

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Petition No. 02/SM/2017

Date of Order: 28th February, 2017

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

IN THE MATTER OF

Determination of Forbearance and Floor Price for the REC framework to be applicable from
1st April 2017.

ORDER

A. BACKGROUND

1. In exercise of the power under section 66 and 178 of the Electricity Act, 2003 the Commission has notified the Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 (hereafter REC Regulations).
2. As per the first proviso to clause (1) of Regulation 9 of the REC Regulations, the Commission may in consultation with the Central Agency (Power System Operation Corporation Limited) and Forum of Regulators from time to time provide for floor price and forbearance price separately for Solar and Non-solar Renewable Energy Certificates.
3. Further, Clause (2) of Regulation 9 of the REC Regulations provides for the guiding principles for determining the forbearance and floor price for Solar and Non-solar Certificates. The relevant provisions are extracted as under:

“9. *Pricing of Certificate:*

(1) The price of Certificate shall be as discovered in the Power Exchange:

Provided that the 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 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 Commissions”*

4. In pursuance of the powers vested under proviso to the Regulation 9 (1) of REC Regulations, the Commission came out with an Order dated 1st June, 2010 for ‘Determination of Forbearance and Floor Price for the REC framework’ (Suo Motu Petition No.99/2010) and prescribed forbearance price and floor price for dealing in Certificates under the REC Regulations:

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

- 5. Above determined forbearance price and floor price were valid for the control period upto 31.03.2012.
- 6. Accordingly, based on the guiding principles specified in Para 3, the Commission vide its suo-motu Order (No 142/2011) dated 23.08.2011 determined the following forbearance and floor prices for the control period from 01.04.2012 to 31.03.2017:

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

7. Subsequently, based on review of solar PV tariff, the Commission vide its suo-motu Order (No. SM/016/2014 dated 30.12.2014) determined the following forbearance and floor price for Solar REC for the remaining period of the control period i.e. up to 31.03.2017. The forbearance and floor price for Non Solar REC were left unchanged.

	Solar REC (Rs/ MWh)
Forbearance Price	5,800
Floor Price	3,500

Further, Clauses (7) & (8) of Regulation 7 of the REC Regulations provide for the guiding principles for quantum of Certificate to be issued to the eligible entities being the solar generating companies registered under REC framework prior to 01.01.2015. The relevant provisions are extracted as under:

“7 Denomination and Issuance of Certificates

....

(7) The Commission shall determine through a separate order, the quantum of Certificate to be issued to the eligible entities being the solar generating companies registered under REC framework prior to 1st January 2015, for one Megawatt hour of electricity generated and injected into the grid or deemed to be injected (in case of self-consumption by eligible CGP) into the grid as per the following formula:

$$\text{Vintage Multiplier} = \text{Floor Price of Base Year} / \text{Current Year Floor Price}$$

Where,

i. "Base year" means the year 2012-13 being the year in which the floor price was determined for solar REC for a period of five years"

(8) The vintage multiplier as specified in clause (7) of this Regulation shall be provided to the solar generating companies registered under REC framework prior 1st January 2015 and shall be applicable for the existing and future solar RECs for the period from 1st January 2015 up to 31st March 2017, after which such projects shall be eligible for one REC for one megawatt hour of electricity generated.

Based on the above, a vintage multiplier of 2.66 was provided to solar generating companies registered under REC framework prior to 1st January 2015. The vintage multiplier is valid up to 31st March 2017.

8. The Commission now proposes the following forbearance and floor price for dealing in Certificates under the REC Regulations with effect from 1st April 2017 as per the proposal enclosed as **Appendix– 1**. The following forbearance and floor price shall be valid until further orders by the Commission.

	Non Solar REC (Rs/ MWh)	Solar REC (Rs/ MWh)
Forbearance Price	2,900	2,500
Floor Price	1,000	1,000

9. Comments / suggestions of the stakeholders on the above proposal are invited by 20.03.2017. We direct that the matter be notified for hearing on 22.03.2017 before taking a final decision regarding the Forbearance and Floor Price for the REC framework.

**Sd/-
(Dr. M. K. Iyer)
Member**

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

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

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

Appendix – 1

Proposal for Determination of Forbearance & Floor Price of REC for the control period starting from 1st April 2017

1. Need for review of REC Forbearance and Floor Price

A. The current forbearance and floor price of Non Solar REC is as under:

	Non Solar REC (Rs/ MWh)	Solar REC (Rs/ MWh)
Forbearance Price	3,300	5,800
Floor Price	1,500	3,500

■

B. In so far as non-solar REC prices are concerned, this was based on Generic Tariff for non-solar RE Technologies for FY 2011-12. In order to give long term visibility, the prices were specified for the control period of 5 years i.e. up to FY 2016-17.

However, the Solar REC forbearance and floor price were reviewed by the Commission and were based on Solar PV Tariff for FY 2014-15 and valid up to 31.03.2017. Due to reduction in capital cost of Solar Projects, its tariff has declined considerably. The recent trends as published by MNRE and the results of competitive bidding as observed by the Commission reveal that the average bid tariff discovered in auctions from the period January 2016 to February 2017 has been Rs 4.65 /kWh.

Auction	Year	Capacity on Offer (MW)	Highest Bid (Rs./KWh)	Lowest (Rs./KWh)	Weighted Avg. Price (Rs./KWh)
Rajasthan-420 MW Bundling	Jan'2016	420	4.36	4.34	4.351
UP-100 MW Bundling	Jan'2016	100	4.78	4.78	4.78

Rajasthan-100 MW Bundling (DCR)	March'16	100	5.07	5.06	5.068
Telangana-50 MW Bundling (DCR)	March'16	50	5.19	5.19	5.19
Jharkhand-200	March'16	102	5.59	5.20	5.464
Jharkhand-1000	March'16	999	5.48	5.08	5.356
Telangana-350 MW Bundling	May'16	350	4.67	4.66	4.667
Karnataka-500 MW Bundling	May'16	500	4.80	4.78	4.79
MH-50 MW (VGF-DCR) [§]	June'16	50	4.43	4.43	4.43
AP-400 MW(VGF) ^{§§}	June'16	400	4.43	4.43	4.43
Karnataka-920 MW(VGF) ^{§§§}	June'16	920	4.43	4.43	4.43
Karnataka-50 MW(VGF-DCR) ^{§§§§}	June'16	50	4.43	4.43	4.43
CG-100(VGF) ^{§§§§§}	June'16	50	4.43	4.43	4.43
REWA Ultra Mega Solar Park [#]	Feb' 17	750	2.979	2.97	3.30
<u>AVERAGE</u>					4.65

[§] Highest VGF required is 130 Lacs/MW with weighted average VGF is 91.14 Lacs

^{§§} Highest VGF required is 74.49 Lacs/MW with weighted average VGF is 59.56 Lacs

^{§§§} Highest VGF required is 73.5 Lacs/MW with weighted average VGF is 72.3 Lacs

^{§§§§} Highest VGF required is 130 Lacs/MW with weighted average VGF is 130 Lacs

^{§§§§§} Highest VGF required is 59 Lacs/MW with weighted average VGF is 59 Lacs

[#] Escalation of 5 paise per unit every year till first 15 years, Levellised tariff Rs 3.30/unit

Source: Ministry of New and Renewable Energy

These developments underscore the need to review the REC forbearance and floor price.

2. Capacity Share of Various RE Technologies in REC framework: The REC framework has been in force for about six years. As on 23.02.2017, a total 1142 projects have been registered in REC framework. The share of each non-solar RE Technology in the REC framework has been analysed for the purpose of determination of the forbearance and floor price of Non Solar RECs. It is expected that the projects coming up for registration under REC framework shall be on similar lines. The detailed break-up of the capacity and number of projects registered is as under:

Technology	No. of Projects	Capacity (MW)	%age Capacity share
Small Hydro	31	247.19	6.15%
Biomass	73	674.845	16.80%
Biofuel Cogeneration	98	758.804	18.89%
Wind	588	2336.47	58.16%
Total Capacity	759	4017.309	

Source: REC Registry

3. Key Parameters for computation of forbearance and floor price:-

3.1 Cost of Generation/RE tariff: Costs of Generation/ RE Tariff for different Technologies have been varied during the control period (2012-2017). RECs are a market instrument and a source of revenue for projects registered under the REC framework. Hence the alignment of REC prices with the market dynamics is required. Various SERCs have prescribed the generic tariff for non-solar RE Technologies. These costs reflect the market scenario prevailing in different states and have been considered to determine the non-solar REC forbearance and floor price. The average bid tariff discovered (as in para 1 (B) above) has been considered to determine the Solar REC forbearance and floor price.

3.2 Average Power Purchase Cost (APPC): means the weighted average pooled price at which the distribution licensee has purchased the electricity including cost of self-generation, if any, in the previous year from all the energy suppliers long-term and short-term, but excluding those based on renewable energy sources (without transmission charges) in the state during the financial year 2015-16.

3.3 Minimum Project Viability Requirement: The project viability approach covers the cost required to meet the viability parameters including O&M, Interest on Loan, Interest on Working Capital and Depreciation (and fuel expenses in case of Biomass and Co-generation projects). Based on the review of generic tariff orders, the Commission has observed that the viability parameters as outlined above constitute 70% of the total levelled tariff.

3.4 *Forbearance Price*: The forbearance price has been derived based on the highest difference between cost of generation of RE Technologies / RE tariff and the average power purchase cost of 2015-16 for the respective states.

3.5 *Floor Price*: The floor price has been determined keeping in view the basic minimum requirements for ensuring the viability of RE projects set up to meet the RE targets. This viability requirement has been observed as approx. 70% of the levellised tariff prescribed for each non solar RE technology or 70% of average bid discovered tariff for solar auctions.

4. Principles for computation of forbearance and floor price:-

In pursuance of the guidelines specified in the Regulation 9 (2) of REC Regulations, the forbearance and floor prices for Solar and Non Solar REC have been evolved based on the following assumptions.

4.1 Computation of Non Solar Forbearance and Floor Price

The Commission followed a two way approach for determination of forbearance and floor price of Non-solar RECs. The approach included the following scenarios.

Scenario 1: Determine Forbearance and Floor Price using APPC and SERC notified tariff for all non-solar RE technologies. Detailed computation may be perused as Annexure – 1A.

Scenario 1 (based on Tariff Orders by SERCs) (in Rs/kWh)				
	SHP	Biomass	Bagasse	Wind
Technology Specific Forbearance Price	2.71	4.20	3.24	2.47
Technology Specific Floor Price	0.84	1.90	1.23	0.74

Total Project Registered under REC mechanism (as on 23.02.2017) Source: REC Registry					
Technology	No. of Projects	Capacity	%age Capacity share	Weighted Average Forbearance Price (Rs/kWh)	Weighted Average Floor Price (Rs/kWh)
Small Hydro	31	247.19	6.15%	0.17	0.05
Biomass	73	674.845	16.80%	0.71	0.32
Biofuel Cogeneration	98	758.804	18.89%	0.61	0.23
Wind	588	2336.47	58.16%	1.44	0.43
Total Capacity	759	4017.309		2.92	1.03

It is evident from the above table that the sum of weightage average forbearance price based on the highest difference between SERC notified tariff and APPC and relative share of technologies in the projects registered in REC framework is Rs 2.92 in per kWh terms.

As regards sum of weightage average floor price based on the highest difference between Minimum Project Viability and APPC and relative share of technologies in the projects registered in REC framework is Rs 1.03 in per kWh terms.

Scenario 2: Determine Forbearance and Floor Price using APPC and SERC notified tariff for all non-solar RE technologies including Bid discovered tariff for Wind Projects. Detailed computation may be perused as Annexure – 1B.

Scenario 2 (based on Tariff Orders by SERCs and Bid Discovered tariff for Wind) (in Rs/kWh)				
	SHP	Biomass	Bagasse	Wind (Bids)
Technology Specific Forbearance Price	2.71	4.20	3.24	0.68
Technology Specific Floor Price	0.84	1.90	1.23	-0.36

Total Project Registered under REC mechanism (as on 23.02.2017) Source: REC Registry					
Technology	No. of Projects	Capacity	%age Capacity share	Weighted Average Forbearance Price (Rs/kWh)	Weighted Average Floor Price (Rs/kWh)
Small Hydro	31	247.19	6.15%	0.17	0.05
Biomass	73	674.845	16.80%	0.71	0.32
Biofuel Cogeneration	98	758.804	18.89%	0.61	0.23
Wind	588	2336.47	58.16%	0.39	-0.21
Total Capacity	759	4017.309		1.88	0.39

It is evident from the above table that the sum of weightage average forbearance price based on the highest difference between SERC notified tariff and APPC and relative share of technologies in the projects registered in REC framework is Rs 1.88 in per kWh terms.

As regards sum of weightage average floor price based on the highest difference between Minimum Project Viability and APPC and relative share of technologies in the projects registered in REC framework is Rs 0.39 in per kWh terms.

4.1.1 Non-Solar Forbearance price

- i. The highest difference between the Costs of Generation/ RE Tariff as specified by various SERCs and the State wise APPC is computed as Technology Specific Forbearance Price for each non-solar RE technology. The Technology Specific Forbearance Price is mapped with the capacity share of each technology in the REC framework and weighted average Technology Specific Forbearance Price for each technology is determined. The sum of the weighted average Technology Specific Forbearance Price for all Non Solar RE technologies in unit price has been rounded off to the nearest ten's, to arrive at the forbearance price of Rs 2,900/MWh.
- ii. Highest difference as forbearance price includes all the technologies and is based on the representative share of each technology in the registered project capacity.

The forbearance price is considered necessary to take care of the risks involved for RE generators in opting for REC mechanism.

4.1.2 Non – Solar Floor Price

- i. The difference between the project viability requirement and APPC determined for different RE Technologies across states. The highest difference for each technology is the Technology Specific Floor Price for each non-solar RE technology. This Technology Specific Floor Price is mapped with the respective capacity share of the technology to get the weighted average Technology Specific Floor Price for each technology. The sum of the weighted average Technology Specific Floor Price for all Non Solar RE technologies in unit price has been rounded off to the nearest ten's, to arrive at the floor price of Rs 1,000/MWh.
- ii. This approach for floor price is considered necessary given the current state of demand supply of REC market. The Commission, however, directs the staff to examine the need of determining the floor price of REC and whether going forward the floor price can be removed.

Therefore, considering the results of the above analysis and the relative share of the technologies therein, the Commission proposes the following forbearance and floor price for non-solar certificates.

	Non Solar REC (Rs/ MWh)
Forbearance Price	2,900
Floor Price	1,000

4.2 Computation of Solar Forbearance and Floor Price

4.2.1 The Commission followed a three pronged approach for determination of forbearance and floor price of Solar RECs. The approach included the following scenarios.

Scenario 1: Determine Forbearance and Floor Price using APPC and Bid Discovered Tariff for all States and Union Territories (UTs) in India. Detailed computation may be perused as Annexure – 2A.

Scenario 1 - Calculation for All States					
Avg. Bid Tariff - Rs. 4.65 /kWh			Avg. Bid Tariff Based MPV - Rs. 3.26 /kWh		
Forbearance Price = Rs. 2.55/kWh			Floor Price = Rs. 1.20/kWh		
Price Range (Rs/kWh)	No. of States	% of States	Price Range (Rs/kWh)	No. of States	% of States
< 1	9	25.0%	< 1	35	97.2%
1 - 2	21	58.3%	1 - 2	1	2.8%
Above 2	6	16.7%	Above 2	0	0.0%
Total	36		Total	36	

It is evident from the above table that the forbearance price based on the highest difference between bid discovered tariff and APPC is Rs 2.55 /kWh. However in respect of a significant majority of States (58.3%), the forbearance price is emerging between Rs 1 and 2 in per kWh terms.

As regards floor price based on the highest difference between Minimum Project Viability and APPC is Rs 1.20 /kWh. However in respect of a significant majority of States (97.2%), the floor price is emerging as less than Rs 1 in per kWh terms.

Scenario 2: Determine Forbearance and Floor Price using APPC and Bid Discovered Tariff for all States and Union Territories (UTs) in India excluding Sikkim, Lakshadweep and Andaman & Nicobar Islands (considering the three States as outliers). Detailed computation may be perused as Annexure – 2B.

Scenario 2 - Calculation for All States (excluding Sikkim, Lakshadweep and A&N Islands)					
Avg. Bid Tariff - Rs. 4.65 /kWh			Avg. Bid Tariff Based MPV - Rs. 3.26 /kWh		
Forbearance Price = Rs. 2.3/kWh			Floor Price = Rs. 1.0/kWh		
Price Range (Rs/kWh)	No. of States	% of States	Price Range (Rs/kWh)	No. of States	% of States
< 1	7	21.2%	< 1	33	100%
1 - 2	21	63.6%	1 - 2	0	0.0%
Above 2	5	15.2%	Above 2	0	0.0%
Total	33		Total	33	

It is evident from the above table that the forbearance price based on the highest difference between bid discovered tariff and APPC is Rs 2.3 /kWh. However in respect of a significant majority of States (63.6%), the forbearance price is emerging between Rs 1 and 2 in per kWh terms.

As regards floor price based on the highest difference between Minimum Project Viability and APPC is Rs 1.0 /kWh. However in respect of almost all States (100%), the floor price is emerging as less than Rs 1 in per kWh terms.

Scenario 3: Determine Forbearance and Floor Price using APPC and Bid Discovered Tariff for selected 17 States and Union Territories (UTs) which have installation of RE based generation sources. Detailed computation may be perused as Annexure – 2C.

Scenario 3 - Calculation for 17 States (RE Rich)					
Avg. Bid Tariff - Rs. 4.65 /kWh			Avg. Bid Tariff Based MPV - Rs. 3.26 /kWh		
Forbearance Price = Rs. 2.2 /kWh			Floor Price = Rs. 0.8 /kWh		
Price Range (Rs/kWh)	No. of States	% of States	Price Range (Rs/kWh)	No. of States	% of States
< 1	4	23.5%	< 1	17	100.0%
1 - 2	10	58.8%	1 - 2	0	0.0%
Above 2	3	17.6%	Above 2	0	0.0%
Total	17		Total	17	

It is evident from the above table that the forbearance price based on the highest difference between bid discovered tariff and APPC is Rs 2.2 /kWh. However in respect of a significant majority of States (58.8%), the forbearance price is emerging between Rs 1 and 2 in per kWh terms.

As regards floor price based on the highest difference between Minimum Project Viability and APPC is Rs 1.0 /kWh. However in respect of almost all States (100%), the floor price is emerging as less than Rs 1 in per kWh terms.

4.2.2 Solar Forbearance price

- i. From the analysis of the three scenarios as above it is evident that the forbearance price could be in the range of Rs 2.2 and Rs 2.55 in per kWh terms. Accordingly, the Commission proposes the forbearance price as Rs 2,500/MWh.
- ii. This approach is considered appropriate as it reflects the current market dynamics and the actual cost of generation as submitted and won by the project developers.

4.2.3 Solar Floor price

- i. The floor price of solar RECs has been calculated based on the project viability approach. The project viability approach covers the cost required to meet viability parameters including O&M, interest on loan, interest on working capital and depreciation.
- ii. The highest difference between the minimum requirements for project viability i.e. 70% of the average bid discovered tariff and respective state APPC of 2015-16 has been considered as floor price.
- iii. In all the above three scenarios in para 4.2.1, the floor price has been observed as ranging between Rs 0.8 and Rs 1.20 in per kWh terms Accordingly, the Commission proposes the floor price as Rs 1,000/MWh

To sum up, considering the results of the above analysis and the relative share of the States and UTs therein, the Commission proposes the following forbearance and floor price for solar certificates.

	Solar REC (Rs/ MWh)
Forbearance Price	2,500
Floor Price	1,000

5. Proposal

Based on the above principles, the following forbearance price and floor price are prescribed for dealing in Certificates under the REC Regulations:

	Non Solar REC (Rs/ MWh)	Solar REC (Rs/ MWh)
Forbearance Price	2,900	2,500
Floor Price	1,000	1,000

The above stated forbearance and floor prices shall be effective from 01.04.2017 and shall remain valid until further orders by the Commission.

No vintage multiplier has been proposed for any technology and the existing vintage multiplier for solar generating technologies registered in REC framework prior to 01.01.2015 shall expire after 31.03.2017.

ANNEXURE-1A (NON SOLAR REC FORBEARANCE AND FLOOR PRICE – BASED ON SERC TARIFF ORDERS)

State (Small Hydro Power)	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	SERC Tariff for Small Hydro Project (5-25 MW) based on SERC Orders (Rs/kWh)	Difference b/w Tariff and APPC (Rs/kWh)	Project Viability Tariff Small Hydro Project (5-25 MW) based on SERC Orders (Rs/kWh)	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Gujarat	3.29	3.64	0.35	2.55	-0.74
Himachal Pradesh	2.43	3.17	0.74	2.22	-0.21
Jammu & Kashmir	3.00	3.73	0.73	2.61	-0.39
Karnataka	3.01	4.16	1.15	2.91	-0.09
Madhya Pradesh	3.54	6.25	2.71	4.38	0.84
Maharashtra	3.46	4.08	0.62	2.86	-0.61
Manipur	2.78	3.80	1.02	2.66	-0.12
Mizoram	2.85	3.80	0.95	2.66	-0.19
Punjab*	4.03	4.69	0.66	3.28	-0.75
Uttar Pradesh	3.82	5.32	1.50	3.72	-0.09
Technology Specific Forbearance Price (Small Hydro Power)				2.71	
Technology Specific Floor Price (Small Hydro Power)				0.84	

State (Wind Energy)	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	SERC Tariff for Wind Energy Project based on SERC Orders (Rs/kWh)	Difference b/w Tariff and APPC (Rs/kWh)	Project Viability Tariff Wind Energy Project based on SERC Orders (Rs/kWh)	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Andhra Pradesh	3.56	4.84	1.28	3.39	-0.17
Gujarat	3.29	4.72	1.43	3.30	0.02
Jammu & Kashmir	3.00	3.86	0.86	2.70	-0.30
Karnataka	3.01	4.5	1.49	3.15	0.14
Madhya Pradesh	3.54	4.78	1.24	3.35	-0.19
Maharashtra	3.46	3.82	0.36	2.67	-0.79
Manipur	2.78	3.96	1.18	2.77	-0.01

Mizoram	2.85	3.96	1.11	2.77	-0.08
Rajasthan \$#	3.29	5.76	2.47	4.03	0.74
Tamil Nadu #	3.35	4.16	0.81	2.91	-0.44
Technology Specific Forbearance Price (Wind Energy)			2.47		
Technology Specific Floor Price (Wind Energy)			0.74		

State (Biomass)	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	Average SERC Tariff for Biomass Project based on SERC Orders (Rs/kWh)	Difference b/w Tariff and APPC (Rs/kWh)	Project Viability Tariff Biomass Project based on SERC Orders (Rs/kWh)	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Bihar	3.88	7.4	3.52	5.18	1.30
Gujarat	3.29	5.64	2.35	3.94	0.66
Karnataka	3.01	5.53	2.52	3.87	0.87
Maharashtra	3.46	7.66	4.20	5.36	1.90
Punjab*	4.03	8.20	4.17	5.74	1.71
Rajasthan \$#	3.29	6.79	3.50	4.75	1.46
Tamil Nadu #	3.35	6.07	2.72	4.25	0.90
Uttar Pradesh	3.82	6.88	3.06	4.82	1.00
Madhya Pradesh	3.54	5.64	2.10	3.95	0.41
Technology Specific Forbearance Price (Biomass)			4.20		
Technology Specific Floor Price (Biomass)			1.90		

State (Bagasse/Cogeneration)	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	SERC Tariff for Bagasse/Cogeneration Project based on SERC Orders (Rs/kWh)	Difference b/w Tariff and APPC (Rs/kWh)	Project Viability Tariff Bagasse/Cogeneration Project based on SERC Orders (Rs/kWh)	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Bihar	3.88	6.19	2.31	4.33	0.46
Gujarat	3.29	5.17	1.88	3.62	0.33
Haryana	3.58	4.20	0.62	2.94	-0.64
Jammu & Kashmir	3.00	5.7	2.70	3.99	0.99

Karnataka	3.01	5.16	2.15	3.61	0.61
Maharashtra	3.46	6.7	3.24	4.69	1.23
Punjab*	4.03	6.59	2.56	4.61	0.58
Tamilnadu #	3.35	5.58	2.23	3.91	0.56
Uttar Pradesh	3.82	6.14	2.32	4.30	0.48
Madhya Pradesh	3.54	6.28	2.74	4.40	0.86
Technology Specific Forbearance Price (Bagasse / Cogeneration)			3.24		
Technology Specific Floor Price (Bagasse / Cogeneration)			1.23		

APPC Data

*Does not include own generation

\$ Data is taken for FY 2014-15

TNERC Order on APPC for 2015-16 has provided APPC as Rs 3.35 per unit

\$\$ RERC Tariff Order 2015-16

Determination of Non Solar Forbearance and Floor Price

Technology	No. of Projects	Capacity	%age Capacity share	Technology Specific Forbearance Price (Rs/kWh)	Weighted Average Forbearance Price (Rs/kWh)	Technology Specific Floor Price (Rs/kWh)	Weighted Average Floor Price (Rs/kWh)
Small Hydro	31	247.19	6.15%	2.71	0.17	0.84	0.05
Wind	588	2336.47	58.16%	2.47	1.44	0.74	0.43
Biomass	73	674.85	16.80%	4.20	0.71	1.90	0.32
Biofuel Cogeneration	98	758.80	18.89%	3.24	0.61	1.23	0.23
Total Capacity	759	4017.31			2.92		1.03

ANNEXURE-1B (NON SOLAR REC FORBEARANCE AND FLOOR PRICE – BASED ON SERC TARIFF ORDERS AND BID DISCOVERED TARIFF FOR WIND PROJECTS)

State (Small Hydro Power)	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	SERC Tariff for Small Hydro Project (5-25 MW) based on SERC Orders (Rs/kWh)	Difference b/w Tariff and APPC (Rs/kWh)	Project Viability Tariff Small Hydro Project (5-25 MW) based on SERC Orders (Rs/kWh)	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Gujarat	3.29	3.64	0.35	2.55	-0.74
Himachal Pradesh	2.43	3.17	0.74	2.22	-0.21
Jammu & Kashmir	3.00	3.73	0.73	2.61	-0.39
Karnataka	3.01	4.16	1.15	2.91	-0.09
Madhya Pradesh	3.54	6.25	2.71	4.38	0.84
Maharashtra	3.46	4.08	0.62	2.86	-0.61
Manipur	2.78	3.80	1.02	2.66	-0.12
Mizoram	2.85	3.80	0.95	2.66	-0.19
Punjab*	4.03	4.69	0.66	3.28	-0.75
Uttar Pradesh	3.82	5.32	1.50	3.72	-0.09
Technology Specific Forbearance Price (Small Hydro Power)			2.71		
Technology Specific Floor Price (Small Hydro Power)			0.84		

State (Wind Energy Projects)	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	Bid Discovered Tariff for Wind Energy Project (Rs/kWh)	Difference b/w Tariff and APPC (Rs/kWh)	Project Viability Tariff Wind Energy Project based on Bid discovered Tariff (Rs/kWh)	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Andhra Pradesh	3.56	3.46	-0.10	2.42	-1.14
Gujarat	3.29	3.46	0.17	2.42	-0.86
Jammu & Kashmir	3.00	3.46	0.46	2.42	-0.58
Karnataka	3.01	3.46	0.45	2.42	0.58
Madhya Pradesh	3.54	3.46	-0.08	2.42	-1.11
Maharashtra	3.46	3.46	0.00	2.42	-1.04
Manipur	2.78	3.46	0.68	2.42	-0.36

Mizoram	2.85	3.46	0.61	2.42	-0.43
Rajasthan \$#	3.29	3.46	0.17	2.42	-0.87
Tamil Nadu #	3.35	3.46	0.11	2.42	-0.93
Technology Specific Forbearance Price (Wind Energy)				0.68	
Technology Specific Floor Price (Wind Energy)				-0.36	

State (Biomass Projects)	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	Average SERC Tariff for Biomass Project based on SERC Orders (Rs/kWh)	Difference b/w Tariff and APPC (Rs/kWh)	Project Viability Tariff Biomass Project based on SERC Orders (Rs/kWh)	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Bihar	3.88	7.4	3.52	5.18	1.30
Gujarat	3.29	5.64	2.35	3.94	0.66
Karnataka	3.01	5.53	2.52	3.87	0.87
Maharashtra	3.46	7.66	4.20	5.36	1.90
Punjab*	4.03	8.20	4.17	5.74	1.71
Rajasthan \$#	3.29	6.79	3.50	4.75	1.46
Tamil Nadu #	3.35	6.07	2.72	4.25	0.90
Uttar Pradesh	3.82	6.88	3.06	4.82	1.00
Madhya Pradesh	3.54	5.64	2.10	3.95	0.41
Technology Specific Forbearance Price (Biomass)				4.20	
Technology Specific Floor Price (Biomass)				1.90	

State (Bagasse/Cogeneration Projects)	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	SERC Tariff for Bagasse/Cogeneration Project based on SERC Orders (Rs/kWh)	Difference b/w Tariff and APPC (Rs/kWh)	Project Viability Tariff Bagasse/Cogeneration Project based on SERC Orders (Rs/kWh)	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Bihar	3.88	6.19	2.31	4.33	0.46
Gujarat	3.29	5.17	1.88	3.62	0.33
Haryana	3.58	4.20	0.62	2.94	-0.64
Jammu & Kashmir	3.00	5.7	2.70	3.99	0.99

Karnataka	3.01	5.16	2.15	3.61	0.61
Maharashtra	3.46	6.7	3.24	4.69	1.23
Punjab*	4.03	6.59	2.56	4.61	0.58
Tamil Nadu #	3.35	5.58	2.23	3.91	0.56
Uttar Pradesh	3.82	6.14	2.32	4.30	0.48
Madhya Pradesh	3.54	6.28	2.74	4.40	0.86
Technology Specific Forbearance Price (Bagasse / Cogeneration)			3.24		
Technology Specific Floor Price (Bagasse/ Cogeneration)			1.23		

APPC Data

*Does not include own generation

\$ Data is taken for FY 2014-15

TNERC Order on APPC for 2015-16 has provided APPC as Rs 3.35 per unit

\$# RERC Tariff Order 2015-16

Determination of Non Solar Forbearance and Floor Price

Technology	No. of Projects	Capacity	%age Capacity share	Technology Specific Forbearance Price (Rs/kWh)	Weighted Average Forbearance Price (Rs/kWh)	Technology Specific Floor Price (Rs/kWh)	Weighted Average Floor Price (Rs/kWh)
Small Hydro	31	247.19	6.15%	2.71	0.17	0.84	0.05
Wind	588	2336.47	58.16%	2.47	0.39	0.74	-0.21
Biomass	73	674.85	16.80%	4.20	0.71	1.90	0.32
Biofuel Cogeneration	98	758.80	18.89%	3.24	0.61	1.23	0.23
Total Capacity	759	4017.31			1.88		0.39

ANNEXURE-2A (SOLAR REC FORBEARANCE AND FLOOR PRICE - FOR ALL STATES)

State	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	Bid Discovered Tariff for Solar Project (Rs/kWh) based on MNRE Data	Difference b/w Bid Discovered Tariff and APPC (Rs/kWh)	Project Viability Tariff (Rs/kWh) based on Bid Discovered Tariff	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Andaman & Nicobar	16.00	4.65	-11.35	3.26	-12.74
Andhra Pradesh	3.56	4.65	1.09	3.26	-0.30
Arunachal Pradesh	3.01	4.65	1.64	3.26	0.25
Assam	3.53	4.65	1.12	3.26	-0.27
Bihar	3.88	4.65	0.77	3.26	-0.62
Chandigarh	3.17	4.65	1.48	3.26	0.09
Chhattisgarh	2.48	4.65	2.17	3.26	0.78
Dadra & Nagar Haveli	3.40	4.65	1.25	3.26	-0.14
Daman & Diu	3.50	4.65	1.15	3.26	-0.24
Delhi	4.19	4.65	0.46	3.26	-0.93
Goa	2.31	4.65	2.34	3.26	0.95
Gujarat	3.29	4.65	1.36	3.26	-0.03
Haryana	3.58	4.65	1.07	3.26	-0.32
Himachal Pradesh	2.43	4.65	2.22	3.26	0.83
Jammu & Kashmir	3.00	4.65	1.65	3.26	0.26
Jharkhand	3.98	4.65	0.67	3.26	-0.72
Karnataka	3.01	4.65	1.64	3.26	0.25
Kerala \$	2.82	4.65	1.83	3.26	0.44
Lakshadweep	13.51	4.65	-8.86	3.26	-10.25
Madhya Pradesh	3.54	4.65	1.11	3.26	-0.28
Maharashtra	3.46	4.65	1.19	3.26	-0.20
Manipur	2.78	4.65	1.87	3.26	0.48
Meghalaya	2.45	4.65	2.20	3.26	0.81
Mizoram	2.85	4.65	1.80	3.26	0.41

Nagaland	3.50	4.65	1.15	3.26	-0.24
Orissa	2.84	4.65	1.81	3.26	0.42
Puducherry	2.98	4.65	1.67	3.26	0.28
Punjab*	4.03	4.65	0.62	3.26	-0.77
Rajasthan \$#	3.29	4.65	1.36	3.26	-0.03
Sikkim	2.10	4.65	2.55	3.26	1.16
Tamil Nadu #	3.35	4.65	1.30	3.26	-0.09
Telangana	3.82	4.65	0.83	3.26	-0.56
Tripura \$	2.80	4.65	1.85	3.26	0.46
Uttar Pradesh	3.82	4.65	0.83	3.26	-0.56
Uttarakhand	2.63	4.65	2.02	3.26	0.63
West Bengal	3.68	4.65	0.97	3.26	-0.42

Determination of Forbearance Price

Price Range (Rs /kWh)	No. of States	% of States
< 1	9	25.0%
1 - 2	21	58.3%
Above 2	6	16.7%

Determination of Floor Price

Price Range (Rs/kWh)	No. of States	% of States
< 1	35	97.2%
1 - 2	1	2.8%
Above 2	0	0.0%

APPC Data

*Does not include own generation

\$ Data is taken for FY 2014-15

TNERC Order on APPC for 2015-16 has provided APPC as Rs 3.35 per unit

\$# RERC Tariff Order 2015-16

ANNEXURE-2B (SOLAR REC FORBEARANCE AND FLOOR PRICE - FOR ALL STATES EXCLUDING SIKKIM, LAKSHADWEEP AND A&N ISLANDS)

State	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	Bid Discovered Tariff for Solar Project (Rs/kWh) based on MNRE Data	Difference b/w Bid Discovered Tariff and APPC (Rs/kWh)	Project Viability Tariff (Rs/kWh) based on Bid Discovered Tariff	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Andhra Pradesh	3.56	4.65	1.09	3.26	-0.30
Arunachal Pradesh	3.01	4.65	1.64	3.26	0.25
Assam	3.53	4.65	1.12	3.26	-0.27
Bihar	3.88	4.65	0.77	3.26	-0.62
Chandigarh	3.17	4.65	1.48	3.26	0.09
Chhattisgarh	2.48	4.65	2.17	3.26	0.78
Dadra & Nagar Haveli	3.40	4.65	1.25	3.26	-0.14
Daman & Diu	3.50	4.65	1.15	3.26	-0.24
Delhi	4.19	4.65	0.46	3.26	-0.93
Goa	2.31	4.65	2.34	3.26	0.95
Gujarat	3.29	4.65	1.36	3.26	-0.03
Haryana	3.58	4.65	1.07	3.26	-0.32
Himachal Pradesh	2.43	4.65	2.22	3.26	0.83
Jammu & Kashmir	3.00	4.65	1.65	3.26	0.26
Jharkhand	3.98	4.65	0.67	3.26	-0.72
Karnataka	3.01	4.65	1.64	3.26	0.25
Kerala \$	2.82	4.65	1.83	3.26	0.44
Madhya Pradesh	3.54	4.65	1.11	3.26	-0.28
Maharashtra	3.46	4.65	1.19	3.26	-0.20
Manipur	2.78	4.65	1.87	3.26	0.48
Meghalaya	2.45	4.65	2.20	3.26	0.81
Mizoram	2.85	4.65	1.80	3.26	0.41
Nagaland	3.50	4.65	1.15	3.26	-0.24
Orissa	2.84	4.65	1.81	3.26	0.42

Puducherry	2.98	4.65	1.67	3.26	0.28
Punjab*	4.03	4.65	0.62	3.26	-0.77
Rajasthan \$#	3.29	4.65	1.36	3.26	-0.03
Tamil Nadu #	3.35	4.65	1.30	3.26	-0.09
Telangana	3.82	4.65	0.83	3.26	-0.56
Tripura \$	2.80	4.65	1.85	3.26	0.46
Uttar Pradesh	3.82	4.65	0.83	3.26	-0.56
Uttarakhand	2.63	4.65	2.02	3.26	0.63
West Bengal	3.68	4.65	0.97	3.26	-0.42

Determination of Forbearance Price

Price Range (Rs /kWh)	No. of States	% of States
< 1	7	21.2%
1 - 2	21	63.6%
Above 2	5	15.2%

Determination of Floor Price

Price Range (Rs/kWh)	No. of States	% of States
< 1	33	100.0%
1 - 2	0	0.0%
Above 2	0	0.0%

APPC Data

*Does not include own generation

\$ Data is taken for FY 2014-15

TNERC Order on APPC for 2015-16 has provided APPC as Rs 3.35 per unit

\$\$ RERC Tariff Order 2015-16

ANNEXURE-2C (SOLAR REC FORBEARANCE AND FLOOR PRICE - FOR RE RICH 17 STATES)

State	APPC (2015-16) as estimated based on SERC Tariff Orders for 2015-16 (Rs/kWh)	Bid Discovered Tariff for Solar Project (Rs/kWh) based on MNRE Data	Difference b/w Bid Discovered Tariff and APPC (Rs/kWh)	Project Viability Tariff (Rs/kWh) based on Bid Discovered Tariff	Difference b/w Project Viability Tariff and APPC (Rs/kWh)
Andhra Pradesh	3.56	4.65	1.09	3.26	-0.30
Arunachal Pradesh	3.01	4.65	1.64	3.26	0.25
Chhattisgarh	2.48	4.65	2.17	3.26	0.78
Gujarat	3.29	4.65	1.36	3.26	-0.03
Haryana	3.58	4.65	1.07	3.26	-0.32
Himachal Pradesh	2.43	4.65	2.22	3.26	0.83
Karnataka	3.01	4.65	1.64	3.26	0.25
Kerala \$	2.82	4.65	1.83	3.26	0.44
Madhya Pradesh	3.54	4.65	1.11	3.26	-0.28
Maharashtra	3.46	4.65	1.19	3.26	-0.20
Punjab*	4.03	4.65	0.62	3.26	-0.77
Rajasthan \$#	3.29	4.65	1.36	3.26	-0.03
Tamil Nadu #	3.35	4.65	1.30	3.26	-0.09
Telangana	3.82	4.65	0.83	3.26	-0.56
Uttar Pradesh	3.82	4.65	0.83	3.26	-0.56
Uttarakhand	2.63	4.65	2.02	3.26	0.63
West Bengal	3.68	4.65	0.97	3.26	-0.42

Determination of Forbearance Price

Price Range (Rs /kWh)	No. of States	% of States
< 1	4	23.5%
1 - 2	10	58.8%
Above 2	3	17.6%

Determination of Floor Price

Price Range (Rs/kWh)	No. of States	% of States
< 1	17	100.0%
1 - 2	0	0.0%
Above 2	0	0.0%

APPC Data

*Does not include own generation

\$ Data is taken for FY 2014-15

TNERC Order on APPC for 2015-16 has provided APPC as Rs 3.35 per unit

\$\$ RERC Tariff Order 2015-16