitive bidding. However, the utilities are at liberty to invite bids and if the tariff is determined through bid route, the Commission will adopt the same as per law.

The Commission also notes that, the Capital cost incurred by KPCL for Solar PV plants ranges from Rs. 20.68 Crs per MW to Rs. 13.97 Crs per MW. KPCL's Raichur plant is at Rs.13.97 Crs per MW. During the public hearing, KPCL agreed that, the capital cost of Rs. 13 Crs per MW could be considered for all their future projects. Most of the stakeholders have suggested to adopt a capital cost in the range of Rs.15 Crs to 17 Crs per MW for SPV and Rs. 13 Crs to 17 Crs for Solar thermal plants.

For the present, the Commission considers a capital cost of Rs 15.50 Crs per MW for Solar PV plants and Rs 13 Crs for Solar thermal plants as reasonable and hence decides to adopt the same.

d. Debt Equity Ratio (DE Ratio):

The Commission had proposed to adopt a Debt Equity Ratio of 70:30. During the public hearing held on 12.07.2010, KPCL requested to consider Debt Equity ratio of 80:20 so as to enable the State owned Company to invest its equity in other projects.

The Commission clarified that the developers are at liberty to invest more than 30% by way of equity. However, the return on equity will be limited to 30% equity only as per norms.

Based on the Tariff Policy and the Industry norm, **the Commission decides to allow 70:30 Debt Equity ratio.**

e. **Capacity Utilization Factor:**

As proposed in the Discussion Paper:

The Commission had proposed to consider CUF of 19% for Solar PV generation and 23% for solar thermal generation considering the fact that, annual average normal radiation falls in the national average values.

Comments/Suggestions from Stakeholders:

KPCL & Solitaire Powertech Pvt Ltd, in their petitions have suggested to consider a CUF of 19%. B.G.Rudrappa, Former Chairman KEB & Member Advisory Committee, KERC has stated that, CUF depends on availability & intensity of sunlight as well as reliability of the plant inclusive of allied equipments. Therefore it is desirable to stipulate availability factor rather than the simplistic CUF.

M/s GMR Group have suggested that, CUF for Solar PV should not exceed 19% while the same for Solar Thermal should not exceed 23%. The CUF should be location based duly considering 'Direct Normal Irradiation' at selected locations in the State to arrive at the exact CUF that may be targeted. Provisions for use of different CUF at different locations should be made available to developers. Further, a capacity degradation factor of 0.6% for first 10 yrs and 0.75% for balance period of the useful life has to be allowed as the industry is still untested.

M/s Millenium Synergy Pvt Ltd, Bangalore, have suggested that, the Solar insolation in Karnataka ranges from 5.2 to 5.3 kwh/m²/day. CERC has arrived at a CUF of 19% considering solar insolation at Rajasthan & Gujarat. As such 16% CUF is a realistic value in Karnataka. Most of the other stakeholders have

generally agreed for adopting a CUF of 19% for Solar PV and 23% for Solar Thermal.

During the public hearing held on 12.07.2010, Sri R.V. Girish, Meridian Green Energy requested to consider efficiency of 22% to 24% for concentrated Solar PV with Sun tracking system with 1.8% being used for auxiliary purposes.

Commission's Decision:

The stakeholders have generally endorsed to the proposals made in the discussion paper i.e., CUF of 19% for Solar PV & 23% for Solar thermal power plants. Some of the stakeholders have suggested that Capacity Degradation Factor should be considered. One of the stakeholders proposed a CUF of 22% for concentrated Solar PV with Sun tracking system with 1.8% being used for auxiliary uses.

The Commission is of the view that, since the technology is yet to be used widely and adequate data is not available, provisions for degradation could be considered when adequate and reliable data is available. Also, since the tariff determination is on a generic basis, CUF based on specific technology like concentrated Solar PV with Sun tracking system is not considered.

Hence, the Commission decides to adopt a CUF of 19% for Solar PV and 23% for solar thermal plants.

f. Tenure of Debt:

As proposed in the Discussion Paper:

The Commission had proposed a normative loan repayment period of ten years.

Comments/Suggestions from Stakeholders:

While most of the stakeholders agreed with the proposal of the Commission to consider normative period of debt of 10 years, others are of the view that 15 to 20 years could be a better option. Millenium Synergy Pvt Ltd, Bangalore, have

suggested that, the tenure should be at 15 years to enable investors to realize some revenue for upkeep and maintenance of the plant.

During the public hearing held on 12.07.2010, Sri B. Ganesh, Moser Baer and Prof. Kishore N. Koka, suggested that the term of loan should be for 15 years.

Commission's Decision:

The Commission is of the view that, long term debts are generally repaid within a period of ten years. This would also provide early relief to the developers to recover their costs. Hence having a long tenure of 15 to 20 years for debt repayment is not advisable. As such, **the Commission decides to adopt loan repayment tenure of ten years.**

g. **Interest on Term Loan:**

As proposed in the Discussion Paper:

The Commission had proposed to consider the interest rate of 11.75% on term-loans following the existing SBI PLR.

Comments/Suggestions from Stakeholders:

KPCL has indicated a rate of 8.5%p.a in its petition. Solitaire Powetech Pvt Ltd has sought an interest rate of 13.39% p.a. Majority of the stakeholders have agreed to the proposal of the Commission to consider the interest rate of 11.75% on term-loans following the existing SBI PLR.

During the public hearing held on 12.07.2010, Sri B. Ganesh, Moser Baer, suggested to consider 12.5% interest on loan. Prof. Kishore N. Koka, suggested to consider 5% interest in accordance with international rates.

Commission's Decision:

The Commission notes that according to the recent guidelines by RBI, the Base Lending Rate (BLR) has replaced the existing Prime Lending Rate (PLR). The new base lending rate of SBI is 7.50% while the same in other banks is ranging between 7.00% to 8.75%. However, considering the fact that many of the

stakeholders are venturing into solar power generation for the first time in India and also many small investor groups are likely to invest, Capital financing at the base lending rate may not be possible. To address risk factors involved in financing these projects a higher rate of interest above BLR has to be allowed. Further, the Commission has noted the hardening tendency of the interest rates in the recent past. **Therefore, the Commission decides to adopt an interest rate of 12% p.a on term loans.**

h. **Operation & Maintenance expenses:**

As proposed in the Discussion Paper:

The Commission had proposed to consider 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%.

Comments/Suggestions from Stakeholders:

KPCL and M/s Solitaire Powertech Pvt Ltd have sought to allow Rs 9.00 lakhs per MW and Rs 9.5 lakhs per MW respectively with 5.72% annual escalation for Solar PV plants. Welspun Renewable Energy Ltd, Mumbai, have suggested considering Rs. 9.51Lakhs/MW for Solar PV and Rs. 13.74 Lakhs/MW for Solar Thermal. Acciona Energy India Pvt Ltd, Bangalore, has suggested to consider Rs. 12 Lakhs/MW for Solar PV and Rs. 23 Lakhs/MW for Solar Thermal with annual escalation of 5.72%. AES Solar Energy Pvt Ltd, Gurgaon, have suggested to consider Rs 15 lakhs per MW. Majority of the other Stakeholders have agreed with the proposal of the Commission.

During the public hearing held on 12.07.2010, KPCL suggested to consider O&M escalation rates at 5.72% per annum instead of proposed 5%. Sri M.G Prabhakar suggested to reduce O&M expenditure to Rs. 5 lakhs per MW from the proposed Rs. 9 lakhs per MW. Sri R.V. Girish, Meridian Green Energy requested to allow 1% of capital cost towards insurance charges.

Commission's Decision:

The O&M expenses include Employee cost, Repairs & Maintenance and Administration & General Expenses. The proposed O&M expenses of Rs 9 lakhs per MW works out to 0.6% 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 which are reasonable. As regards the rate of annual escalation, the Commission notes that 5% escalation rate is adequate to take care of the inflation. Hence, **the Commission decides to adopt 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%.**

i. Working capital:**As proposed in the Discussion Paper:**

The Commission had proposed two month's receivables for determining working capital requirement for both solar thermal and solar PV plants.

Comments/Suggestions from Stakeholders:

KPCL has suggested to consider one month's O&M, 15 % of capital cost for spares and two months receivables while M/s Solitaire Powertech Pvt Ltd, GMR Group, Astonfield, Mumbai and Hyderabad Karnataka Chamber of Commerce & Industry, Gulbarga have sought to allow one month's O&M, 15 % of O&M for spares and two month's receivables towards working capital. Majority of the other stakeholders have agreed with the Commission's proposal of considering two month's receivables as working capital.

During the public hearing held on 12.07.2010, Sri B. Ganesh, Moser Baer, suggested that, Working capital should be equivalent of two month's receivables plus one month's O&M expenses.

Commission's Decision:

Majority of the stakeholders are in agreement with the Commission's proposal to allow two month's receivables as working capital. Further, a payment security mechanism is available to the developer in the form of Letter of Credit (LC). In view of this, provision of working capital equivalent to two month's receivables is reasonable. Accordingly, **the Commission decides to allow two month's receivables for determining working capital requirement for both solar thermal and solar PV plants.**

J. Interest on working capital:**As proposed in the Discussion Paper:**

The Commission had proposed to consider SBI PLR of 11.75% plus 1.5% i.e., 13.25% for determining interest on working capital for both solar thermal and solar PV plants.

Comments/Suggestions from Stakeholders:

KPCL has considered 10.25% as interest on working capital in its petition. Solitaire Powertech Pvt Ltd, has suggested to consider 12.89% plus 100 basis points towards interest on working capital. M/s GMR Group and M/s Hyderabad Karnataka Chamber of Commerce & Industry, Gulbarga, have proposed SBI PLR plus 150 basis points. KREDL and CESC have suggested 13.25%. Mohana Murali, has suggested 11.5% to 12.5%.

Commission's Decision:

As discussed under the para pertaining to interest on loans, the existing SBI PLR has been replaced by base lending rates. The Commission has allowed an interest rate of 12% for term loans. For financing working capital requirements, a

marginally higher rate of interest would be necessary. Hence, **the Commission decides to allow 12.50% towards interest on working capital.**

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

As proposed in the Discussion Paper:

The Commission had proposed to provide a RoE of 16% and to allow actual tax as a pass through as tax rates keep on varying.

Comments/Suggestions from Stakeholders:

KPCL and Solitaire Powertech Pvt Ltd, have suggested to consider 19% pre-tax for first ten years and 24% pre-tax for the remaining fifteen years as RoE. GMR Group has stated that, the developers are entering into a business which is totally new in India. There is technology risk as well as financial risks. As such they should be allowed a RoE as per CERC norms. Reliance Industries Ltd, Solar Energy Group, have suggested that, Pre tax RoE is to be considered to give more transparency. Welspun Renewable Energy Ltd, Mumbai, have agreed to the Commission's proposal as this will relieve the developers from risks related to change in income tax laws. Other stakeholders have generally agreed to the Commission's proposal.

During the public hearing held on 12.07.2010, KPCL requested to consider RoE of 19% for first ten years and 24% for the balance fifteen years. Sri B. Ganesh, Moser Baer, suggested that an RoE of 20% has to be allowed.

Commission's Decision:

The Commission, having taken note of the stakeholder's views, **decides to allow 16% Return on Equity.** Further, the Commission decides not to consider tax element while allowing RoE as the tax rates keep on changing from time to time and developers need to be allowed to pass on the actual tax component. **Therefore, the Commission decides to allow the actual tax paid annually as a pass through without factoring in the same for tariff computations and to be claimed directly from the procurer (Distribution Licensees).**

l. Depreciation:**As proposed in the Discussion Paper:**

The Commission had proposed to provide 7% depreciation per annum on straight-line method on the capital cost of the asset.

Comments/Suggestions from Stakeholders:

KPCL & Solitaire Powertech Pvt Ltd have suggested considering 7% for first 10 years and 1.33% for the balance 15 years. Most of the stakeholders suggest adopting 7% depreciation for the first ten years.

Commission's Decision:

Considering 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:

M/s Prayas, Pune, have suggested that, a discount rate of 10.19% as specified in CERC's competitive bidding guidelines is to be used.

The Commission notes that, CERC has adopted weighted average cost of capital for deriving the discount factor. Considering the approved rate of interest on loan and Return on Equity with normative debt equity ratio of 70:30, the discount factor works out to 13.20%. **As such the Commission decides to adopt a discount factor of 13.20% for determination of Levelised tariff for 25 years.**

n. Auxiliary Consumption:**As proposed in the Discussion Paper:**

The Commission had proposed to consider nil auxiliary consumption for solar PV plants and 10% of generation as auxiliary consumption for solar thermal plants.

Comments/Suggestions from Stakeholders:

KPCL & Solitaire Powertech Pvt Ltd have not considered any auxiliary consumption for their Solar PV plants. Acciona Energy India Pvt Ltd, Bangalore, has suggested to consider 0.25% for Solar PV, 0.7% for PV using tracking system and 10% for Solar thermal plants should be allowed towards auxiliary consumption. Welspun Renewable Energy Ltd, Mumbai, has stated that, GERC order provides for startup or standby power at tariff applicable to HTP Consumer category and should not be adjusted to kwh basis with energy account and the same practice needs to be adopted.

Commission's Decision:

The Commission notes that solar PV generation does not require auxiliary consumption while the same is required for solar thermal generation. Further, the Commission notes that the conventional thermal power plants involves coal and ash handling necessitating a higher rate of auxiliary consumption which is 9%. **As such, the Commission decides not to allow any auxiliary consumption for solar PV plants and to allow 8% of the gross energy generated as auxiliary consumption for solar thermal power plants.** Further, any expenses towards electricity consumption in solar PV station shall be met out of O&M expenses.

4. Roof top Solar Photovoltaic and other small solar power Plants connected to Distribution network at voltage levels of below 33KV:**As proposed in the Discussion Paper:**

The Commission had proposed to extend the tariff to be determined in this proposed order to all the LT/11kv grid connected Rooftop Solar plants. The Distribution utilities shall be entitled to claim the generation based incentive as detailed above from MNRE.

Comments/Suggestions from Stakeholders:

Reliance Industries Ltd, Solar Energy Group, Bangalore has stated that, the cost of roof top SPV is more than MW SPV plants because of economies of scale and hence this needs to be considered while determining tariff for small roof top units.

Commission's Decision:

The Commission notes that no reliable data on the cost parameters for roof top solar PV and other small solar power generation is available. **As such, for the present, the Commission decides to extend the tariff as determined in this Order to all Rooftop Solar PV and other small solar power plants connected to Distribution network at voltage levels of below 33KV.** The Distribution utilities shall be entitled to claim the generation based incentive (GBI) as applicable under the guidelines for 'Rooftop PV and small solar power generation programme (RPSSGP)' issued by MNRE on 16.06.2010.

5. Other issues:**(i) Sharing of Clean Development Mechanism (CDM) benefits-****As proposed by the Commission:**

The Commission had proposed to adopt sharing of CDM benefits as per CERC Regulations dated 16.09.2009.

Comments from Stakeholders:

BESCOM has suggested that, Sharing of benefits of CDM shall be 100% to generator in the first year, 20% to the beneficiaries in the second year and progressively every year at 20% till it reaches 80%. Thereafter, the share shall be in the ratio of 20:80 between the generator and the beneficiaries. Welspun Renewable Energy Ltd, Mumbai has stated that, all costs are borne by the developer in registering the project under CDM and transaction of Certified Emission Reduction (CERs) shall be shared in proportion of sharing applicable in each year. CDM benefit sharing should be on the basis of actual revenues realized and not prior to realization or adjustment in monthly bills. Acciona

Energy India Pvt Ltd, Bangalore, have opined that, no CDM benefit sharing should be allowed.

During the public hearing held on 12.07.2010, Prof Kishore N. Koka, PEC, suggested that, in order to enable bridge financing, 100% CDM benefits should be allowed to be retained by the developers.

Commission's Decision:

The Commission decides to adopt the following mechanism for sharing of 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) Wheeling charges:

As proposed by the Commission:

The Commission had proposed not to charge any transmission or wheeling charges on solar energy for transactions within the State.

Comments from Stakeholders:

CESC, Mysore, have suggested that, in case of third party sales wheeling shall be allowed with wheeling charges in vogue and Banking shall not be extended. Gadag District Chamber of Commerce and Industry, Gadag, have stated that, when reasonable attractive tariff for solar generators is going to be determined in addition to incentives & subsidies, there is no necessity to curtail the income to the transmission company on third party sale. This also leads to wrong classification among generators of various sources. Consumer Care Society, Bangalore, have

stated that, if solar power is sold to third parties within the State, it would be unfair to DISCOMs and its consumers. If third party is ready to buy high cost solar power then such buyer would also be willing to pay the wheeling charges. Millenium Synergy Pvt Ltd, Bangalore, have commented that, the proposal of the Commission is acceptable. Acciona Energy India Pvt Ltd, Bangalore, have stated that, for third party sales, the Commission should give maximum promotional incentives and not to levy wheeling charges for transactions outside the State and Banking must be allowed for both within and outside the State.

Commission's Decision:

As a promotional measure, for the third party sales/ wheeling through open access within the State, the Commission decides not to charge any transmission or wheeling charges. However, in respect of third party sales/ wheeling through open access out side the State, the normal transmission and wheeling charges determined by the Commission from time to time is applicable.

(iii) Merit Order Dispatch:

As a promotional measure, for the present, as solar power is considered as infirm power, the Commission decides not to apply Merit order dispatch for all grid connected solar power plants.

(iv) Grid Connectivity:

Some of the stakeholders have suggested that the grid connectivity should be provided by the STU/ESCOMs.

The Commission observes that the STU has to plan for economic and efficient intra-state transmission system. As such, the STU shall take responsibility to evacuate power from the interconnection point. Further, STU/ESCOMs 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.

(v) Metering:

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

(vi) Allocation of solar power:

The Government of Karnataka shall allocate the solar power among the ESCOMs including Hukeri Rural Electric Cooperative Society, in proportion to the actual quantum of total power purchases made during FY10. The allocation shall be irrespective of the location of the solar power plant.

All other conditions governing the generation and supply of power shall be as per the Standard Power Purchase Agreement approved by the Commission in respect of all NCE projects.

Abstract of cost parameters approved by the Commission:

Particulars	Approved Parameters	
	Solar PV	Solar Thermal
Capital Cost/MW- Rs. Lakhs	1550	1300
Debt: Equity Ratio	70:30	70:30
Debt-Rs. Lakhs	1085	910
Equity- Rs. lakhs	465	390
Debt Repayment Tenure in Yrs.	10	10
Interest charges on Debt-%	12.00%	12.00%
Capacity Utilisation Factor (CUF)	19%	23%
ROE-%	16%	16%
Discount Factor -%	13.20%	13.20%
Auxiliary consumption-%	0	8%
O & M expenses in Rs. Lakhs per MW	9.00	13.00
O & M Escalation p.a.	5.00%	5.00%
Working Capital	2 months receivables	2 months receivables
Interest on Working Capital-%	12.50%	12.50%
Depreciation for first 10 yrs	7.00%	7.00%
Depreciation for next 15 yrs	1.33%	1.33%

6. Tariff for grid connected Solar PV, Solar Thermal power plants (other than demonstration projects) and Roof top Solar Photovoltaic and other small solar power Plants connected to Distribution network at voltage levels below 33KV.:

In the written as well oral submissions made before the Commission the stakeholders have made the following proposals regarding tariff to be approved:

KPCL has suggested to approve a Levelised tariff of Rs. 18.44 per unit for its existing units at Kolar and Belgaum and Rs.14.75 per unit for future projects. Solitaire Powertech Pvt Ltd has sought a Levelised tariff of Rs. 17.91 per unit for 25 years. Sri Murali Mohan of Suntechnics India Ltd has suggested to adopt a Levelised tariff of Rs.17.91 per unit and Rs.14.96 per unit (based on accelerated depreciations) as approved by CERC. Sri Kishore N.Koka, PEC suggested to approve a tariff of Rs. 19 per unit.

The Commission notes that none of the stakeholders have furnished detailed computations in support of their suggestions.

The Commission, based on the approved parameters as discussed in the foregoing paras, has determined the tariff as follows:

- | | |
|---|---------------------------|
| i. Solar PV Power Plants: | Rs. 14.50 per unit |
| ii. Solar Thermal Power Plants: | Rs. 11.35 per unit |
| iii. Rooftop Solar PV and other
Small solar power plants
connected to Distribution network
at voltage levels of below 33KV | Rs. 14.50 per unit |

In respect of projects to be commissioned after 31.03.2013, the tariff would be determined separately.

This order is signed and issued by Karnataka Electricity Regulatory Commission on this thirteenth day of July 2010.

Consequent upon the issue of this Order, the petition filed by KPCL, Solitaire Powertech Pvt Ltd and application filed by BESCO, shall stand disposed of.

Sd/-

M.R.Sreenivasa Murthy

Chairman

Sd/-

Vishvanath Hiremath

Member

Sd/-

K. Srinivasa Rao

Member

Annex-1

Sl. No	Name and address of the Stakeholders who have furnished written comments to the Discussion paper on determination of tariff for grid connected solar power plants.
1	KPCL, Bangalore
2	Solitaire Powertech Pvt Ltd, N23 B, Block -N, DDA Flat, Saket, New Delhi 110017
3	Prof. R.S.Deshpande, Institute for Social and Economic Change, VKRK Road, Nagarabhavi, Bangalore 72
4	Sri. M.R.Ganapathi, Arushi, Pump House Road, Madikeri 571 201
5	S.L. Rao, Chartered Cottage, 8, Langford Road, Bangalore 25
6	G.S.Rajamani, Ex. Member, CERC
7	B.G.Rudrappa, Former Chairman KEB & Member Advisory Committee, KERC
8	GMR Group, Knowledge Park, Bangalore- 560 029
9.	Hyderabad Karnataka Chamber of Commerce & Industry, Gulbarga- 585 101
10	G.G. Hegde Kadekodi, Sirsi 581 401
11.	Moahan Murali, Sun Technics Energy Systems Pvt Ltd, 660/1, 100 ft Road, Indiranagar, Bangalore- 560 038
12	CESC, Mysore
13	HESCOM, Hubli
14	Gadag District Chamber of Commerce and Industry, Gadag - 582 101
15	Consumer Care Society, Banashankari Bangalore
16	BESCOM, Bangalore
17	Millenium Synergy Pvt Ltd, No.16, 3 rd Main Road, Sakamma Garden, Basavanagudi, B'lore-04
18	Reliance Industries Ltd, Solar Energy Group, BTM Layout, 100ft Ring Road, B'lore- 76
19	KREDL, No. 19, A D Loganathan INA Cross, Queen's Road, B'lore- 52
20	Welspun Renewable Energy Ltd,Welspun House, 7 th Floor, Kamala City, Senapathi Bapat Marg, Lower Parel, Mumbai- 400 013
21	Prayas, Athwale Corner, Karve Road, Pune- 411 004
22	Astonfield, Makers Chambers V, Suite 916, Nariman Point, Mumbai 400 021
23	PEC Consultants, Kay Kay Heights, 104/75, 2 nd Main Road, Chamarajpet, B'lore-18
24	Acciona Energy India Pvt Ltd, The Millenia, No 1&2, Murphy Road, Ulsoor, Bangalore- 560 008
25	Ranga & Co, 112, 2 nd Floor, R.V.Road, VV Puram, B'lore- 04
26	AES Solar Energy Pvt Ltd, 9 th Floor, Tower B, Bldg 10, DLF Cybercity, Phase II, Gurgaon,Haryana-02
27	KPTCL, Bangalore

Annex-2

List of persons who have attended the public hearing held on 12/07/2010, in the matter of determination of tariff for grid connected solar power plants other than demonstration projects.

SI.NO.	SMT / SRI NAME	CONSULTANTS
1	SHRIDHAR PRABHU	ADVOCATE
2	R.V. GIRISH,	DIRECTOR, M/S MERIDIAN GREEN ENERGY PVT. Ltd.
3.	Y.V. ASWATHANARAYANA	CONSUMER CARE SOCIETY
4.	R.NAGARAJA	KPCL
5.	M.G. PRABHAKARAN	CONSULTANT
6.	GANESH AND MADHAVAN AND S.SHAIK AHMED	MOSER BAER
7.	SHIVANAND BHAVI	EXECUTIVE ENGINEER (COMERCIAL) GESCOM, GULBARGA
8.	R.NAGARAJA SHETTY	BANGALORE
9.	VIKARAM S. ANNAPPA	QUEST SEZ DEVELOP PVT.LTD.
10.	K.R. SRINIVASA	ENERCON INDIA LTD., BANGALORE
11.	B.M. CHANDRASHEKAR	FINANCIAL ADVISOR, KPTCL
12.	T. UMESH	SEE, KPTCL
13.	N.K. UPADHYA	EE (ELE.) HESCOM, HUBLI
14.	MANGALJYOTHI AND SUPRAJIT	ENERCON
15.	N.KRISHNA	PRAHARI ENERGY SOLUTION, BANGALORE
16.	S. MADHAVAN	-
17.	SUPRIYO GHOSH	ACCIONM ENERGY
18.	SONU MONDURKAR	JSLON TECHNOLOGY, C.V. RAMAN NAGAR, BANGALORE
19.	PROF ,KISHORE N. KOKA,	N.K.K.A, CEO, POLY ENGG AND CONSULTANTS
20.	C.VENU	ENGINEERING AND ADV. TO MEDIA
21.	T.V.SUDHARSHAN	MILLENIUM SYNERGY (P) LTD., BANGALORE
22.	L.SOMARAJU	AEE, CESE , MYSORE
23.	P.PONSEKAR	RELIANCE INDUSTRIES LTD.
24.	POONAM HAKLAR	LANCO SOLAR ENERGY PVT.LTD.
25.	M.A. NAGARAJU	CHAMUNDESHWARI ENG. BANGALORE-1
26.	SRI. JAYA PRAKASH	G.M.(TECH) BESCOM
27.	SMT. SAROJAMMA	DGM ,BESCOM

List of persons who made oral submissions before the Commission during the Public Hearing held on 12.07.2010 @ Court Hall, KERC

Sl. No	Name & Address of the Stakeholders
1	Sri. Guruprasad, Law Officer, KPCL, Bangalore
2	Sri. Sridhar Prabhu, Advocate, Bangalore
3	Sri. Y.V.Ashwathnarayana, Consumer Care Society, Banshankari, Bangalore
4	Sri. M.G.Prabhakar, FKCCI, Bangalore
5	Sri. B.Ganesh, Solitaire Powertech Pvt Ltd, New Delhi.
6	Sri.R.V.Girish, Director, Meridian Green Energy, Bangalore
7	Prof. Kishore .N.Koka, PEC, Bangalore