



**COMMISSION'S ORDER**

**ON**

**FIXATION OF TARIFF FOR GENERATION OF POWER  
THROUGH SOLAR ENERGY**

**FOR FY 2008-09 TO FY 2012-13**

**April 25, 2008**

**HARYANA ELECTRICITY REGULATORY COMMISSION**

**BAYS 33-36, SECTOR - 4, PANCHKULA - 134 112, HARYANA**

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HARYANA ELECTRICITY REGULATORY COMMISSION  
BAYS NO. 33-36, SECTOR – 4, PANCHKULA.

Date of Order: 25/04/2008

**ORDER**

Power is a critical infrastructure input for the development and growth of the economy of a country. Since there is a limitation of producing power from conventional sources such as coal, oil etc., it is imperative that some alternative energy source has to be discovered to meet the increasing demand of energy in the country. In this backdrop, power from renewable energy assumes importance. One of the renewable energy sources for generation of power is the solar energy which is available in abundance. The solar insolation level in Haryana and about 320 clear sunny days in a year, offer great potential for generation of power through solar energy in the state.

Keeping in view the importance of producing power from renewable sources, Government of Haryana came out with a new policy for promoting generation of electricity through renewable energy sources vide Notification No.22/69/2005-5P dated 23.11.2005 to encourage Independent Power Producers (IPPs) for setting up of power plant based on renewable energy sources such as Biomass, Bagasse Co-generation, Wind Energy, Small Hydro, Solar and Urban Waste. The said policy also includes incentives like banking of power, exemption from electricity duty, exemption of Local Area Development Tax, exemption of conversion charges by the Town & Country Planning Department for setting up of renewable power projects in agriculture zone etc. It was also decided to treat all such new projects as industry in terms of Industrial Policy, 2005. As a follow up to this, Haryana Renewable Energy Development Agency (HAREDA) sent a request vide memo no. DRE/2008/3466 dated 16/01/2008 to the Commission for fixation of tariff for generation of power through solar energy (solar photovoltaic & solar thermal) under Section – 3 of the Electricity Act 2003. HAREDA which has been declared

nodal agency for implementation of renewable energy projects in Haryana, has already invited expression of interest from Independent Power Producers (IPPs) for setting up SPV/solar thermal based power projects in the State.

The Commission set about the task of determining the tariff for the above by inviting comments / suggestions and objections of stakeholders and experts on the key assumptions for computation of tariff. The parameters on which comments/suggestions/objections were invited by the Commission are as under:-

Project Life	20 Years
Debt : Equity	70:30
Project Cost (Rs. Million/MW)as per HAREDA	280
Return on Equity (%)	16
Preferential rate of Interest from IREDA (10 year)	2.5
Depreciation (% of project cost per annum)	4.5
O&M cost (% of project cost Rs. Millions)	0.5
Derating Factor (% per annum)	1
Solar Insolation Level (per square meter)	5.5 kWh – 6.5kWh
Clear Sunny Days in an Year	320
Average Cost of Generation as indicated by HAREDA	Rs. 13/kWh (approximate)
Annual Escalation in O&M (second year onward)	1.5%
Tariff Period	5 Years

The public notice inviting comments/suggestions/objections was inserted on the above mentioned parameters by the Commission on 17/03/2008 in two newspapers i.e. Hindustan Times (Delhi Edition) and Dainik Jagran (Delhi Edition). Comments were received from as many as nine parties:

1. HAREDA
2. Moserbaer Photo Voltaic.
3. Reliance Industries Limited

4. Advanced Electronic System, New Delhi
5. Power and Energy Consultants, New Delhi.
6. Ruchi Soya
7. Uttar Haryana Bijli Vitran Nigam
8. Dakshin Haryana Bijli Vitran Nigam

It will be relevant at this stage to mention the statutory provisions as given in the Electricity Act, 2003 on the subject. As per section 86(e) of the said Act the State Commission shall promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. It was also further stipulated in Section 61 of the Act that the State Commission shall subject to the provision of the Act specify the terms and conditions for determination of tariff for promotion of co-generation and generation of electricity from renewable sources of energy.

In compliance with Section 3 of the Electricity Act, 2003 the Central Government has notified the Tariff Policy on 6.1.2006 in continuation of the National Electricity Policy notified on 12.2.2005. Section 6.4 in the said policy deals with the non-conventional sources of energy including co-generation, which is reproduced as under:-

- (1) Pursuant to provisions of section 86(1)(e) of the Act, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. ....

It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission

- (2) Such procurement by Distribution Licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs.”

**In compliance with the statutory provision in the Act and the policy guidelines given in the Tariff Policy of the Govt. of India, the Commission vide its order dated 15<sup>th</sup> May 2007 and 3<sup>rd</sup> October 2007 (on review filed against the order dated 15<sup>th</sup> May 2007) has already determined the percentage of electricity to be procured by the Distribution licensee(s) from non-conventional sources, wheeling charges, grid connectivity, banking and carbon credit. The same shall be applicable in the instant case too.**

The Commission scheduled a public hearing on the instant petition on 20<sup>th</sup> March 2008 which due to in-sufficient response from the stakeholders was rescheduled to 2<sup>nd</sup> April 2008. The date of filing comments / objections was accordingly extended from 14<sup>th</sup> March 2008 to 25<sup>th</sup> March 2008. The public hearing was held in the court room of the Commission on 2/04/2008.

The issues raised by the interveners in their written submission in response to the public notice issued by the Commission as well as their oral submissions made by them at the time of public hearing held on 2<sup>nd</sup> April 2008 and Commission’s response thereto are presented in the paragraphs that follow:

HAREDA submitted that to attract the developers for setting up Solar PV power in Haryana the Commission may consider the power purchase rate of Rs. 16/kWh . They submitted that 5 MW PV Power plant requires about 30 to 40 acres of land. Unlike in states like Rajasthan, cost of land in Haryana is very high which further increases the project cost.

On the interest rate HAREDA submitted that earlier IREDA had given the special interest rate but now the interest rate is 10.5%. The generation based incentives from MNRE applicable for 10 years is restricted to 50 MW in the country on first come first serve basis. This is also subject to an aggregate capacity of a maximum of 10 MW in a State. Consequently, the Commission may consider tariff both with MNRE subsidy and without. Further, as this project is cost intensive, utilities need to take care of the transmission lines. CDM benefit need to be given to the developers, otherwise the tariff needed for viability will be higher.

We have considered the above submission of HAREDA. While reckoning with the project cost the Commission has given due weightage to land requirement and cost as obtaining in Haryana. We, for the purpose of computing tariff, has considered the rate of interest at which funds are available on a long term basis considering the life cycle of the solar PV plant stated to be over thirty years in place of the concessional rate of interest considered by the Commission in its key assumptions. We have also taken note of the fact that the subsidy is available for a very limited capacity and only for 10 years. Consequently, we have determined tariff without taking into consideration Government subsidy. **However, if the project qualifies for generation based incentive of a maximum of Rs. 12/kWh for the projects commissioned by 31/12/2009 and with 5% reduction and ceiling of Rs. 11.40/kWh for the projects commissioned after 31/12/2009 only the net rate after deducting incentive amount shall be payable by the Discoms.** On the issue of CDM benefit as well as cost of transmission lines the Commission has already passed as order dated 15<sup>th</sup> May 2007 & 3<sup>rd</sup> October 2007, the same shall be applicable in this case too.

Moserbaer Photo Voltaic, while commenting on the key assumptions, suggested that IREDA funds are available at 11 to 12% rate of interest and the same should be considered. On solar insolation level, they, in the light of the studies undertaken by their technical team suggested that it ranges between 5 to 5.25 kWh/Sq.M. Thus, the average cost of generation ought to be Rs. 16/kWh. The tenure of tariff proposed by them is at

least 25 years so that the investments get recovered. In order to ensure financial feasibility 80% accelerated depreciation in the 1<sup>st</sup> year should be allowed.

We have considered the above contentions of Moserbaer Photo Voltaic. The interest rate considered for the purpose of providing interest cost on loan fund shall be as per the rate at which such funds are available on a long term basis. The insolation levels for the purpose of computing generation considered by us is in line with authentic insolation data available in the case of Haryana. We, in line with the guidelines for availing generation based incentive for grid interactive solar power generation projects of Government of India, Ministry of New and Renewable Energy dated 24<sup>th</sup> January, 2008 has not considered accelerated depreciation. **We, given the uncertainties of solar insolation at different locations of Haryana, and the resultant plant load factor on an actual basis as well as losses and the likely reduction in project cost as the technology evolves, has initially set the tariff for 5 years. The projects commissioned during this period would have the comfort of capital cost, return on equity, debt – equity ratio unchanged when the Commission re-sets the tariff after five years. However, for the projects attaining financial closure after the said period the Commission will examine all the cost components afresh to determine tariff applicable beyond FY 2012-2013. It is also clarified that PPA can be executed for a period of 20 years.**

Reliance Industries Limited (RIL) commenting on the parameters on which the Commission sought comments/objections and suggestions submitted that Solar PV worldwide is a proven technology with a life of 30 years as against 20 years considered by the Commission. On interest rate they submitted that concessional loan @ 2.5% is no more available. The cost of solar generation tariff (initial selling rate) as per the work sheet attached by them is Rs. 16.40/kWh. The tenure of tariff suggested by them is 30 years. On grid interfacing RIL has proposed that the cost for this should be borne by the Discoms. They have also raised the issue of accelerated depreciation and high cost of land.

We have already given its views on the issue of interest rate, tenure of tariff and grid interfacing, accelerated depreciation and cost of land hence no separate comments are being offered here.

Advanced Electronic Systems submitted that they agree with the parameters/assumptions given by HAREDA.

We have already dealt with the comments of HAREDA hence no separate comments / views are being offered here.

Power & Energy Consultants have submitted that the project cost of 1 MW Solar Power Plant is Rs. 250 million and not Rs. 280 million. Further, the interest rate should be 10.25% as per the present rate of interest for such projects. They also suggested that the tariff should be determined for a period of 20 years so that investors may show interest in investing in such projects.

We have taken note of the submission on project cost. It has already dealt with the issue of rate of interest and tenure of tariff.

Ruchi Soya Industries Limited, in response to the public notice issued by the Commission, has suggested that depreciation should be linked with loan repayment i.e. 10 to 12 years. They have also proposed accelerated depreciation in line with other renewable energy plants. Further, due to high requirement of land the same i.e. 5 acres per MW the Government must provide land free of cost or at a subsidized rate. The State Electricity Board must arrange for power evacuation from the plant itself. The annual escalation in O&M should at least be 5% per annum.

We have considered the above comments / suggestions of Ruchi Soya Industries Limited. The issue of depreciation, evacuation and high requirement and cost of land in Haryana has already been dealt with by the Commission. As far as annual escalation in O&M is concerned the Commission is of the considered view and the same was supported by the

interveners including Reliance Industries Limited and Moserbaer Photo Voltaic that O&M as a percentage of project cost is estimated around 0.2% while the recurring expenses are insignificant. Consequently, the Commission is not inclined to accept the proposal of 5% per annum escalation in O&M. We agree in principle with the proposal on 'land availability' at a subsidized rate. The nodal agency HAREDA may take – up the issue with the State Government including the possibility of making land available on a nominal lease rental basis to the developers.

Uttar Haryana Bijli Vitran Nigam (UHBVNL) vide memo no. Ch-07/GM/RA/N/F-25/Vol-XVII dated 17/03/2008 and Dakshin Haryana Bijli Vitran Nigam vide memo no. Ch-19/SE/RA-319 dated 26/03/2008 filed their comments on fixation of tariff for generation of power through solar energy. UHBVNL on specific issues relevant for determination of tariff in the instant case submitted that ROE should be considered at 14% in line with other conventional sources of energy. Further, the wheeling charges applicable to Solar power should be in line with those of other state utilities. UHBVNL also invited the attention of the Commission to the subsidy scheme of the Central Government as well as the tariff determined by PSERC.

We have considered the above contentions of UHBVNL. We have already dwelt at length with these issues and decided the same in its order dated 15<sup>th</sup> May 2007 with respect to renewable energy tariff & other issues. Consequently, we feel no need to elaborate the same all over again. We are aware of the Government of India Guidelines for Generation Based Incentive for Grid Interactive solar Power projects as well as the order(s) of different SERCs including Punjab on the issue of Solar tariff. As far as ROE is concerned, **we, given the initial high project cost and long life cycle of the solar PV plant agree with UHBVNL that ROE should be restricted to 14%.**

DHBVNL, in addition to the above issues, also submitted 'Net Metering Plan'. However, the representative of DHBVNL failed to elaborate the same to the satisfaction of the Commission. Consequently, they are advised to explain the same to enable the Commission to offer its view or decision. However, this issue is not relevant to the

process of tariff determination in the instant case and hence the same is not being considered by the Commission.

**Tariff:**

After considering the views of the experts & interveners as per their written as well as oral submissions made at the time of public hearing held on 2<sup>nd</sup> April 2008 we determine the tariff for SPV Technology as under.

Solar Power plants commissioned upto 31/12/2009	Rs. 15.96 / kWh
Solar Power plants commissioned after 31/12/2009 but by 31/03/2010	Rs. 15.16/kWh

**The tariff approved by us is an average tariff that shall remain constant for a period of five years. The above tariff is without considering any subsidy/incentive. However, if the project qualifies for generation based incentive then the tariff payable by the Discoms shall be the difference of the above mentioned tariff and incentive.**

The Commission, due to insufficient data / information made available by the petitioner i.e. HAREDA and other experts/intervenors, has not considered fixation of tariff based on solar thermal technology. The Commission will pass a separate tariff order as and when sufficient data/information is available with it.

The IPPs shall sign power purchase agreement (PPA) with the electricity distribution licensee(s) for sale of energy generated by them from solar energy sources in the state of Haryana.

**T.S.Tewatia**  
**(Member)**

**Bhaskar Chatterjee**  
**(Chairman)**

In regard to the tariff determined above for solar power based on SPV technology, I express difference of opinion as under:-

I approve a tariff of Rs. 4.38 / Kwh for solar power using SPV technology for working out the generation incentive under the policy framed by MNRE, which corresponds to highest power purchase rate approved by the Commission for FY 2008-09 in case of Tehri Hydel Project. This tariff shall be determined by the Commission annually while approving the ARR / tariff of Discoms.

I approve a total tariff inclusive of generation incentive on solar power payable by the Govt. of India to the solar Power Producers based on SPV technology equal to Rs. 15.75 (for plants commissioned up to 31.12.2009) and Rs. 15.15 (for plants commissioned after 31.12.2009 but by 31.3.2010) and all conditions of Govt. of India policy shall be applicable on them.

( T.R. Dhaka )  
Member

### **ORDER**

In terms of Section 92 (3 & 4) of the Electricity Act 2003 (Act 36 of 2003), the majority view of Sh. Bhaskar Chatterjee, Chairman and Sh. T.S. Tewatia, Member, will be the order of the Commission.

This order is signed, dated and issued by the Haryana Electricity Regulatory Commission on 25th April 2008.

Date: 25.04.2008

Place: Panchkula

T. S. Tewatia  
(Member)

T.R.Dhaka  
(Member)

Bhaskar Chatterjee  
(Chairman)