

# Solar Energy Sector: *Favourable amendments in RPO norms carried out recently & strong project pipeline are positives, though solar PV bid tariffs continue to remain aggressive*

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ICRA RATING FEATURE

## Executive Summary

This note highlights the recent amendments in solar renewable purchase obligation (RPO) norms, compliance of solar RPO norms in some important states and trends in competitively bid solar photovoltaic (PV) tariff for calendar year 2016 till date. The State Electricity Regulatory Commissions (SERC) in states such as in Maharashtra & Tamil Nadu have recently amended solar RPO norms with upward revision in norm and extension in trajectory period. The pipeline of project awards through bidding route continue to remain healthy with award of about 5.4 GW of capacity (both through Central Government's National Solar Mission (NSM) policy and state specific solar policy route) in last six-month period. However, the bid tariffs for these solar PV projects continue to be aggressive with sizeable projects won at a tariff of less than Rs. 5/kWh. As a result, ability of such projects to tie-up debt funding in a timely manner remains crucial, in ICRA's view. Further, an inconsistency in the solar RPO norms across the states, shortfall in RPO compliance by distribution utilities & absence of stricter enforcement by SERCs continue to remain regulatory challenges for the sector.

- ❖ The all-India solar energy capacity stood at 7,565 MW as on May 31, 2016 which accounts for about 17.6% of renewable energy capacity in the country and 2.5% of all India installed power generation capacity. During FY2016, the solar capacity addition was 3,019 MW - the highest ever achieved - against 1,112 MW in FY 2015. During April and May 2016, another 802 MW of solar capacity was added on all-India basis. This growth has been driven by policy support at both, Central and State levels as well as improved competitiveness vis-a-vis conventional sources of power.
- ❖ On the regulatory front, solar RPO norms (including draft orders which are yet to be finalised by SERC) have been amended in three states namely Tamil Nadu, Maharashtra and Jharkhand in the last four-months. The SERC in Tamil Nadu has significantly increased solar RPO norm from 0.5% in FY2016 to 5% in FY2018. The SERC in Maharashtra has extended the solar RPO trajectory till FY2020 while gradually increasing the solar RPO norm from 0.5% in FY2016 to 3.5% in FY2020. The SERC in Jharkhand in its draft order has extended RPO trajectory till FY2020 and also gradually increased solar RPO from 1% in FY2016 to 4.5% in FY2020. Thus extension in RPO trajectory coupled with upward revision in solar RPO norms as seen in these states are positive developments for the domestic solar energy sector.

Table 1: Recent Amendments (including draft orders) in Solar RPO Norms

State	FY2017	FY2018	FY2019	FY2020
Tamil Nadu Solar RPO	2.50%	5.00%		
Maharashtra Solar RPO	1.00%	2.00%	2.75%	3.50%
Jharkhand Solar RPO (Draft)	1.50%	2.25%	3.25%	4.50%

- ❖ Nonetheless, the overall solar RPO norms still show wide divergence across the states and are by and large below national RPO targets laid down in National Action Plan on Climate Change (NAPCC). SERCs in 24 of the 30 states have declared solar

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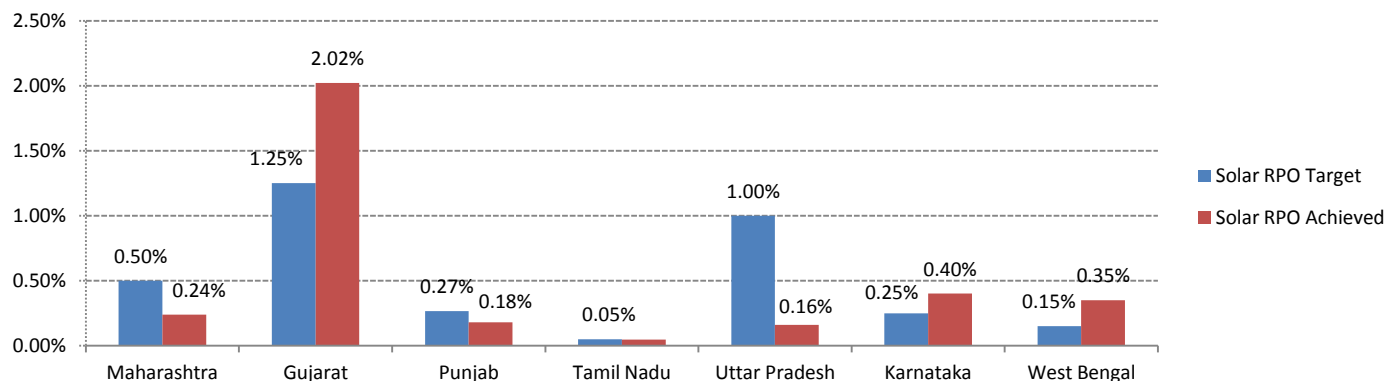
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RPO targets for FY2017 which vary from 0.2% to 2.5% for the obligated entities. Significantly, two states with large solar potential, viz. Rajasthan and Gujarat are yet to announce the solar RPO targets beyond FY2017. Thus, the timely revision of the state solar RPO norms to bring them in line with the solar RPO target of 8% for FY2022 as per National Tariff Policy (NTP), 2016, remains crucial in ICRA's opinion.

- ❖ The solar sector continues to face a major regulatory challenge with regard to compliance of the solar RPO targets by the discoms. The compliance on solar RPO by state discoms across seven states (which constitute about 55% of energy demand in the country) for FY2015 under study has been shown in *Chart 1*. As seen from *Chart 1*, only three states, viz. Gujarat, West Bengal and Karnataka, were able to meet the solar RPO targets for FY2015, while shortfalls were seen in the remaining states.

**Chart 1: Solar RPO targets v/s actuals for state discoms for FY2015**



Source: ICRA research, State Electricity Regulatory Commissions & Nodal Agencies; Data above is only for state-owned discoms; Target for Punjab discom includes the carry-forward solar units from FY2014

- ❖ ICRA however takes a note of the judgement<sup>1</sup> of the Appellate Tribunal for Electricity (APTEL) dated April 28, 2016 which is favourable for the solar sector. In this order, APTEL has stated that “there is no justification for the State Commission for imposing such meager penalty of Rs.25,000/-. Such meager penalty will defeat the object behind RPO obligation and REC mechanism. Imposition of such meager penalty may become a precedent and that may not be in the interest of stated object of promotion of generation of electricity from renewable energy sources.” APTEL has also directed the SERC to hear the parties on the quantum of penalty and pass appropriate order. As a result, stricter enforcement of RPO regulations in a timely manner by SERC remains crucial for sustained demand of solar energy in the long run.
- ❖ ICRA notes despite the regulatory challenges in the sector the projects bid out in the solar sector have been quite large. In the period from January 2016 till date, solar projects with cumulative capacity of about 5,420 MW have been awarded under the State and Central Government policies, with installation period ranging from 12 to 18 months. *Table 2* provides brief details on the projects awarded in CY2016 (till date).

**Table 2: Details on solar projects awarded during CY2016 (till date)**

State & Scheme	Month of Bid Result	Capacity Allocated	Tariff range (Rs/kWh)	Weighted average tariff (Rs/kWh)
Rajasthan (JNNISM*, Phase II, Batch II, Tranche I)	January 2016	420 MW	4.34-4.36	4.35
Maharashtra (JNNISM, Phase II, Batch III, Tranche I)^	January 2016	500 MW	4.41-4.43	4.43

<sup>1</sup> This order by APTEL is against the petition filed on the Madhya Pradesh State Electricity Regulatory Commission's (MPERC) decision to impose a token penalty of Rs. 25,000 on Madhya Pradesh Power Management Company Limited for non-fulfilment of Solar RPO for FY2012 to FY2014

Uttar Pradesh (JNNSM, Phase II, Batch II, Tranche I)	January 2016	100 MW	4.78	4.78
Uttar Pradesh (JNNSM, Phase II, Batch III, Tranche III)^	March 2016	125 MW	4.43	4.43
Jharkhand (State Solar Policy)	March 2016	Category 1: 102 MW <sup>&amp;</sup> Category 2: 999 MW <sup>&amp;</sup>	Category 1: 5.20-5.59 Category 2: 5.08-5.48	Category 1: 5.46 Category 2: 5.36
Karnataka (State Solar Policy)	March 2016	Category 1: 810 MW <sup>#</sup> Category 2: 100 MW <sup>#</sup>	Category 1: 4.69-5.50 Category 2: 5.94-6.10	Category 1: 5.02 Category 2: 6.10
Karnataka (JNNSM, Phase II, Batch II, Tranche I)	April 2016	500 MW	4.78-4.80	4.79
Telangana (JNNSM, Phase II, Batch II, Tranche I)	May 2016	350 MW	4.66-4.67	4.67
Andhra Pradesh (JNNSM, Phase II, Batch III, Tranche IV)^	May 2016	400 MW	4.43 + bid VGF	4.43 + bid VGF
Karnataka (JNNSM, Phase II, Batch III)^	June 2016	920 MW	4.43 + bid VGF	4.43 + bid VGF
Chhattisgarh (JNNSM, Phase II, Batch III)^	June 2016	100 MW	4.43 + bid VGF	4.43 + bid VGF
<b>Sub-total</b>		<b>5,426 MW</b>		

\* JNNSM: Jawaharlal Nehru National Solar Mission

^ projects awarded under the Viability Gap Funding (VGF) Scheme

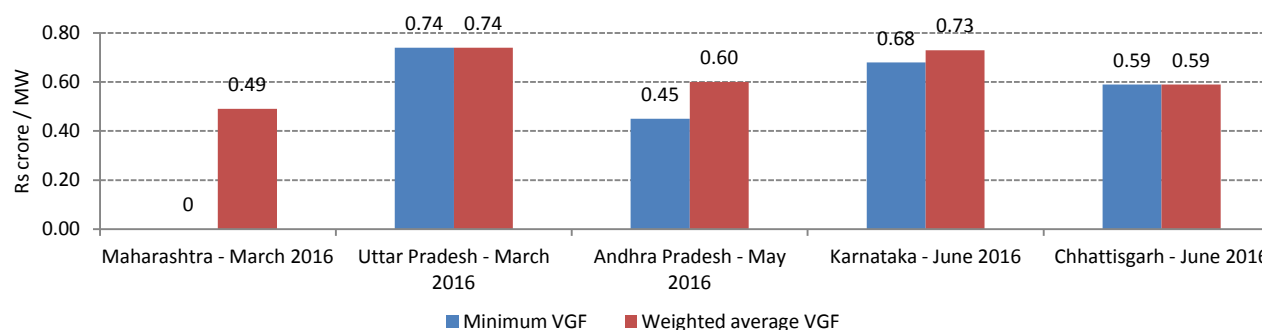
& Bids in Jharkhand were invited under two categories: Category 1 was for solar capacities of 25MW or below & Category 2 was for solar capacities above 25MW

# For Karnataka bids, capacity of 100 MW (Category 2) was reserved for solar cell and module manufacturers located in Karnataka

Source: MNRE, ICRA research

- ❖ The bidding in the solar space continues to remain aggressive. The weighted average tariff of projects awarded in CY2015 was about Rs. 5.6/kWh which has reduced to Rs. 5.0/kWh for YTD CY2016 (excluding projects awarded under VGF route). More importantly, about 2,130 MW out of 5,420 MW of solar capacity awarded in CY2016 so far have tariffs less than Rs. 5/kWh. As per ICRA estimates, solar projects setup at a project cost of Rs. 5.5 crore/MW and earning tariff of Rs. 5/kWh would have a post-tax project IRR of 7.6% and average DSCR of 1.09 time<sup>2</sup>. The ability of such projects to tie-up debt funding in a timely manner remains crucial. In ICRA's view, viability of such tariffs hinges on structuring of debt with longer tenures, competitive funding costs and the ability of the project developers to keep the cost of modules within the budgeted levels.
- ❖ Solar projects awarded under VGF scheme (JNNSM, Phase II, Batch III) in CY2016 have a fixed tariff of Rs. 4.43/kWh<sup>3</sup> while the VGF amount sought by the developers has varied from nil to Rs. 0.75 crore/MW. The weighted average VGF amount for these projects was Rs. 0.64 crore per MW (which equates to about Rs. 0.69/kWh<sup>4</sup>). Average equivalent tariff for these projects is about Rs. 5.12/kWh. The trend of the average VGF amount sought is shown in *Chart 2*.

**Chart 2: Minimum and Weighted Average VGF trend for projects awarded in CY2016**



<sup>2</sup> Other assumptions include PLF of 19% with annual degradation of 0.5%; debt to equity funding ratio of 70:30; interest rate of 12% per annum on borrowings; debt repayment period of 12 years

<sup>3</sup> except for a 30 MW project awarded in Maharashtra in January 2016 where the tariff quoted was Rs. 4.41/kWh

<sup>4</sup> under normative principles

## Annexure: Solar RPO trajectory across all states

Table 3: Highlights of Solar RPO Trajectory Across States

	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022
Andhra Pradesh		0.25%	0.25%	0.25%	0.25%	0.25%					
Arunachal Pradesh		0.10%	0.15%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
Assam	0.10%	0.15%	0.20%	0.25%	0.25%	1.00%	1.25%	1.50%			
Bihar	0.50%	0.25%	0.50%	0.75%	1.00%	1.25%	1.50%	1.75%	2.00%	2.50%	3.00%
Chhattisgarh	0.25%	0.50%	0.50%	0.75%	1.00%						
Delhi (NCT)		0.15%	0.20%	0.25%	0.30%	0.35%					
Gujarat	0.50%	1.00%	1.00%	1.25%	1.50%	1.75%					
Haryana	0.50%	0.05%	0.10%	0.25%	0.75%	1.00%	1.25%	1.50%	2.00%	2.50%	3.00%
Himachal Pradesh	0.01%	0.25%	0.25%	0.25%	0.25%	0.25%	0.50%	0.75%	1.00%	2.00%	3.00%
Jammu & Kashmir	0.10%	0.25%	0.25%	0.75%	0.75%	1.00%	1.25%	1.50%	1.75%	2.00%	3.00%
JERC (Goa & UTs)	0.30%	0.40%	0.40%	0.60%	0.85%	1.15%	1.50%	1.85%	2.20%	2.60%	3.00%
Jharkhand	0.50%	1.00%	1.00%	1.00%	1.00%	1.50%	2.25%	3.25%	4.50%		
Karnataka	0.25%	0.25%	0.25%	0.25%	0.25%	0.50%	0.75%	1.00%	1.50%	1.50%	1.50%
Kerala	0.25%	0.25%	0.25%	0.25%	0.45%	0.50%	0.55%	0.60%	0.65%	0.70%	0.75%
Madhya Pradesh	0.40%	0.60%	0.80%	1.00%	1.00%	1.25%	1.50%	1.75%			
Maharashtra	0.25%	0.25%	0.50%	0.50%	0.50%	1.00%	2.00%	2.75%	3.50%		
Manipur	0.25%	0.25%	0.25%	0.25%	0.25%						
Meghalaya	0.30%	0.40%	0.40%	0.41%	0.42%	0.43%					
Mizoram	0.25%	0.25%	0.25%	0.25%	0.25%						
Nagaland	0.25%	0.25%	0.25%	0.25%	0.25%						
Orissa	0.10%	0.15%	0.20%	0.25%	0.50%	1.50%	3.00%	4.50%	5.50%		
Punjab	0.03%	0.07%	0.13%	0.19%	1.00%	1.30%	1.80%	2.20%	2.50%		
Rajasthan	0.50%	0.75%	1.00%	1.50%	2.00%	2.50%					
Sikkim	0.00%	0.00%	0.00%	0.00%	0.00%						
Tamil Nadu	0.05%	0.05%	0.05%	0.05%	0.50%	2.50%	5.00%				
Telangana				0.25%	0.25%	0.25%					
Tripura	0.00%	0.10%	0.15%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
Uttarakhand	0.10%	0.15%	0.20%	0.25%	0.50%	0.75%	1.00%	1.25%	1.50%		
Uttar Pradesh	0.50%	0.25%	0.50%	0.75%	1.00%	1.25%	1.50%	1.75%	2.00%	2.50%	3.00%
West Bengal	0.25%	0.50%	0.50%	0.75%	1.00%						

Source: ICRA research, MNRE

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