

**CENTRAL ELECTRICITY REGULATORY COMMISSION  
NEW DELHI**

**Petition No. SM/016/2014 (Suo Motu)**

**Date of order: 30<sup>th</sup> September, 2014**

**Coram:**                      **Shri Gireesh B. Pradhan, Chairperson**  
                                      **Shri M. Deena Dayalan, Member**  
                                      **Shri A.K. Singhal, Member**  
                                      **Shri A.S. Bakshi, Member**

**ORDER**

IN THE MATTER OF

**Determination of Forbearance and Floor Price for the Solar REC**

1.        The existing REC framework provides that each certificate (REC) shall represent 1 MW hour of electricity generated from renewable energy source and injected into the grid. There is a minimum and maximum price of REC within which REC transactions can be undertaken. This has been provided to avoid adverse impact of price volatility. These are called the 'floor price' and 'forbearance price.

2.        The Central Commission in consultation with the Central Agency (National Load Despatch Centre) and Forum of Regulators (FOR) from time to time provides for floor price and forbearance price separately for Solar and Non-solar Renewable Energy Certificates. The REC Regulations provide for the guiding principles for determining the forbearance and floor price for solar and non-solar Certificates. The relevant provisions are extracted as under:

***"Regulation 9 of REC Regulations Pricing of Certificate:***

1.        *The price of Certificate shall be as discovered in the Power Exchange:  
                                      Provided that the Central Commission may, in consultation with the Central Agency and Forum of Regulators from time to time provide for the floor price and forbearance price separately for solar and non-solar      Certificates.*
2.        *The Central Commission while determining the floor price and forbearance price shall be guided inter alia by the following principles:*
  - a) *Variation in cost of generation of different renewable energy technologies falling under solar and non-solar category, across States in the country;*

- b) *Variation in the Pooled Cost of Purchase across States in the country;*
- c) *Expected electricity generation from renewable energy sources including:-*
  - i. *expected renewable energy capacity under preferential tariff*
  - ii. *expected renewable energy capacity under mechanism of certificates;*
- d) *Renewable Purchase obligation targets set by State Central Commissions”*

3. Based on the above referred guiding principles, the Commission earlier came out with an Order dated 1.06.2010 in the matter of ‘Determination of Forbearance and Floor Price for the REC framework’ (suo motu Petition No.99/2010) and determined forbearance price and floor price for dealing in Certificates under the REC Regulations:

**Table : Floor and Forbearance price**

	<b>Non Solar REC (Rs./MWh)</b>	<b>Solar REC (Rs./MWh)</b>
<b>Forbearance Price</b>	3,900	17,000
<b>Floor Price</b>	1,500	12,000

4. The above determined forbearance price and floor price were valid for the control period up to 31.03.2012.

5. Subsequently, based on the guiding principles specified in Para 3, the Commission vide its suo motu Order (No.142 / 2011) dated 13.06.2011 determined the following forbearance and floor prices for the control period from 1.04.2012 to 31.03.2017:

**Table : Forbearance and Floor price**

	<b>Non Solar REC (Rs./MWh)</b>	<b>Solar REC (Rs./MWh)</b>
<b>Forbearance Price</b>	3,300	13,400
<b>Floor Price</b>	1,500	9,300

6. The Commission now proposes the following forbearance price and floor price for the Solar REC :

- i. Solar REC Floor price for the Solar projects commissioned on and after 1.4.2014: Rs. 3500/ Certificate
- ii. Solar REC Forbearance price for the Solar projects commissioned on and after 1.4.2014: Rs. 5800/ Certificate
- iii. Solar projects that sell the electricity generated to the distribution licensee of the area in which the eligible entity is located, at the pooled cost of power purchase of such distribution

licensee as determined by the Appropriate Commission, shall be issued Certificates, for one Megawatt hour of electricity injected into the grid, considering following Vintage Multiplier (VM) :

<b>Year of Commissioning</b>	<b>Multiplier</b>
2013	1.47
2014	1.19
2015	1.00

- iv. Solar projects that sell the electricity generated to any other licensee or to an open access consumer at a mutually agreed price, shall be issued Certificates for one Megawatt hour of electricity injected into the grid, considering following Vintage Multiplier (VM) :

<b>Year of Commissioning</b>	<b>Multiplier</b>
2013	0.74
2014	0.60
2015	0.50

- v. Solar projects which are CGP shall be issued Certificates for self consumption of one Megawatt hour electricity generated and self consumed. considering following Vintage Multiplier (VM) :

<b>Year of Commissioning</b>	<b>Multiplier</b>
2013	0.74
2014	0.60
2015	0.50

- vi. The Vintage multiplier based on the above shall be provided for a period of 12 years, from the year of commissioning.

- vii. The proposed Vintage Multipliers are derived based on the formulation as provided in the Regulation 7 of the Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) (Third Amendment) Regulations, 2014. This will be reviewed every year and on such review the revised multiplier shall apply for projects commissioned in the respective years.

7. Detailed working of the proposal is attached as Annexure-1. Comments / suggestions/ objections of the stakeholders on the above proposal are invited by 30.10.2014. We direct that the matter be notified for hearing on 4.11.2014 before taking a final decision regarding the Forbearance and Floor Price for the Solar REC framework.

Sd/-  
**(A.S. Bakshi)**  
**Member**

Sd/-  
**(A. K. Singhal)**  
**Member**

Sd/-  
**(M. Deena Dayalan)**  
**Member**

Sd/-  
**(Gireesh B. Pradhan)**  
**Chairperson**

## **Proposal for review of Floor and Forbearance prices for solar projects**

### **Background**

#### **Concerns raised by stakeholders**

1. Based on the experience so far, stakeholders have raised some concerns regarding the floor and the forbearance Price for Solar RECs as under:

#### **Bankability and Longer term visibility of Floor and Forbearance price**

2. Various stakeholders have raised concern about the bankability of renewable energy project under REC mechanism because of high risk perceived by the bankers/ financial institutions. The key constraint identified by them was the lack of visibility of revenue under the REC mechanism as the floor and forbearance price band had been announced for 5 years upto 31.03.2017 and beyond which there was no clarity on the evolution of the price band. The stakeholders were aware that in all likelihood this would be revised downwards as was done once, but the magnitude of the decline was not known. They requested for clarity in this regard which was essential for investment certainty in this mechanism.

3. Under REC mechanism there are two sources of revenue for a generator, one from the sale of electricity component and another from sale of certificates. Revenue from the sale of electricity could be at the rate of average pooled purchase cost of local distribution licensee in case of sale of electricity to such local distribution licensee or it could be at the mutually decided rate in case of sale of electricity component to any open access user and at market determined rate in case of sale of electricity component through a power exchange. Revenue from sale of electricity can be visualized for the future years. Revenue from the sale of certificates entirely depends upon demand and supply. The floor and the forbearance prices have been defined for a particular control period. At present, they are defined upto 2017. It means that investors putting their renewable energy generation projects today have visibility of revenue from sale of certificates upto 31.03.2017 only.

4. From the point of view of the investors and bankers/financial institutions, the floor and forbearance price set by the Commission should be at least up to loan period i.e. 10 to 12 years to facilitate easier availability of loan for renewable energy projects under REC mechanism.

### **Significant mismatch between Solar Certificate Floor prices and Solar PV tariff**

5. The present notified solar certificate price range is Rs. 9,300-13,400 (Rs. 9.3/kWh – Rs.13.40/kWh) for the period of 2012-2017. At the same time, solar PV tariff has come down drastically in the last three years and the latest price bids for large scale solar PV projects are around Rs. 6.50/kWh. The CERC determined solar PV tariffs are also set at Rs 6.91/kWh and Rs.7.72/kWh with and without accelerated depreciation benefit respectively for the FY 2014-15. It is expected that prices will continue to decline. The Solar PV projects coming in later years (with lower costs) may get much higher profits if the market clearing price for solar RECs is dictated by the older projects. It has been suggested that CERC should revise solar floor and forbearance price downwards otherwise it will result in windfall profit to the solar PV project developer and will adversely impact the retail consumers. It is argued that higher priced solar certificate would not be sustainable for the solar sector in the long run.

### **Vintage based multiplier for solar certificates**

6. As the floor and forbearance price reduces in future with the emergence of low cost renewable energy technologies, REC mechanism doesn't offer a viable alternative for the investor who made investment earlier. This is particularly true in the case of Solar where all the investment is made up front and the project has negligible operational costs. Some of the stakeholders suggested the REC Regulations should recognize that the investments already made in renewable energy projects, particularly in Solar PV projects, cannot take advantage of the low cost technologies. Therefore, it has been suggested that the Central Commission should introduce the concept of multiplier to the REC certificate recognizing the vintage of a project as and when floor price is reduced. The project set up in initial years should be entitled to higher number of certificates for the same value of electricity generated than the project coming later and this valuation would have to be carried out every year based on the viability tariff required for each year.

### **Issues for consideration**

7. The following issues have been raised regarding the Floor and Forbearance prices of Solar Certificates:

- a) Need for review of solar REC Floor and Forbearance price;
- b) Need for introduction of vintage based multiplier concept to take care of older projects;
- c) Need for longer term visibility of revenue from the REC projects.

### **Need for review of solar REC Floor and Forbearance prices**

8. The current Floor price and Forbearance price of solar REC (as mentioned in para 5 above) were determined based on Solar PV and Solar Thermal Tariff for FY 2011-12. In order to give longer term visibility, such prices were specified for the control period of 5 years i.e. upto FY 2017. Due to reduction in the capital cost of Solar PV projects its tariff reduced drastically. Trend in reduction in capital cost of Solar PV and Solar Thermal Tariff is shown in the table below:

**Table :** Capital cost and Tariff for solar thermal and solar PV projects as determined by CERC

<b>Particulars</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>	<b>2012-13</b>	<b>2013-14</b>	<b>2014-15</b>
Solar PV Capital Cost Rs. Cr/MW	17.00	16.90	14.42	10.00	8.00	6.91
<b>Solar PV Tariff (Without AD) Rs./kWh</b>	18.44	17.91	15.39	10.39	8.75	7.72
Solar Thermal Capital Cost Rs. Cr/MW	13.00	15.30	15.00	13.00	12.00	12.00
<b>Solar Thermal Tariff Rs./kWh</b>	13.45	15.31	15.04	12.46	11.90	11.88

9. The prevailing Floor price of Solar REC is Rs. 9.30/kWh. As against the same, today's levelled cost of generation of Solar PV projects as determined by the Commission is Rs. 7.72/kWh. Solar PV power procured through competitive bidding recently by various States has yielded PV tariff, around Rs. 6.50/kWh. This mismatch has resulted into distortion in the Solar REC market. The obligated entities are not comfortable buying Solar REC as Solar PV generation is available at much cheaper rate than Solar REC. There is at the same time an apprehension that Solar PV projects registered under REC mechanism are having windfall profit.

10. In the Solar REC market, unsold Solar RECs are piling up due to two main reasons. One, RPO is not being enforced at the State level and the other, solar power is now available at much cheaper rate. Therefore, there is an urgent need to review the existing solar Floor and Forbearance price.

### **Determination of Solar REC Floor Price for FY 2015**

11. The floor price of solar RECs has been calculated based on the project viability approach which has been adopted under the current REC price framework as well. The project viability approach covers the cost required to meet viability parameters including O&M, interest, principal

repayment etc. The project viability of solar thermal has not been considered since there is no REC capacity under solar thermal. The table below provides state wise variations in the difference between minimum requirement and average pooled purchase cost of States, which forms the basis for determination for Floor price:

Table: Determination of solar REC floor price for FY 2015

State	APPC (Rs/kWh)	FIT (Rs/kWh)	Min. Project viability req.	Difference (Min. Req. - APPC)
Andhra Pradesh	3.38	7.72	5.50	2.12
Chhattisgarh	1.92	7.72	5.50	3.58
Gujarat	3.02	7.72	5.50	2.48
Haryana	3.60	7.72	5.50	1.90
HP	2.12	7.72	5.50	3.38
Karnataka	3.14	7.72	5.50	2.36
Kerala	3.50	7.72	5.50	2.00
Maharashtra	3.76	7.72	5.50	1.74
MP	2.66	7.72	5.50	2.84
Arunachal P.	3.39	7.72	5.50	2.11
Punjab	3.92	7.72	5.50	1.58
Rajasthan	3.13	7.72	5.50	2.37
Tamil Nadu	3.28	7.72	5.50	2.22
UP	3.88	7.72	5.50	1.62
Uttarakhand	2.52	7.72	5.50	2.98
West Bengal	3.46	7.72	5.50	2.04
<b>Maximum difference</b>				<b>3.58</b>

## Proposal

12. The highest difference between the minimum requirement for project viability of solar PV and respective state APPC in FY 2015 is proposed as new solar REC floor price.

Table: Floor Price for FY 2015

Minimum Required for Project viability (Rs per kWh)	Min. APPC assumed (Rs per kWh)	Floor Price - Round off (Rs per kWh)
5.50	1.92	3.50



13. Accordingly, the new solar REC Floor price proposed from the date of issuance of the final order will be Rs. 3500 per MWh.

### Forbearance Price

14. The forbearance price acts as a maximum price at which the REC can be sold in the REC market. This was introduced to protect the interests of the obligated entities. The current solar forbearance price is Rs. 13,400 per MWh. The current forbearance price is applicable till FY 2017. Solar projects have witnessed steep fall in the tariff over the years. This necessitates change in the forbearance price for solar REC. The table below details the difference between Tariff determined by the Commission and APPC across states for both solar PV technology. Table: Solar REC Forbearance Price

State	APPC	Solar PV FiT	[FIT - APPC] for Solar PV
Andhra Pradesh	3.38	7.72	4.34
Chhattisgarh	1.92	7.72	5.80
Gujarat	3.02	7.72	4.70
Haryana	3.60	7.72	4.12
HP	2.12	7.72	5.60
Karnataka	3.14	7.72	4.58
Kerala	3.50	7.72	4.22
Maharashtra	3.76	7.72	3.96
MP	2.66	7.72	5.06
Arunachal	3.39	7.72	4.33
Punjab	3.92	7.72	3.80
Rajasthan	3.13	7.72	4.59
Tamil Nadu	3.28	7.72	4.44
UP	3.88	7.72	3.84
Uttarakhand	2.52	7.72	5.20
West Bengal	3.46	7.72	4.26
	<b>Maximum difference</b>		<b>5.80</b>

### Proposal

15. The highest difference between the Tariff determined by the Commission for Solar PV project and respective state APPC in FY 2015 is proposed as new Solar REC forbearance price.

- The new Solar REC Forbearance price proposed is Rs 5.80 per kWh.

### **Vintage based multiplier**

16. The Vintage Multipliers are derived based on the following formulation as provided in the amended Regulation 7 of the Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) (Third Amendment) Regulations, 2014.

Vintage Multiplier =

Maximum difference [Minimum Requirement in of Base Year – APPC of Current Year (state wise)] / Maximum Difference [Min Requirement in Current Year – APPC of Current Year (state wise)]

Where,

- i. “APPC” means Average Pooled Cost of Purchase of State;
- ii. “Minimum requirement” means minimum evellised tariff required for viability of project to meet interest expenses, loan repayment and operation & Maintenance Expenses for various renewable energy technologies in the commissioning year and current year based on tariff determined by the Commission in respective years;
- iii. “Base year” means the year of commissioning.”

17. The variation in the minimum requirement assumed for calculating solar REC floor price and APPC variation over the years has been shown in the table below:

**Table : Minimum requirement and REC solar price bands (Rs per kWh)**

Financial Year	2013	2014	2015
<b>Tariff determined by the Commission: Solar PV: Rs./kWh</b>	10.39	8.75	7.72
<b>Minimum Requirement: Rs./kWh</b>	7.18	6.17	5.50
<b>Minimum APPC across States: Rs./kWh</b>	2.00	1.95	1.92
<b>Difference between Minimum requirement and APPC: Rs./kWh</b>	5.18	4.22	3.50

18. Based on the approach, the vintage multiplier for solar projects are proposed as under:

(i) Solar projects that sell the electricity generated to the distribution licensee of the area in which the eligible entity is located, at the pooled cost of power purchase of such distribution licensee as determined by the Appropriate Commission, shall be issued Certificates, for one Megawatt hour of electricity injected into the grid, considering following Vintage Multiplier (VM) :

Year of Commissioning	Multiplier
2013	1.47
2014	1.19
2015	1.00

(ii) Solar projects that sell the electricity generated to any other licensee or to an open access consumer at a mutually agreed price, shall be issued Certificates for one Megawatt hour of electricity injected into the grid, considering following Vintage Multiplier (VM) :

Year of Commissioning	Multiplier
2013	0.74
2014	0.60
2015	0.50

(iii) Solar projects which are CGP shall be issued Certificates for self consumption of one Megawatt hour electricity generated and self consumed. Considering following Vintage Multiplier (VM) :

Year of Commissioning	Multiplier
2013	0.74
2014	0.60
2015	0.50

19. The Vintage multiplier based on the above shall be provided for a period of 12 years, from the year of commissioning.

20. The proposed Vintage Multipliers are derived based on the formulation as provided in the Regulation 7 of the Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) (Third Amendment) Regulations, 2014. This will be reviewed every year and on such review the revised multiplier shall apply for projects commissioned in the respective years.

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