

## **Current Trends/Status in Solar Power Market**

***Workshop on “Challenges and Issues in Solar RPO Compliance/RECs”***

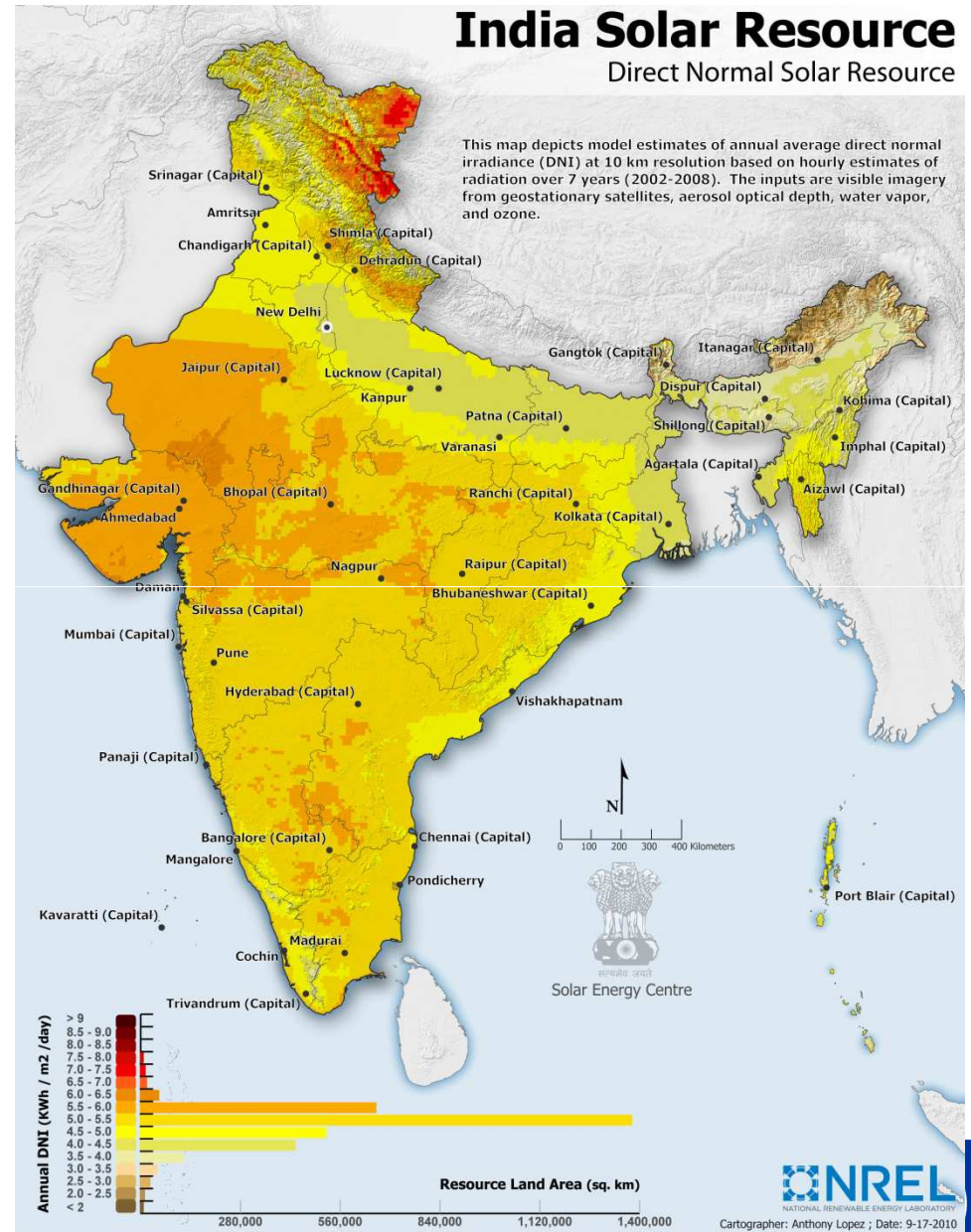
***December 19, 2012***

**AF-Mercados EMI**

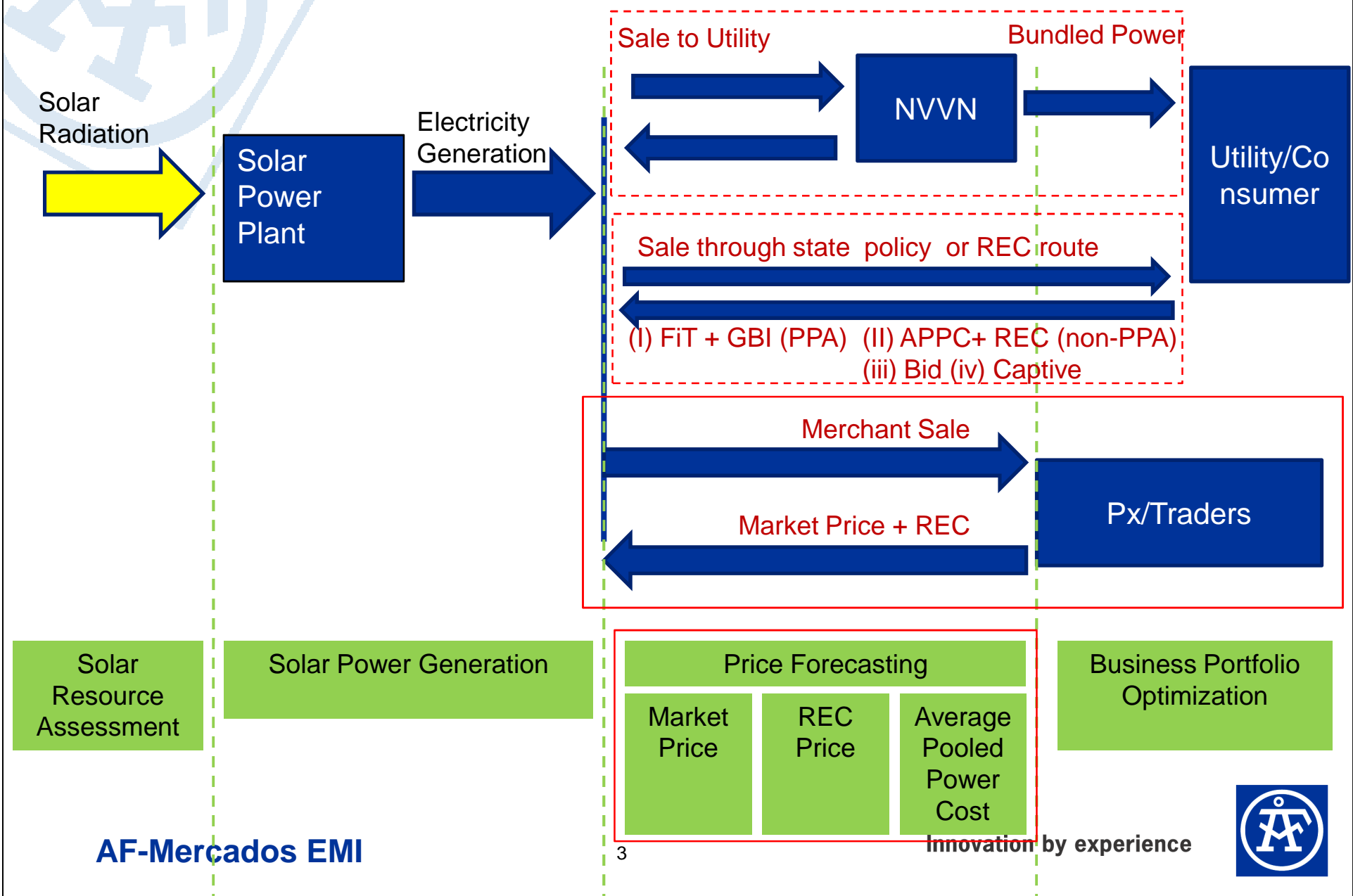


# Harnessing India's vast Solar Potential

- Among the various renewable energy resources, **solar energy potential is the highest in the country.**
- The global solar radiation over India varies from 4-7 Kwh/sq m/day
- The states that have **the maximum isolation are Rajasthan and Gujarat.** In addition, the states of Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Maharashtra and Chattisgarh also enjoy good insolation levels.



# Current solar power business models



## Policy Snapshot

**Increasing cost of ever decreasing resource of fossil fuels**, issues in development of thermal projects, and environmental friendliness of RE sources has over the recent years fuelled the use of Renewable Energy.



- **NEP and NTP lay emphasis on promotion of RE generation** by stipulating appropriate commission to fix minimum percentage of purchase of power from renewable sources.
- **RPO mechanism introduced to increase RE penetration.** Each SERC has set own levels of RPO (solar & non-solar) for the DISCOMS to comply with.
- **NAPCC** envisages a national level 10% RPO level to be achieved by 2015.
- As per **Tariff Policy**, the solar power purchase obligation for states may start with 0.25% in Phase I (by 2013) and go up to 3% by 2022
- RE **resource unequally distributed** in the country with some states having abundant supply. This makes it difficult for the RE deficit states to meet their RPO targets.
- To counter this issue, **REC mechanism was introduced.** Discoms could buy REC's from power exchanges and fulfil their RPO.

**Several policy measures introduced to harness India's vast solar energy potential**



## Solar RPO Target

As per Tariff policy, Solar RPO has to begin with 0.25 % by 2013 and reach 3% by 2022

Year	Solar RPO (%) (B)	Solar Capacity Requirement for RPO compliance (MW)
2012-13	0.25%	1,536
2013-14	0.50%	3,291
2014-15	0.75%	5,291
2015-16	1.00%	7,560
2016-17	1.25%	10,127
2017-18	1.75%	15,176
2018-19	2.25%	20,885
2019-20	2.50%	24,839
2020-21	2.75%	29,247
<b>2021-22</b>	<b>3.00%</b>	<b>34,152</b>

Demand based on the National Electricity Plan for Generation January 2012

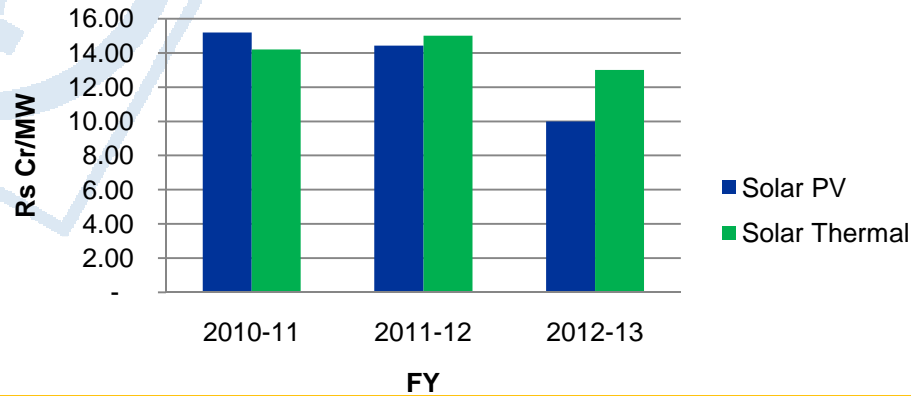
CUF based on CERC norms are used to arrive at MW capacity

**To achieve 3% RPO compliance by 2022, we would need ~34,000MW of solar capacity**



# Solar PV & Solar Thermal Cost & Tariff - Benchmark

## Cost of solar PV & Solar Thermal

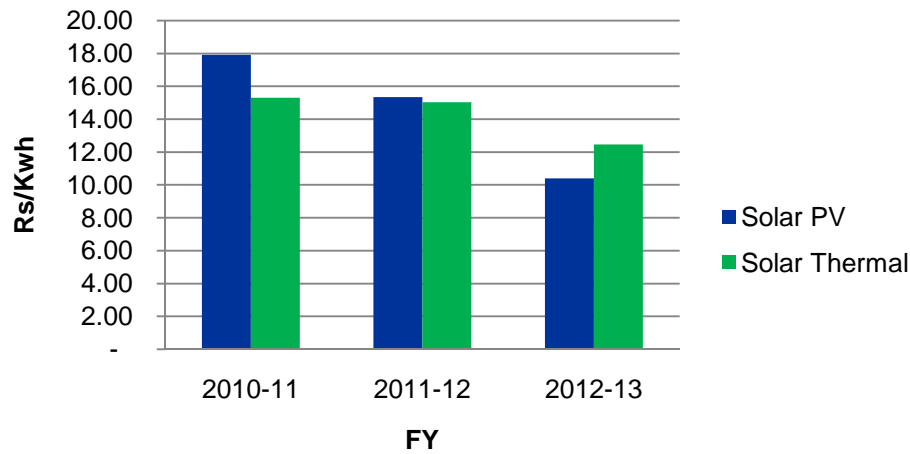


Rs Cr/MW	2010-11	2011-12	2012-13
Solar PV	15.20	14.42	10.00
Solar Thermal	14.20	15.00	13.00

Benchmark Cost & Tariffs

**This has resulted in reduction in benchmark tariffs as shown below:**

## Solar Tariff



Rs/Kwh	2010-11	2011-12	2012-13
Solar PV	17.91	15.34	10.39
Solar Thermal	15.31	15.04	12.46



## Summary status of projects under National Solar Mission

Projects		Project Allotted	Project Commissioned	Wt Av Tariff(Rs/Kwh)	CERC Tariff (Rs/Kwh)
		MW	MW		
<b>Solar PV projects through NVVN (Batch I)</b>		150	130\$	12.16 (32% reduction)	17.91
<b>Solar Thermal Projects Through NVVN</b>		470*	-	11.48	
<b>Migration Scheme</b>	Solar PV	54	48		
	Solar Thermal	30*	2.5		
<b>RPSSGP Scheme (PV)</b>		98.5	87.80		
<b>PV projects through NVVN (Batch II)</b>		350	-	8.77 (43% reduction)	15.34
<b>Other schemes**</b>			21.5		
<b>TOTAL</b>			<b>290 MW</b>		

\$ Two projects were cancelled

\*\*Includes demonstration projects, pilot projects, tail end projects

**\*The solar thermal projects are scheduled to be commissioned by first half of 2013.**

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Innovation by experience



## Current solar capacity Status

### Gujarat

Projects have come mainly through state policy.

### Rajasthan

NSM Phase - 1 : ~100 MW

Rest through state policy, Migration scheme, & RPSSGP

Sr. No.	States	Installed Capacity (MW)
1	Andhra Pradesh	23.75
2	Arunachal Pradesh	0.025
3	Chhattisgarh	4
4	Delhi	2.525
5	Goa & UT	1.685
<b>6</b>	<b>Gujarat</b>	<b>709.54</b>
7	Haryana	7.8
8	Jharkhand	16
9	Karnataka	14
10	Kerala	0.025
11	Madhya Pradesh	7.25
12	Maharashtra	21
13	Odisha	13
14	Punjab	9.325
<b>15</b>	<b>Rajasthan</b>	<b>201.15</b>
16	Tamil Nadu	17.05
17	Uttarakhand	5.05
18	Uttar Pradesh	12.375
19	West Bengal	2.05
<b>Total</b>		<b>1067.6</b>

Note : The data is compiled on the basis of information obtained from IREDA, NVVN, State Agencies and Project Developers

Several states such as Gujarat, Rajasthan, Tamil Nadu, Chhattisgarh, Andhra Pradesh, Orissa, Uttar Pradesh (Draft) have come up with solar Policies to promote solar power in respective states



## State Initiatives

State	Target
Gujarat	Had announced around 968MW solar capacity;709 MW already commissioned
Andhra Pradesh	RFP for 1,000 MW already issued
Tamil Nadu	RFP for 1,000 MW already issued
Orissa	Allocated 50MW in two phases of 25MW each
Rajasthan	Called bid for 200MW solar capacity
Karnataka	Allocated 80 MW of solar power projects planned to be commissioned in 2013
Chhattisgarh	Aims at capacity of 500MW till March 2017
Uttar Pradesh	Aims at capacity of 500MW till March 2017
Madhya Pradesh	Plans to add 300 MW of solar power under its solar policy. 200MW has already been bid out
Maharashtra	Has announced 205MW



## State RPO regulations – Few select states

State	Regulations
<b>Bihar</b>	If solar certificates are not available in a particular year, then in such cases, <b>additional non-solar certificate shall be purchased for fulfillment of the Renewable Purchase Obligation (RPO).</b>
<b>Gujarat</b>	The RPO regulations are <b>not applicable on captive as well as open access consumers.</b>
<b>Karnataka</b>	Captive users can sell their surplus power <b>only to the distribution companies (ESCOMs)</b> at a price not exceeding the APPC
<b>Rajasthan</b>	Solar RPO in Rajasthan <b>is applicable on DISCOMS only.</b>
<b>Maharashtra</b>	Captive user(s) consuming power from <b>grid connected fossil fuel based co-generation plants, are exempted from applicability of RPO target</b> and other related conditions as specified in these Regulations.
<b>Kerala</b>	The regulation <b>does not specify the min capacity for Captive consumers</b> for applicability of RPO.



## Current state-wise RPO targets

States	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Andhra Pradesh	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%					
Arunachal Pradesh	Not regulation issued for RPO by the Power Department										
Assam	0.10%	0.15%	0.20%	0.25%							
Bihar	0.25%	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%									
Delhi	0.10%	0.15%	0.20%	0.25%	0.30%	0.35%					
JERC (Goa & UT)	0.30%	0.40%									
Gujarat	0.50%	1.00%									
Haryana	0.00%	0.05%	0.75%								
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 and Kashmir	0.10%	0.25%									
Jharkhand	0.50%	1.00%									
Karnataka	0.25%										
Kerala	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
Madhya Pradesh	0.40%	0.60%	0.80%	1.00%							
Maharashtra	0.25%	0.25%	0.50%	0.50%	0.50%						
Manipur	0.25%	0.25%									
Mizoram	0.25%	0.25%									
Meghalaya	0.30%	0.40%									
Nagaland	0.25%	0.25%									
Orissa	0.10%	0.15%	0.20%	0.25%	0.30%						
Punjab	0.03%	0.07%	0.13%	0.19%							
Rajasthan	0.50%	0.75%	1.00%								
Sikkim	Not regulation issued for RPO by the Power Department										
Tamil Nadu	0.05%										
Tripura	0.10%	0.10%									
Uttarakhand	0.03%	0.05%									
Uttar Pradesh	0.50%	1.00%									
West Bengal			0.25%	0.30%	0.40%	0.50%	0.60%				

(Source: SERCs Order on RPO Regulations)

- ❑ There should be uniformity in RPO trajectory specified by different states.
- ❑ Also, states need to set RPO targets as per tariff policy guidelines

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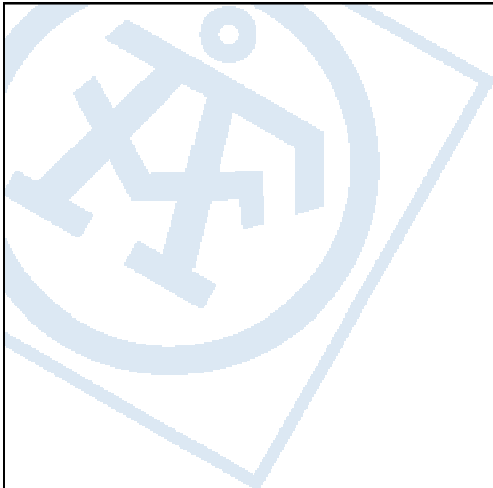


## Key Aspects for Discussion in the Workshop

- State policies – how have they performed? What is the future direction?
- REC Framework – does the mechanism need significant changes?  
Issues in implementing the REC scheme
- Discom's perspective on solar RPO & Regulatory issues in solar RPO implementation – how can the market creation mechanism be provided with more certainty
- Rooftop solar – Business models, Guidelines and issues?
- Financing of roof top Solar Projects - How to reduce the costs of finance?

**The aim of the workshop is to have a structured dialogue on the issues**





Thank You

