

# Market for Renewable Energy Certificates

**Indian Institute of Technology Kanpur (IITK) and Indian Energy Exchange (IEX) are delighted to announce  
Training Program on  
"Power Procurement Strategy and Power Exchanges"  
28-30 July, 2014**

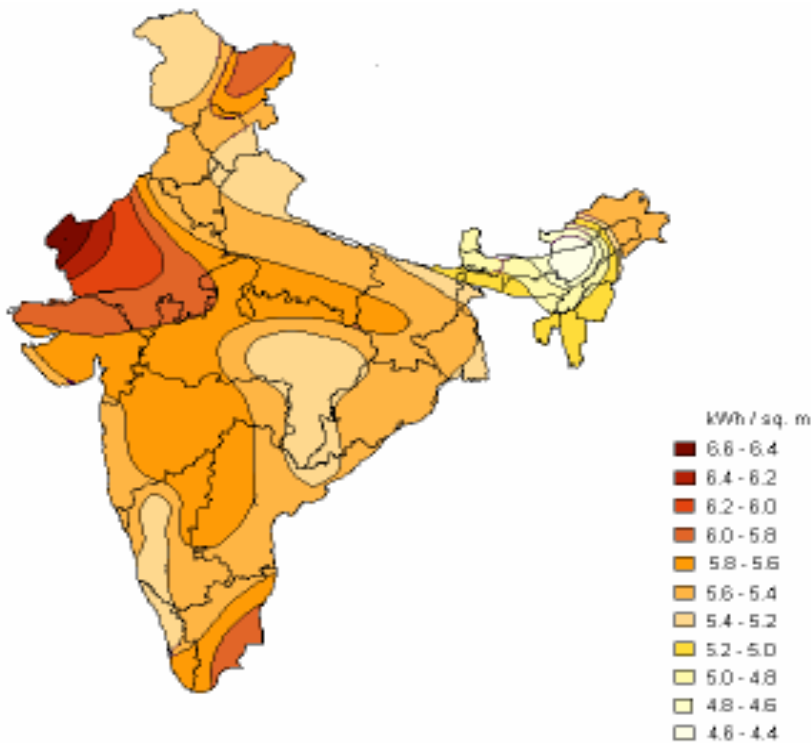
**Rakesh Shah  
Advisor (Renewable)  
Central Electricity Regulatory Commission**

# **OVERVIEW OF REC MECHANISM**

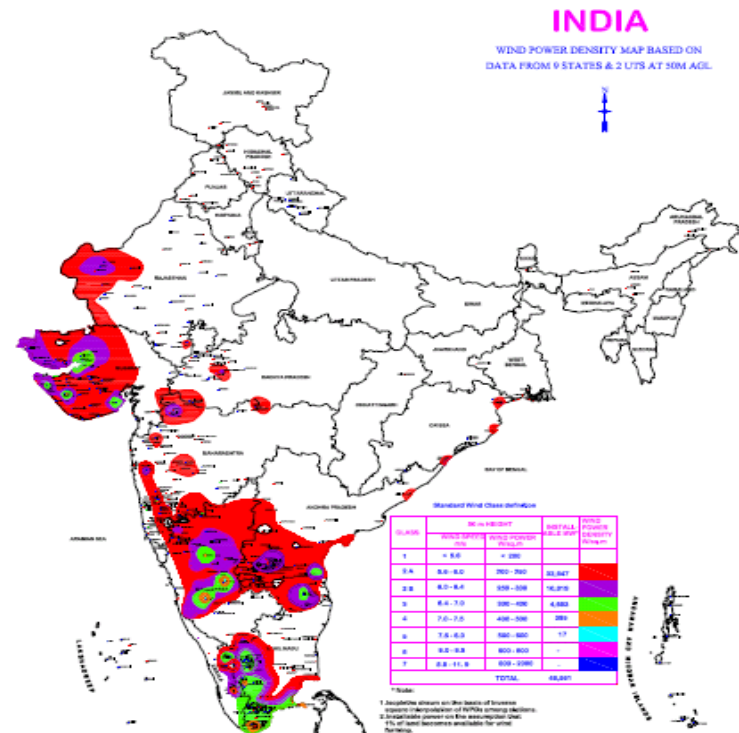
# REC – CONTEXT

## Unevenly Distributed RE Resources

### SOLAR

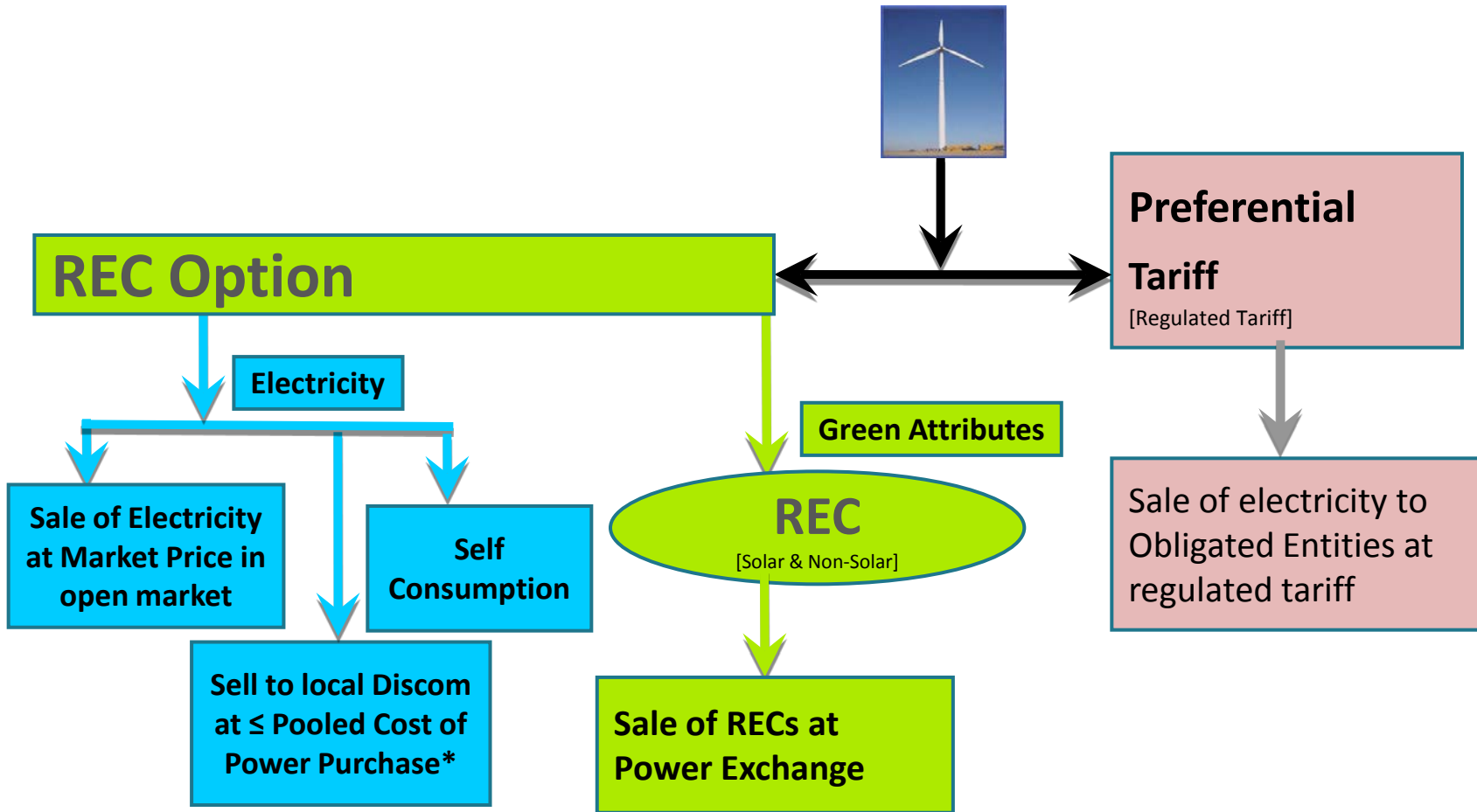


### WIND



- Resource rich states not willing to purchase high cost RE power beyond RPO
- Variability : Inter-state transmission is also difficult

# REC Design



\* - Weighted Average Pooled Price at which distribution licensee has purchased electricity (including cost of self generation, long-term and short term purchase) in the previous year, but excluding the cost of RE power purchase

## CERC REC Regulation, 2010: Salient features

### Salient features

Accreditation	State Agency
Registration	Central Agency
Revocation of Registration	Central Agency
Categories of REC	Solar REC & Non-Solar REC
Issuance of REC	By Central Agency only based on injection certificate
REC Denomination	1 MWh = 1 REC
Time limit for claiming REC	3 Months from injection
Validity of REC	730 days after issuance
Dealing in Certificates	Power Exchanges only
REC Price Guarantee	Between 'Floor' Price and 'Forbearance' Price
Monitoring Mechanisms	Compliance Auditor

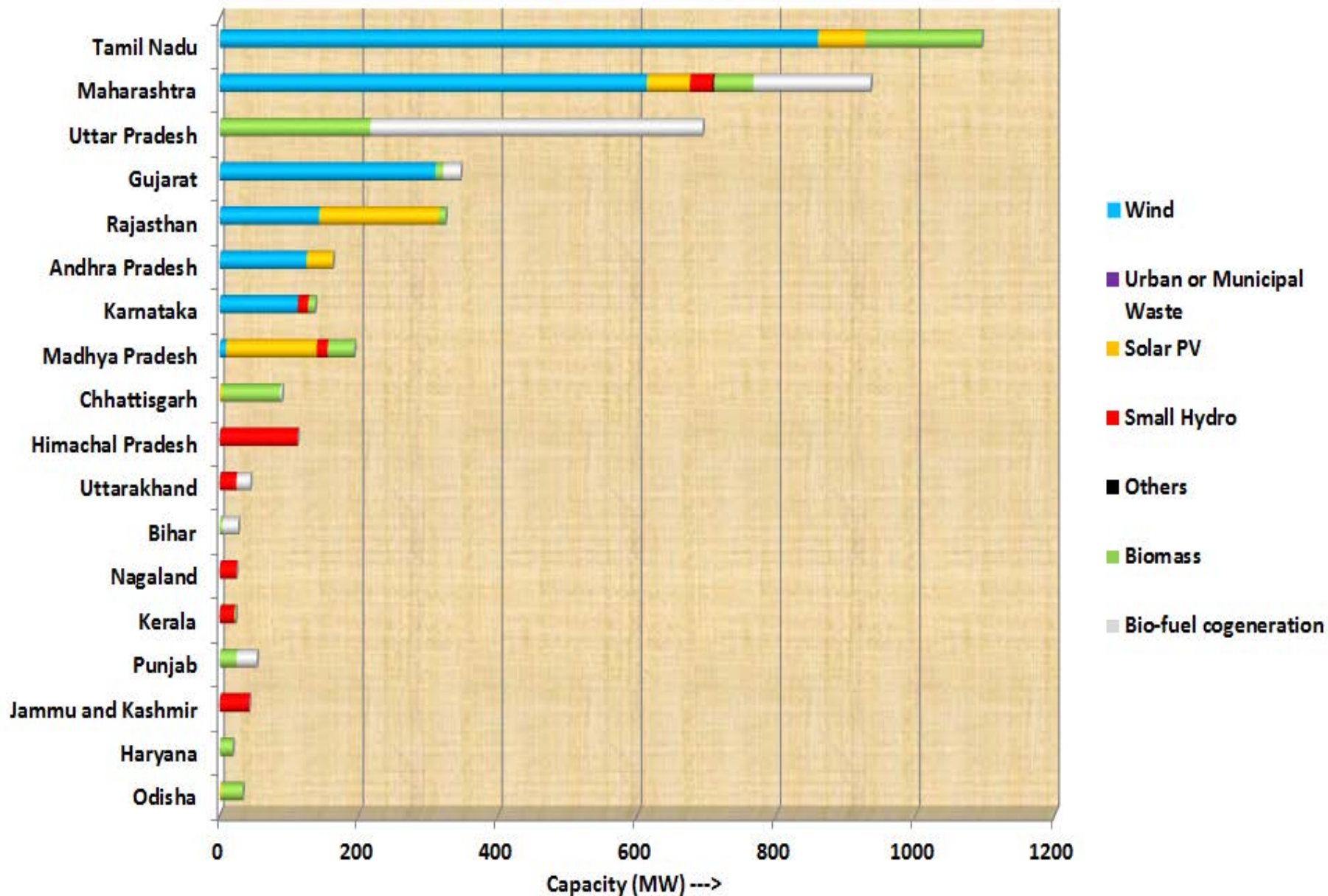
# **MARKET EVOLUTION**

## Details of RE projects Registered under REC Mechanism

Sr. No	Source Wise	Accreditation		Registration	
		Capacity (MW)	Unit	Capacity (MW)	Unit
1	Wind	2,422	617	2,218	577
2	Biomass	721	75	677	72
3	Bio-fuel cogeneration	853	89	745	82
4	Small Hydro	342	37	288	31
5	Solar PV	530	244	479	220
7	Biogas	2	1	2	1
	<b>Total</b>	<b>4,871</b>	<b>1,063</b>	<b>4,409</b>	<b>983</b>

- RE generators from 18 States are participating in the REC Mechanism
- RE Projects with capacity as low as 0.11 MW (Solar) and as high as 50.4 MW (Wind) has been registered
- Average plant size capacity registered:
  - Wind ~4 MW, Solar ~ 2 MW,
  - Small Hydro, Biomass and Biofuel co-gen ~ 9 MW

## State and Fuel-Source wise Registration Status Capacity (MW) (as on 30-June-14)

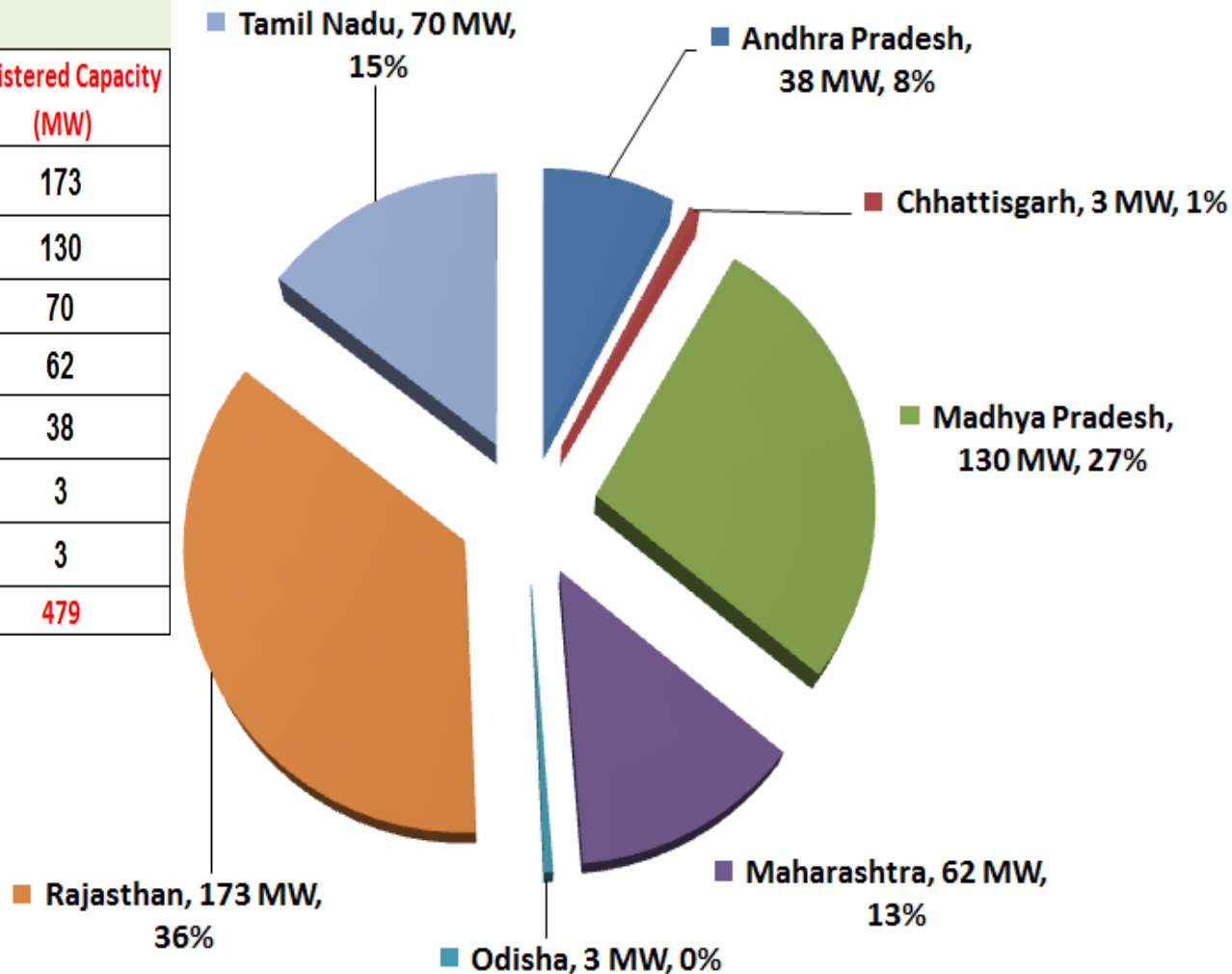




# Solar PV Projects Registered Under REC Mechanism

Details of Solar PV Projects

S. No.	State	No.of Projects	Registered Capacity (MW)
1	Rajasthan	72	173
2	Madhya Pradesh	73	130
3	Tamil Nadu	28	70
4	Maharashtra	37	62
5	Andhra Pradesh	7	38
6	Chhattisgarh	2	3
7	Odisha	1	3
	<b>Total</b>	<b>220</b>	<b>479</b>



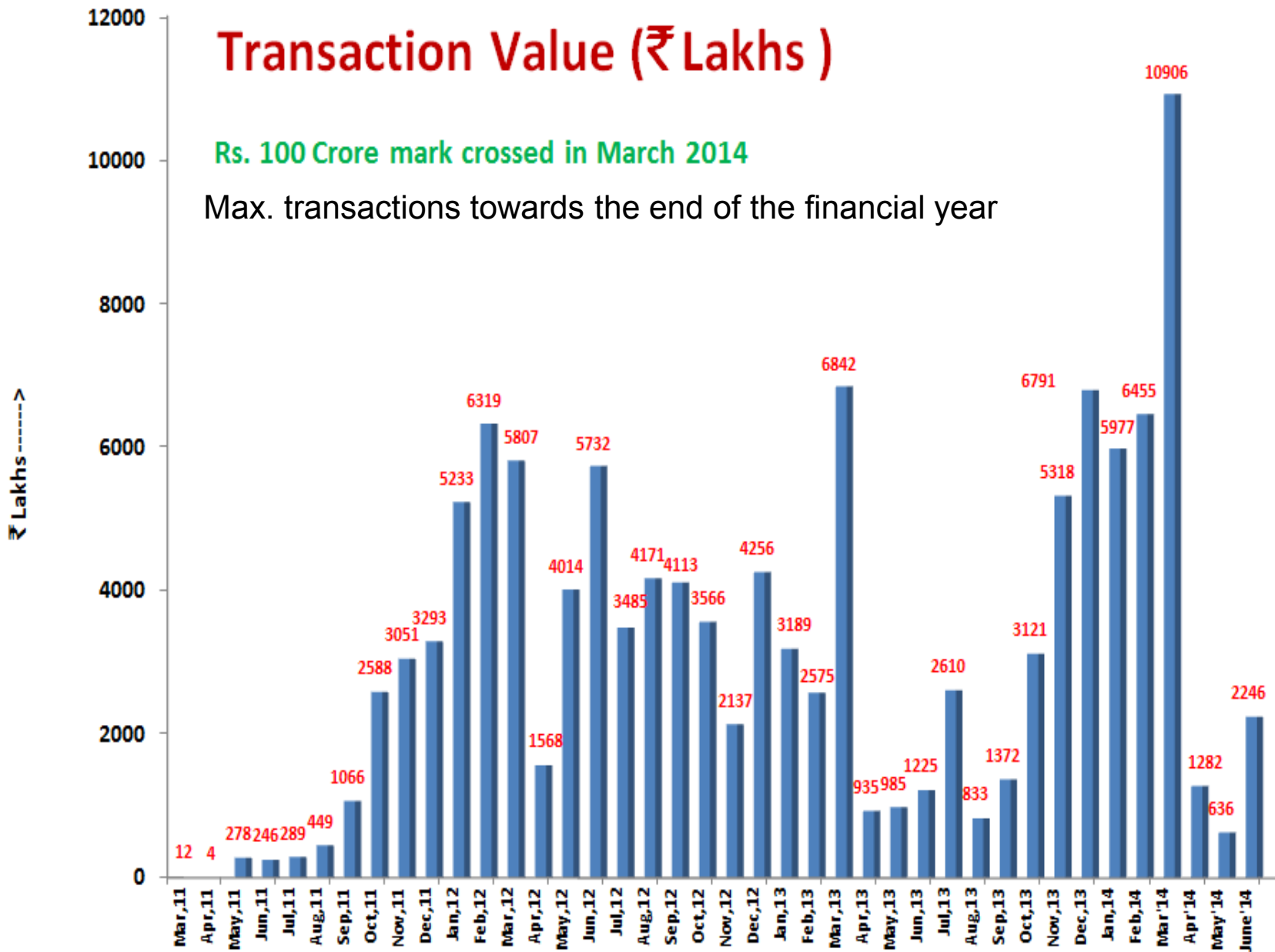
## Details of Issuance of RECs

<b>Sr. No</b>	<b>Source Wise</b>	<b>No. of RECs Issued</b>	<b>No. of RECs Redeemed</b>	<b>Closing Balance</b>
1	Wind	66,76,289	35,93,187	30,83,102
2	Bio-fuel cogeneration	26,00,718	4,40,057	21,60,661
3	Biomass	37,79,360	17,84,198	19,95,162
4	Small Hydro	12,47,925	6,94,122	5,53,803
5	Solar PV	3,26,369	85,456	2,40,913
6	Urban or Municipal Waste	13,165	3,107	10,058
7	Biogas	10,545	6,905	3,640
	<b>Total</b>	<b>1,46,54,371</b>	<b>66,07,032</b>	<b>80,47,339</b>

# Transaction Value (₹ Lakhs)

Rs. 100 Crore mark crossed in March 2014

Max. transactions towards the end of the financial year



# REC Trading Details

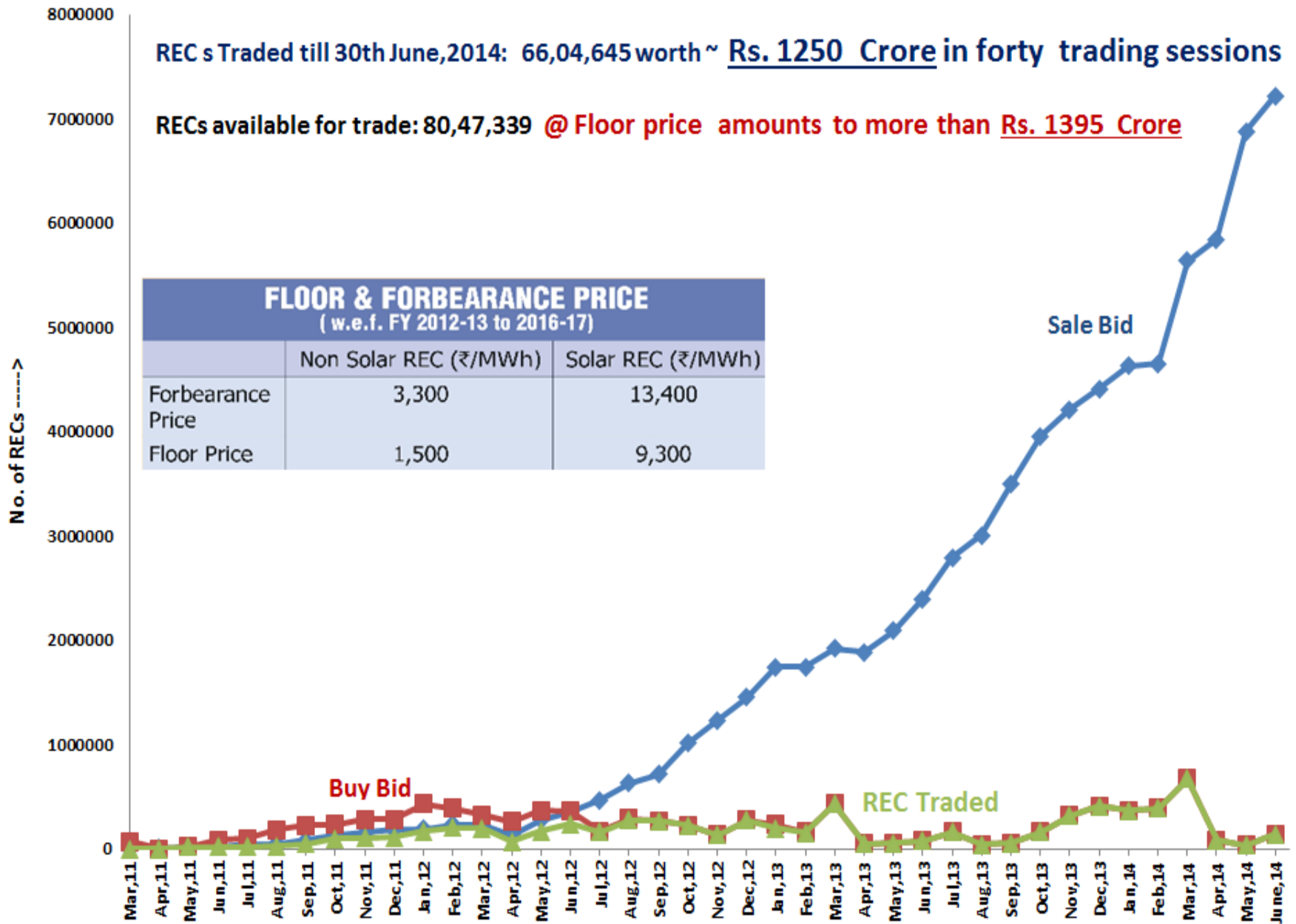
RECs Traded till 30th June, 2014: 66,04,645 worth ~ Rs. 1250 Crore in forty trading sessions

RECs available for trade: 80,47,339 @ Floor price amounts to more than Rs. 1395 Crore

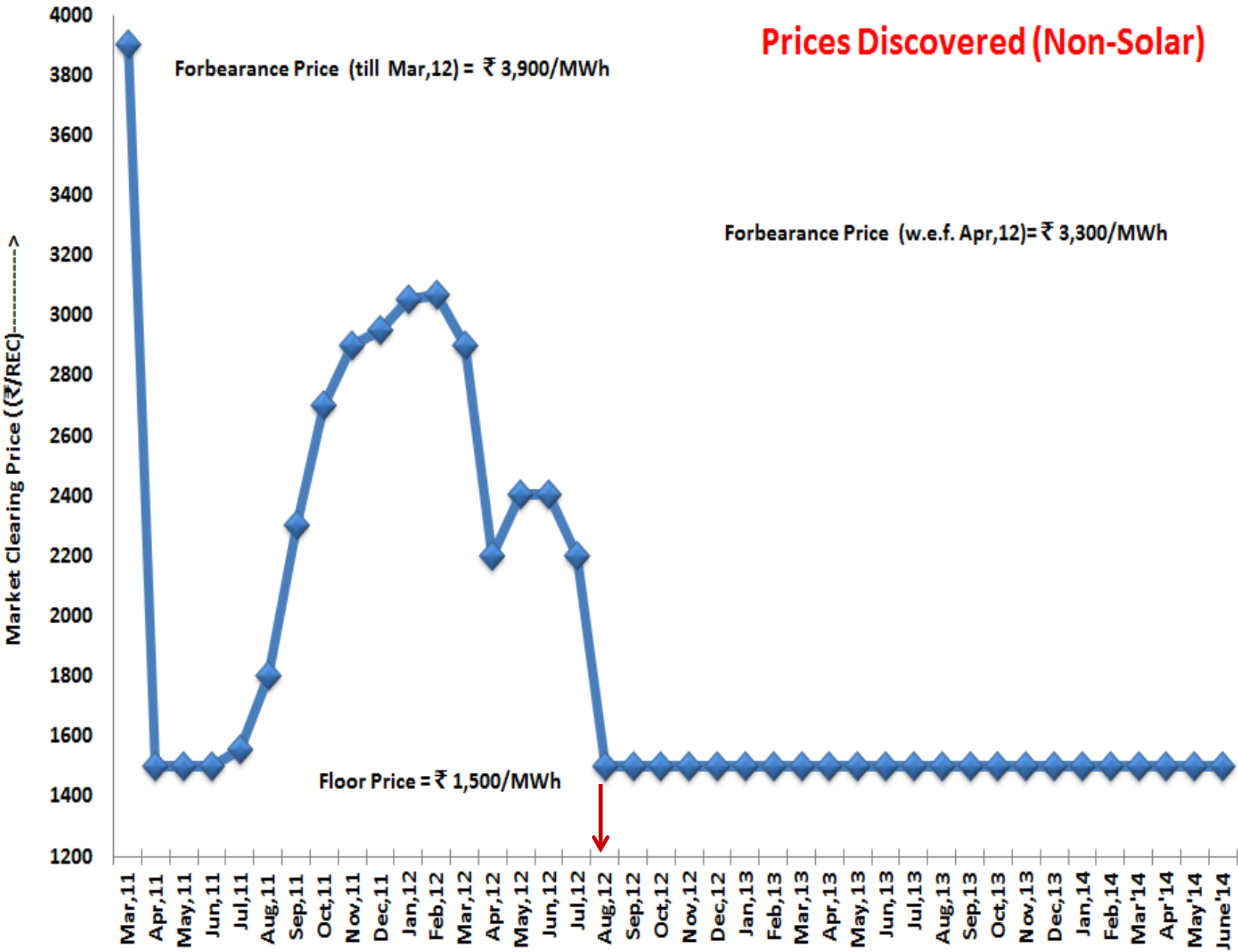
## FLOOR & FORBEARANCE PRICE

( w.e.f. FY 2012-13 to 2016-17)

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



# Prices Discovered (Non-Solar)

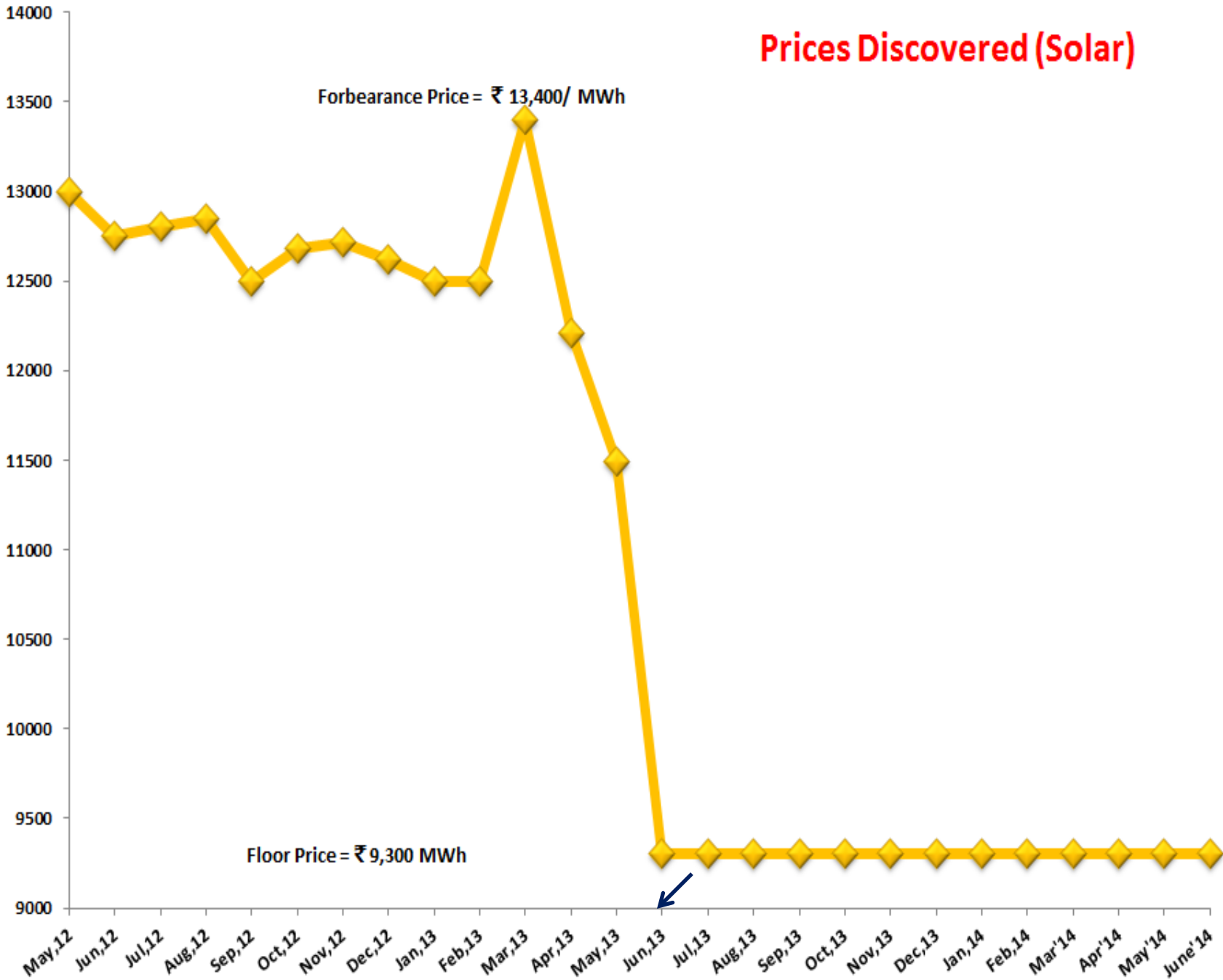


# Prices Discovered (Solar)

Forbearance Price = ₹ 13,400/ MWh

Floor Price = ₹ 9,300 MWh

Market Clearing Price (₹/REC) - - - - ->



## What do REC statistics reflect

- Non-Solar: Not adequate demand
  - Buyers : Largely CPPs and OA consumers; Very few Discoms (Torrent, Tata Power, REL, Chandigarh, DDN, JUSCO).
- Solar: Absence of large buyers
  - Buyers: Largely CPPs and OA consumers; Very few Discoms (Chandigarh, Tata Steel Power Distribution Licensee), OA consumers, CPP

## List of Voluntary Buyers of Non-Solar RECS

Sl. No.	Buyer Name	State	Buying RECs Quantity
1	Rural Electrification Corporation Limited	Delhi	16400
2	NMDC LTD	Andhra Pradesh	2500
3	Power System Operation Corporation Limited	Delhi	1452
4	TATA Services Ltd	Maharashtra	1090
5	Security Printing and Mining Corporation of India Ltd	Delhi	667
6	Indian Renewable Energy Development Agency Ltd (IREDA)	Delhi	100
7	Rashtriya Ispat Nigam Limited	Andhra Pradesh	100
8	Ennore Port Ltd	Tamil Nadu	66
9	Manikaran Power Ltd.	Jharkhand	12
10	EKI Energy Services Ltd	Madhya Pradesh	11
11	Indian Energy Exchange Ltd	Delhi	5
12	Neo Remark Marketing Services	Delhi	4
13	Sumit Kumar	Bihar	1
	<b>Total</b>		<b>22408</b>

No voluntary buyers in 1<sup>st</sup> quarter of 2014-15



## Facilitating Voluntary Buyers

- Policy initiatives-DPE guidelines for 2012-13 exclusively mentioned REC. However, new guidelines w.e.f. 12<sup>th</sup> April 2013 mentions only promotion of Renewable source of energy
- Simplification of procedures for voluntary buyers through Power Exchanges
- Sensitization/awareness building on REC market to boost the voluntary segment

## REC expiry details

<b>S. No.</b>	<b>Energy Source</b>	<b>No. of REC(s) already expired</b>	<b>No. of RECs likely to expire, if not traded upto Dec 2014</b>
<b>1</b>	<b>Wind</b>	<b>3,023</b>	<b>46,174</b>
<b>2</b>	<b>Bio-fuel cogeneration</b>	<b>2,525</b>	<b>10,782</b>
<b>3</b>	<b>Biomass</b>	<b>-----</b>	<b>3,110</b>
	<b>TOTAL</b>	<b>5,548</b>	<b>60,066</b>

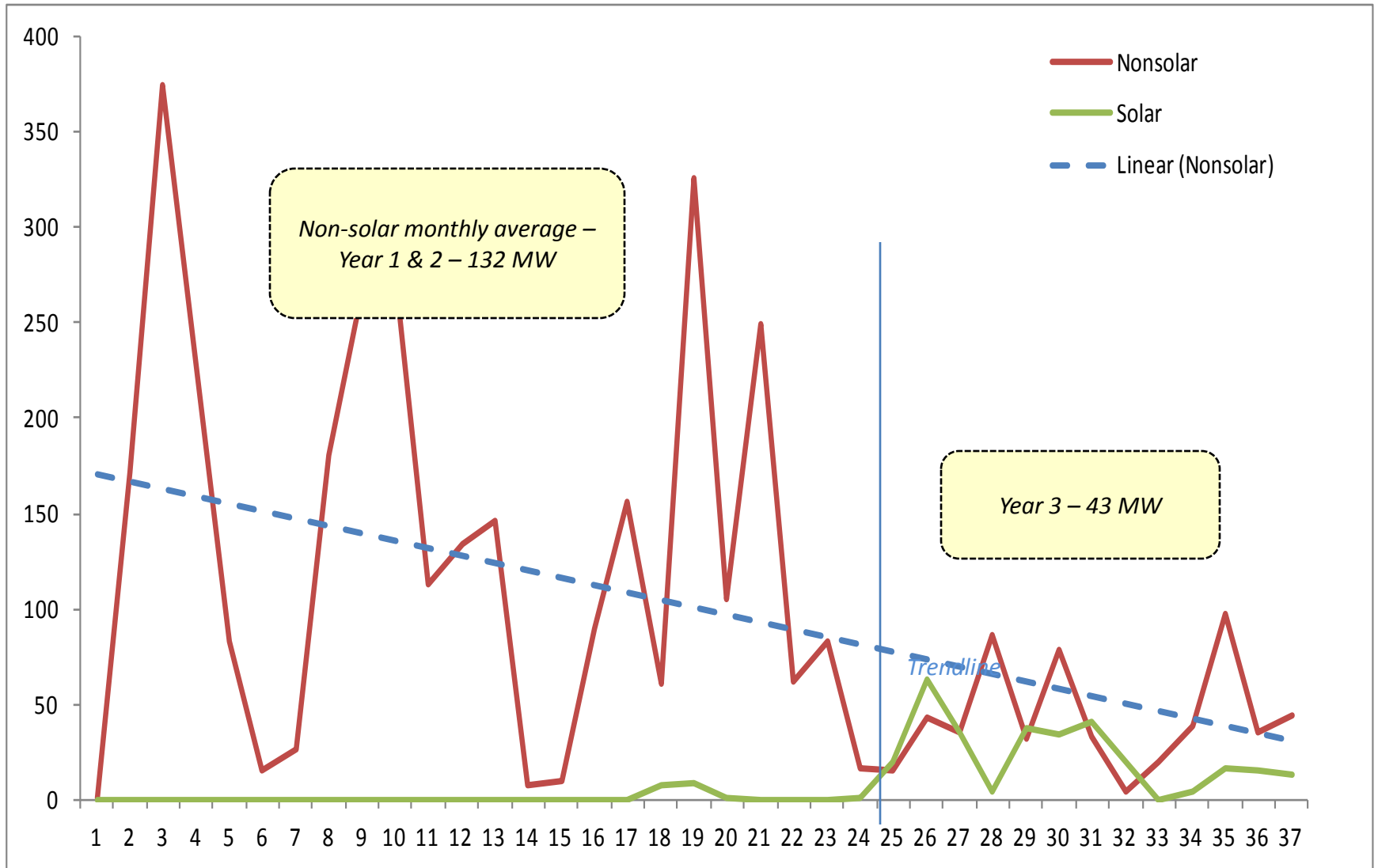
RECs expired despite the extension of Shelf-life of RECs from 365 days to 730 days w.e.f. 11.02.2013

## Projects Registered Under REC Mechanism (Year-wise)

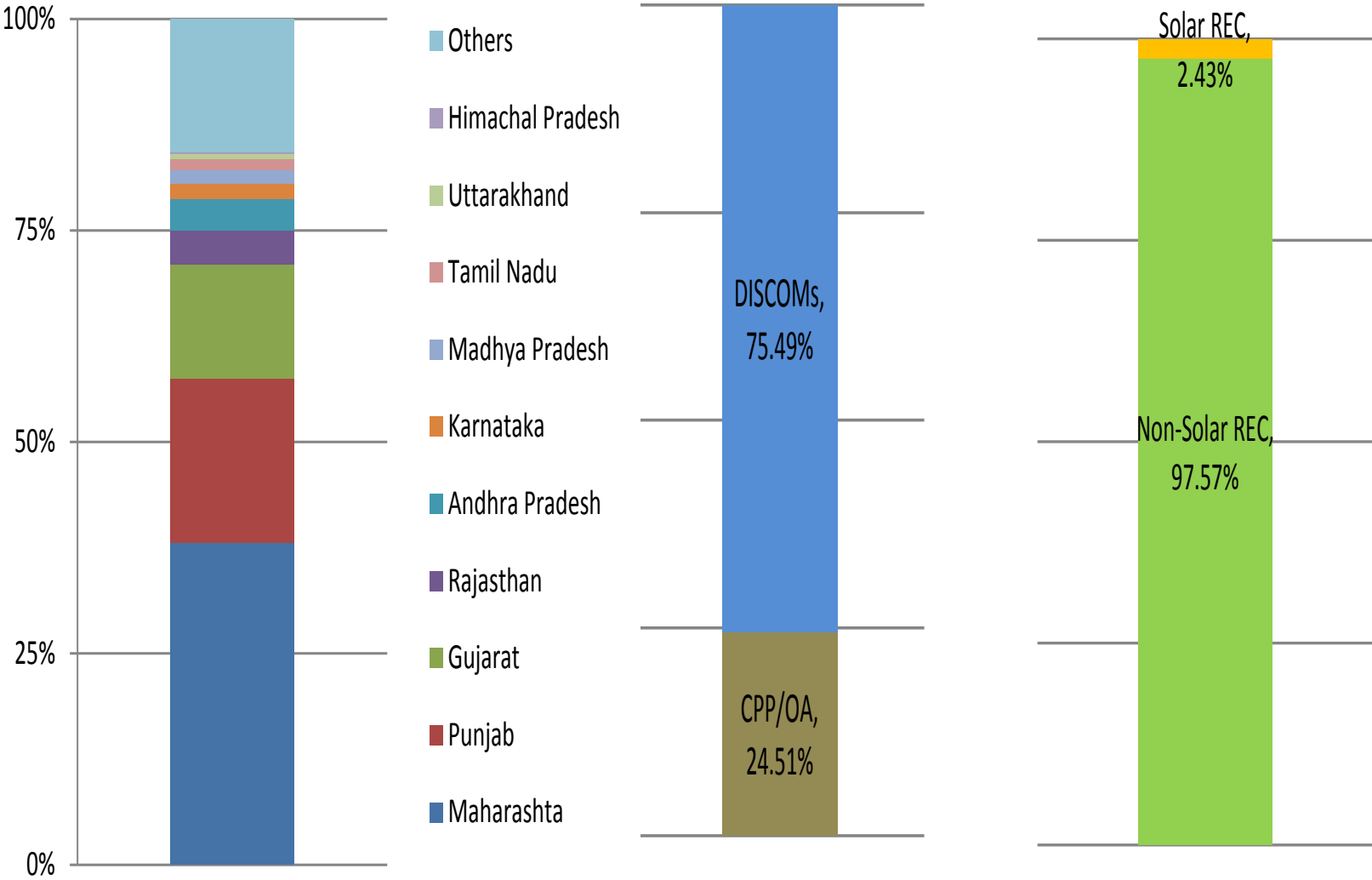
<b>Year</b>	<b>No. of Projects</b>			<b>Capacity (MW)</b>		
	<b>Solar</b>	<b>Non Solar</b>	<b>Total</b>	<b>Solar</b>	<b>Non Solar</b>	<b>Total</b>
<b>2011-12</b>	<b>0</b>	<b>334</b>	<b>334</b>	<b>0</b>	<b>1979</b>	<b>1979</b>
<b>2012-13</b>	<b>20</b>	<b>299</b>	<b>319</b>	<b>62</b>	<b>1174</b>	<b>1236</b>
<b>2013-14</b>	<b>144</b>	<b>93</b>	<b>237</b>	<b>307</b>	<b>483</b>	<b>790</b>

- Overall registration of the project w.r.t. capacity is decreasing by more than 35% on Y-o-Y basis.

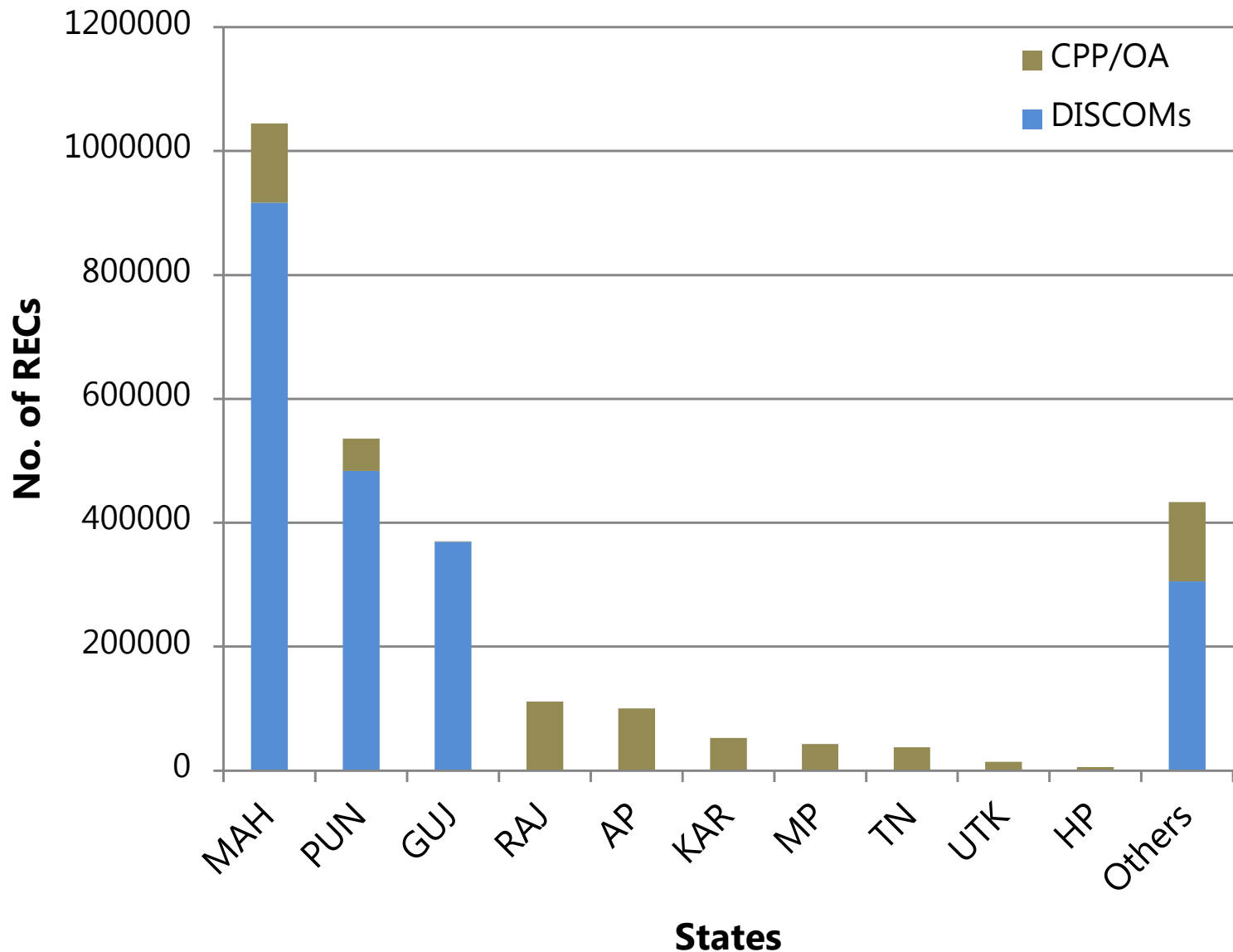
# Monthly capacity addition



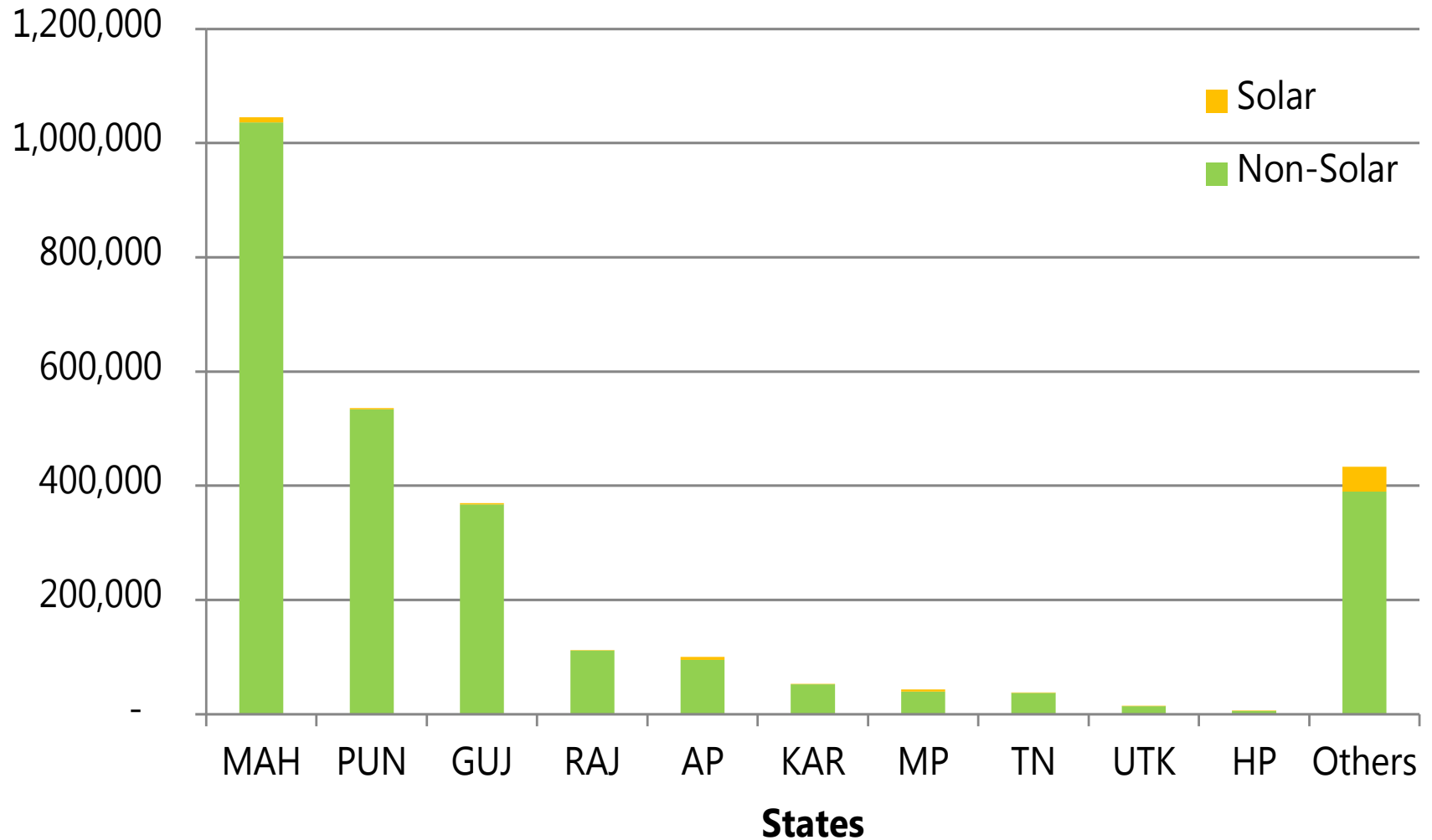
# REC Trading Analysis – Overview



# REC Trading Analysis – State-Obligated Entity wise



# REC Trading Analysis – State-REC type wise



# Issues: State-wise RPO Status



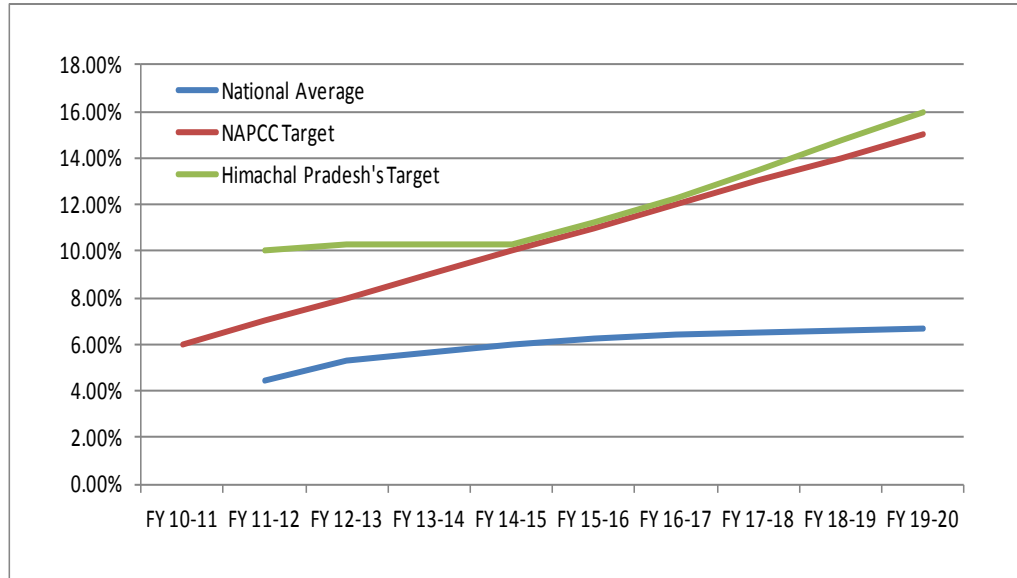
# RPO Trajectory of States

S.	STATE	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21
1	Andhra Pradesh			5.00%	5.00%	5.00%	5.00%	5.00%				
2	Arunachal Pradesh			4.20%	5.60%	7.00%						
3	Assam	1.40%	2.80%	4.20%	5.60%	7.00%						
4	Bihar	1.50%	2.50%	4%	4.50%	5.00%						
5	Chhattisgarh	5.00%	5.25%	5.75%	6.25%	6.75%	7.25%					
6	Delhi			3.40%	4.80%	6.20%	7.60%	9.00%				
7	Gujarat	5.00%	6.00%	7.00%	7.00%	8.00%	9.00%	10.00%				
8	Haryana	1.50%	1.5%	2.00%	3.00%	3.25%	3.50%	3.75%	4.50%	5.00%	5.50%	6.00%
9	Himachal Pradesh		10.01%	10.25%	10.25%	10.25%	11.25%	12.25%	13.50%	14.75%	16.00%	17.50%
10	Jammu Kashmir	1.00%	3.00%	5.00%	5.00%	6.00%	7.50%	9.00%				
11	Goa & UT	1.00%	2.00%	3.00%	3.00%	3.30%	3.55%	3.95%	4.30%	4.65%	5.10%	5.50%
12	Jharkhand	2.00%	3.00%	4.00%								
13	Karnataka	10%/7%	10%/7%	10%/7%	10%/7%	10%/7%						
14	Kerala	3.00%	3.30%	3.63%	3.99%	4.39%	4.83%					
15	Madhya Pradesh	0.80%	2.50%	4.00%	5.50%	7.00%						
16	Maharashtra	6.00%	7.00%	8.00%	9.00%	9.00%	9.00%					
17	Manipur	2.00%	3.00%	5.00%								
18	Mizoram	5.00%	6.00%	7.00%								
19	Meghalaya	0.50%	0.75%	1.00%								
20	Nagaland	6.00%	7.00%	8.00%								
21	Orissa	4.50%	5.00%	5.50%	6.00%	6.50%	7.00%					
22	Punjab		2.40%	2.90%	3.50%	4.00%						
23	Rajasthan (Draft)		6.00%	7.10%	8.20%	9.00%	10.20%	11.40%				
24	Sikkim											
25	Tamil Nadu (Draft)		9.00%	9.00%	9.00%	9.00%	9.00%					
26	Tripura	1.00%	1.00%	2.00%								
27	Uttarakhand	9.00%	10.00%									
28	Uttar Pradesh	4.00%	5.00%	6.00%								
29	West Bengal				4.00%	4.50%	5.00%	5.50%	6.00%	7.00%	8.00%	

# SPO Trajectory of States

S.	STATE	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
1	Andhra Pradesh		0.25%	0.25%	0.25%	0.25%	0.25%					
2	Arunachal Pradesh		0.10%	0.15%	0.20%							
3	Assam	0.10%	0.15%	0.20%								
4	Bihar	0.50%	0.75%	1.00%	1.25%							
5	Chattisgarh	0.25%	0.50%	0.50%	0.75%	1.00%						
6	Delhi		0.15%	0.20%	0.25%	0.30%	0.35%					
7	Gujarat	0.50%	1.00%	1.00%	1.25%	1.50%	1.75%					
8	Haryana (Draft)	0.50%	0.75%	0.10%	0.25%	0.38%	0.57%	0.86%	1.30%	1.96%	3.00%	
9	Himachal	0.01%	0.25%	0.25%	0.25%	0.25%	0.25%	0.50%	0.75%	1.00%	2.00%	3.00%
10	Jammu Kashmir	0.10%	0.25%	0.25%	0.75%	1.50%	1.75%					
11	Goa & UT	0.30%	0.40%	0.40%	0.60%	0.85%	1.15%	1.50%	1.85%	2.20%	2.60%	3.00%
12	Jharkhand	0.50%	1.00%									
13	Karnataka	0.25%	0.25%	0.25%	0.25%							
14	Kerela	0.25%	0.25%	0.25%	0.25%	0.25%						
15	Madhya Pradesh	0.40%	0.60%	0.80%	1.00%							
16	Maharashtra	0.25%	0.25%	0.50%	0.50%	0.50%						
17	Manipur	0.25%	0.25%									
18	Mizoram	0.25%	0.25%									
19	Meghalaya	0.30%	0.40%									
20	Nagaland	0.25%	0.25%									
21	Orissa	0.10%	0.15%	0.20%	0.25%	0.30%						
22	Punjab	0.03%	0.07%	0.13%	0.19%							
23	Rajasthan (Draft)	0.50%	0.75%	1.00%	1.50%	2.00%	2.50%					
24	Sikkim											
25	Tripura	0.10%	0.10%									
26	Tamil Nadu (Draft)	0.05%	0.05%	0.05%	2.00%	2.00%						
27	Uttarakhand	0.05%										
28	Uttar Pradesh	0.50%	1.00%									
29	West Bengal			0.10%	0.15%	0.20%	0.25%	0.30%	0.40%	0.50%		

# Himachal Pradesh :



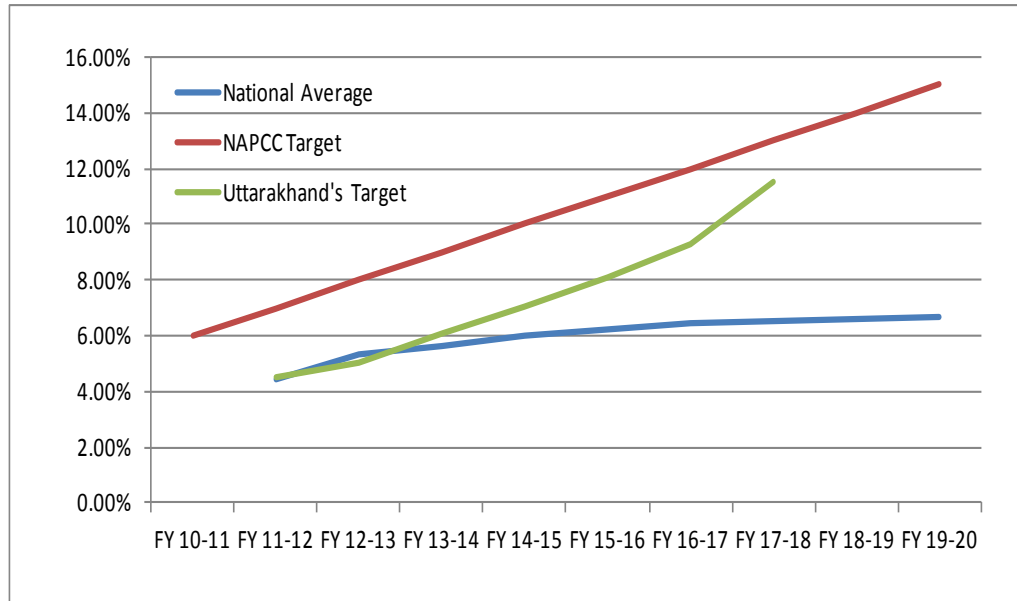
Non-Solar only; See notes on calculation in Annexure

Compliance Status		
	Non Solar	Solar
DISCOMS	Complied	Rolled Forward
OA/CPP	Partial; RECs purchased	Partial; RECs purchsaed

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Complied	Rolled Forward
FY 12-13	Complied	Rolled Forward
FY 13-14	Reviewing	Reviewing
Penalty	Not imposed	Not imposed

Highlights
<ul style="list-style-type: none"> <li>HPSEBL has met with non-solar RPO targets of FY12 &amp; FY13</li> <li>HPERC has asked OA/CPPs in state to declare their stand-by power unit capacities for reviewing compliance through a public notice issued in March 2014</li> </ul>

# Uttarakhand :

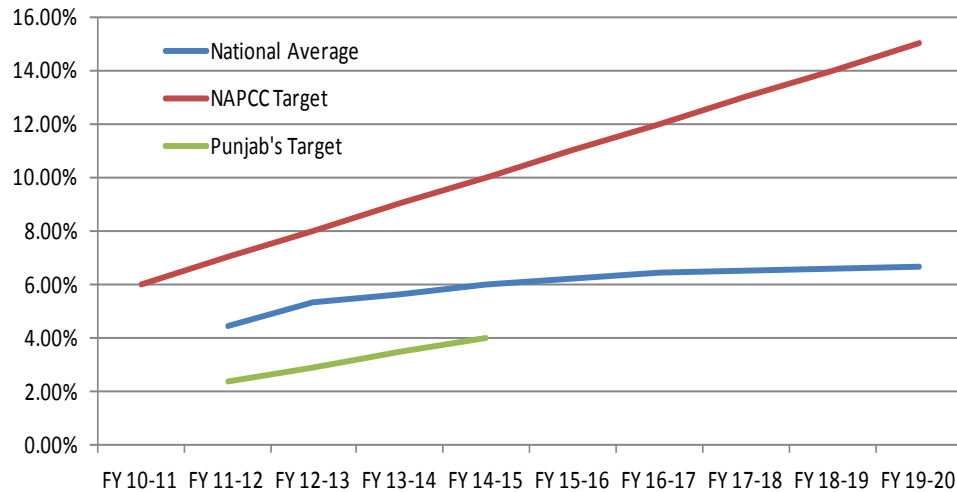


Compliance Status		
	Non Solar	Solar
DISCOMS	Penalty imposed; RECs not purchased	Rolled Forward
OA/CPP	Reviewing; Partially complied thru RECs	Reviewing & Partially complied

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Rolled Forward	Rolled Forward
FY 12-13	Penalty imposed	Rolled Forward
FY 13-14	Not Available	Not Available
Penalty	Imposed	NA

Highlights
<ul style="list-style-type: none"> <li>Only state till date, to impose penalty for non-compliance on Discom</li> <li>In an order on 13th March, UERC has reviewed RPO compliance of OA consumers; has directed to submit details of compliance by 10th April 2014.</li> </ul>

# Punjab :



## Compliance Status

	Non Solar	Solar
DISCOMS	Partially Complied thru RECs	Partially Complied; <b>RECs not purchased</b>
OA/CPP	Partially Complied	Partially Complied

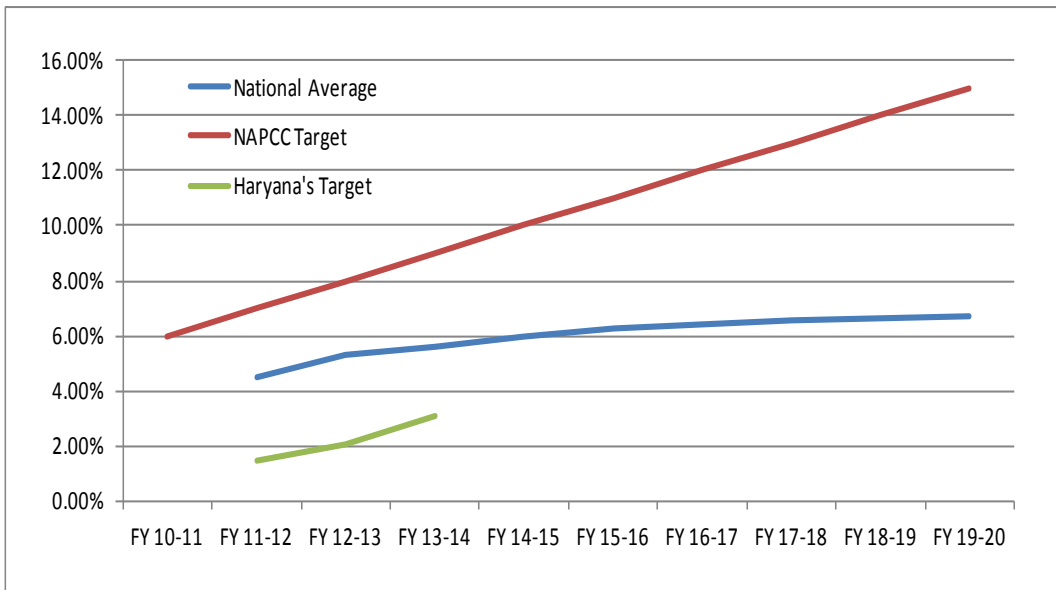
## Enforcement Status

Orders	Non Solar	Solar
FY 11-12	Rolled Forward	Rolled Forward
FY 12-13	PSPCL and OA consumer were asked to comply by Dec'13	
FY 13-14	Not Available	Not Available
Penalty	Not imposed	Not imposed

## Highlights

- PSPCL was asked to comply with shortfall of previous years by December 2013
- They were also asked to submit quarterly compliance report to the ERC
- PSERC allowed REC s procurement cost under ARR.

# Haryana

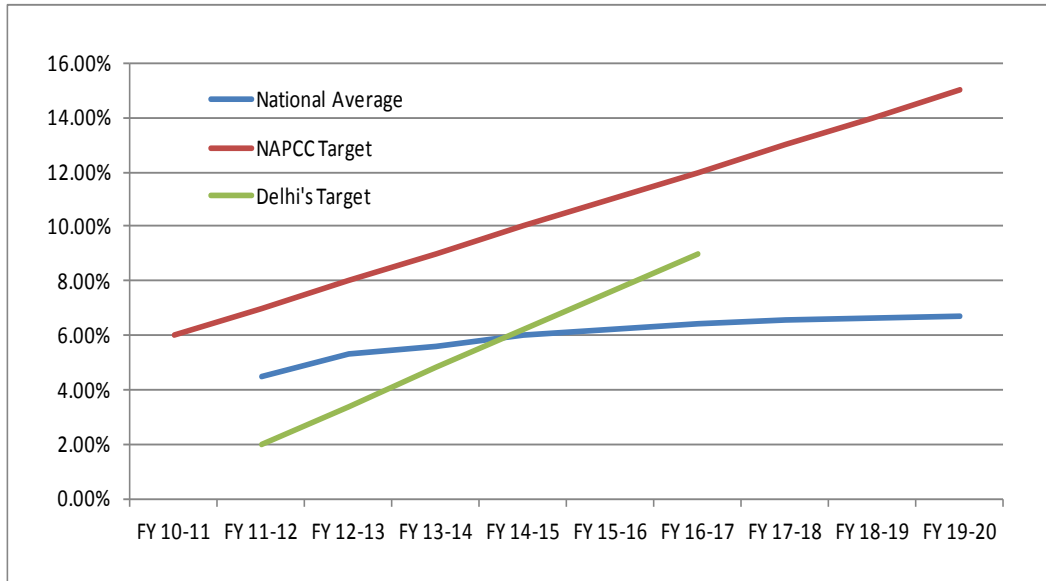


Compliance Status		
	Non Solar	Solar
DISCOMS	Partially Complied; RECs not purchased	Partially Complied; RECs not purchased
OA/CPP	Partially Complied; RECs purchased	Partially Complied; RECs purchased

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Rolled forward to FY 14-15	
FY 12-13		
FY 13-14		
Penalty	Not imposed	Not imposed

Highlights
<ul style="list-style-type: none"> <li>Order of Nov 2013 allowed roll forward of RPO to FY 2014-15</li> </ul>

# Delhi :

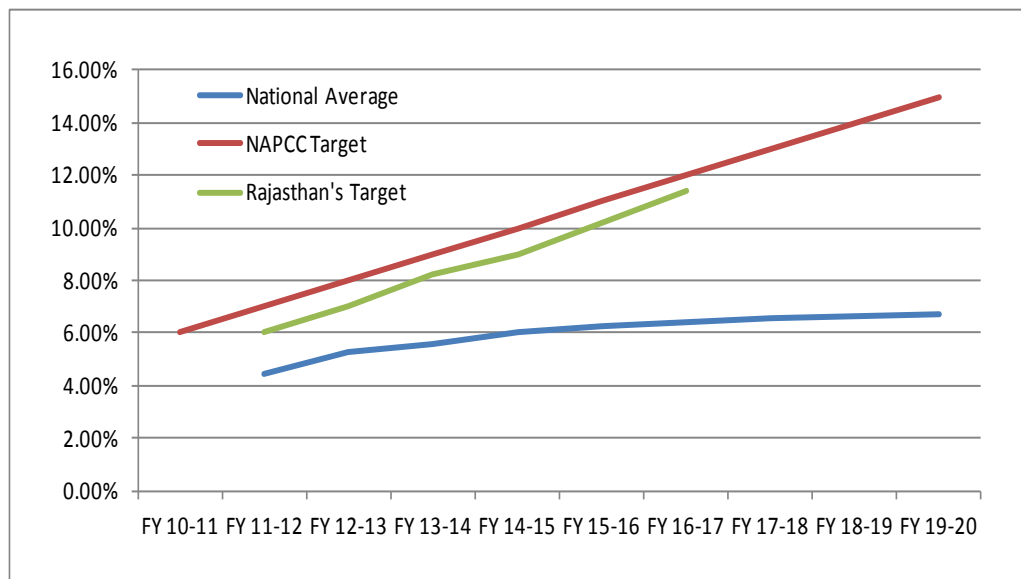


Compliance Status		
	Non Solar	Solar
DISCOMS	Not complied	Not complied
OA/CPP	Partially complied	Partially complied

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	NA	NA
FY 12-13	No assessment so far	No assessment so far
FY 13-14	NA	NA
Penalty	NA	NA

Highlights
<ul style="list-style-type: none"> <li>In Aug'13, DERC had allowed all discoms to build RPO compliance costs in their tariffs.</li> </ul>

# Rajasthan :



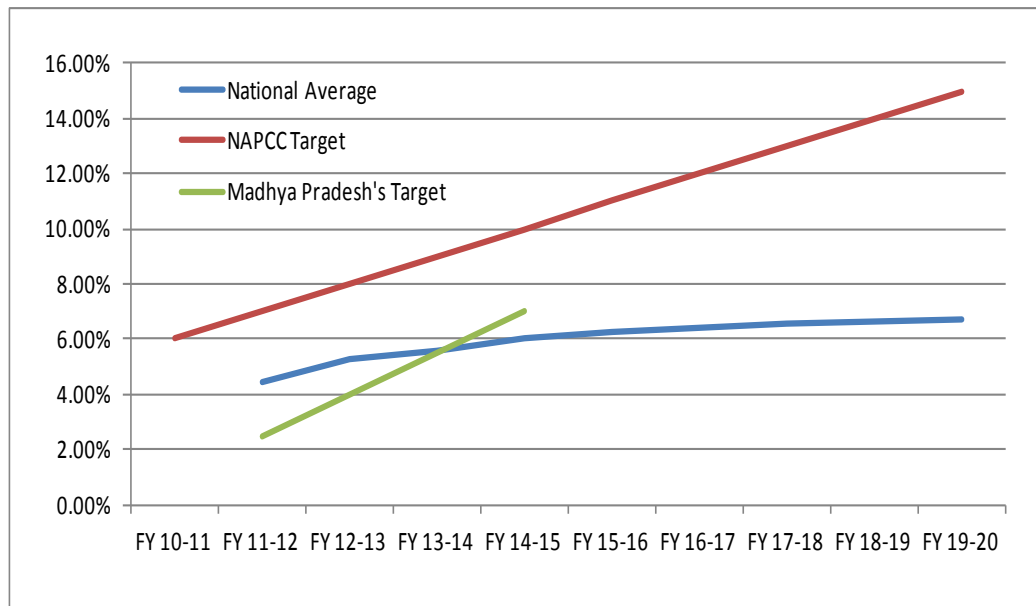
Compliance Status		
	Non Solar	Solar
DISCOMS	Partially Complied; RECs not purchased	Partially Complied; RECs not purchased
OA/CPP	Partially Complied; RECs purchased	Partially Complied; RECs purchased

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	No assessment	
FY 12-13	No assessment	
FY 13-14	No assessment	
Penalty	Not imposed	Not imposed

Highlights
<ul style="list-style-type: none"> <li>RERC has proposed 3<sup>rd</sup> amendment to its RPO regulations, RPO percentages defined upto FY 16-17</li> <li>OA/CPP consumers with capacity above 10 MW to meet solar obligation also</li> </ul>



# Madhya Pradesh :

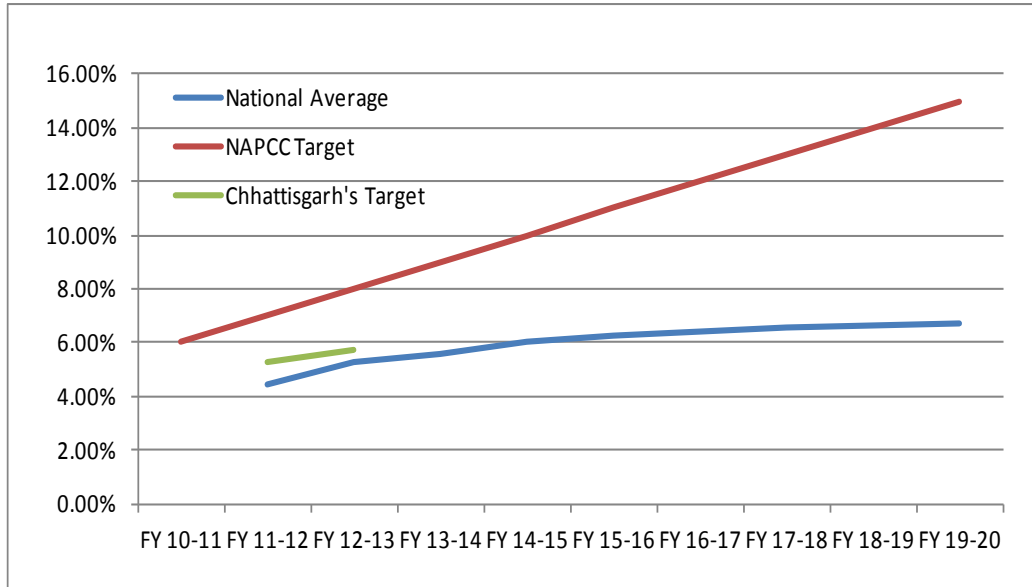


Compliance Status		
	Non Solar	Solar
DISCOMS	Data not available	Data not available
OA/CPP	Partially complied	Partially complied

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Not Available	Not Available
FY 12-13	Not Available	Not Available
FY 13-14	Not Available	Not Available
Penalty	Not imposed	Not imposed

Highlights
<ul style="list-style-type: none"> <li>In Sept'13, MPERC informed that additional cost of RPO compliance will be accounted in true-up exercise.</li> <li>In Nov'13, MPERC expressed serious concern over non-compliance of Solar RPO.</li> </ul>

# Chhattisgarh :

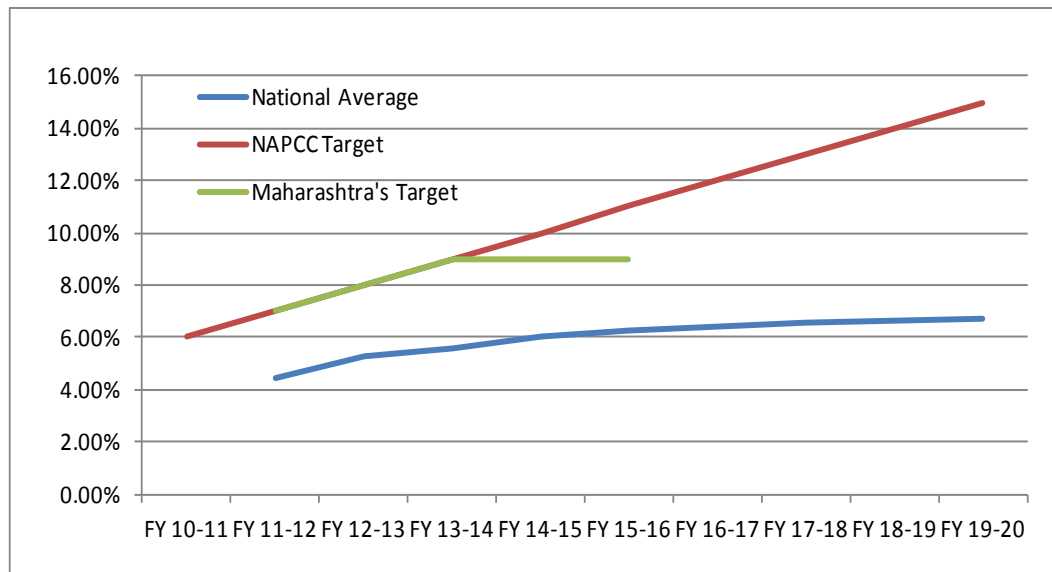


Compliance Status		
	Non Solar	Solar
DISCOMS	Partially Complied	Partially Complied
OA/CPP	Partially complied	Partially complied

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Rolled Forward	Rolled Forward
FY 12-13	Rolled Forward	Rolled Forward
FY 13-14	Not Available	Not Available
Penalty	Not imposed	Not imposed

Highlights
<ul style="list-style-type: none"> <li>Case Hearing on RPO compliance is scheduled on 25th April 2014</li> </ul>

# Maharashtra :



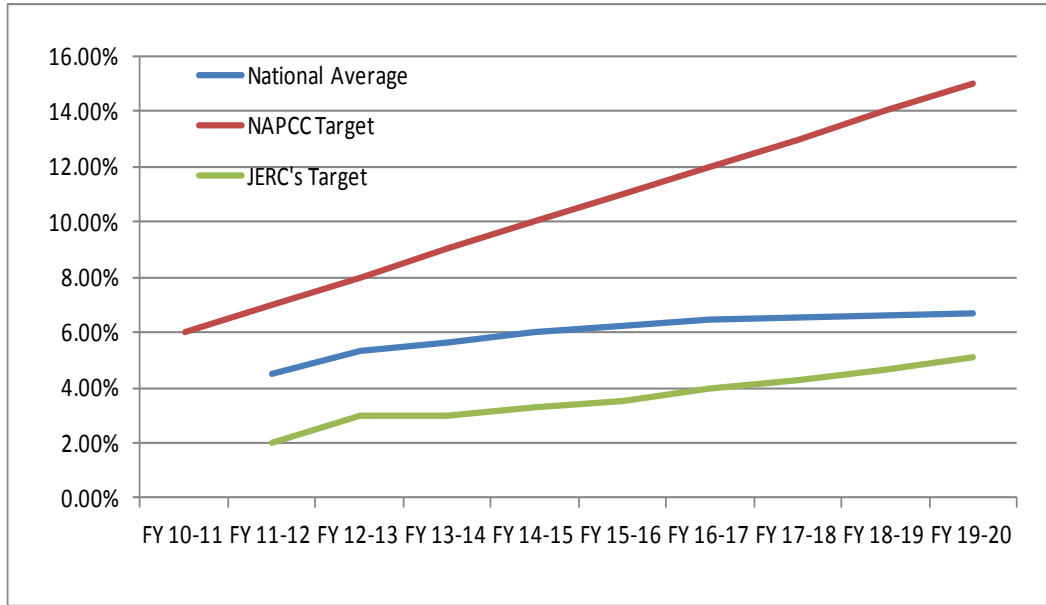
Compliance Status		
	Non Solar	Solar
DISCOMS	Partially complied	Partially complied
OA/CPP	Partially complied	Partially complied

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Rolled Forward	Rolled Forward
FY 12-13	Rolled Forward	Rolled Forward
FY 13-14	To comply by end of FY 13-14	Rolled Forward
Penalty	Not imposed	Not imposed

Highlights
<ul style="list-style-type: none"> <li>RPO target FY11 &amp; FY12. Hydro &amp; solar RPO relaxed till FY16.</li> <li>Reliance-D , Tata Power-D have not-complied with hydro RPO and the same is relaxed till FY16.</li> <li>BEST has complied with hydro RPO, directed to meet shortfall of non-solar RPO by end of FY14</li> </ul>



# JERC (Goa & UTs) :

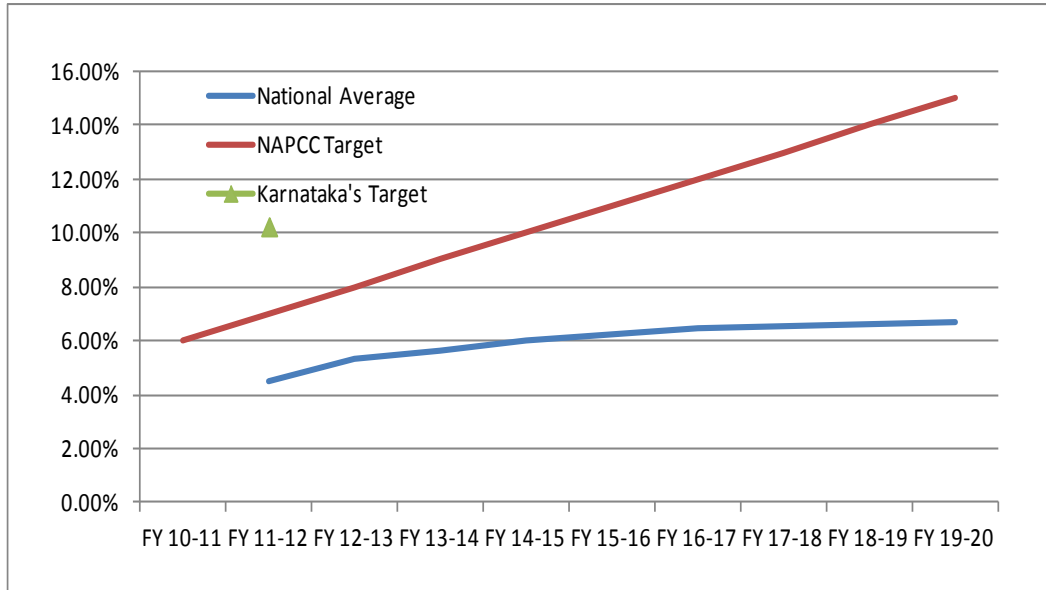


Compliance Status		
	Non Solar	Solar
DISCOMS	Partially complied	Partially complied
0A/CPP	Not complied	Not complied

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Rolled forward	Rolled forward
FY 12-13	Rolled forward	Rolled forward
FY 13-14	Rolled forward	Rolled forward
Penalty	Not imposed	Not imposed

Highlights
<ul style="list-style-type: none"> <li>JERC has taken note of non-compliance but till now has not imposed any penalty.</li> <li>DNH, Chandigarh and Pudducherry have partially fulfilled its RPO targets</li> </ul>

# Karnataka :



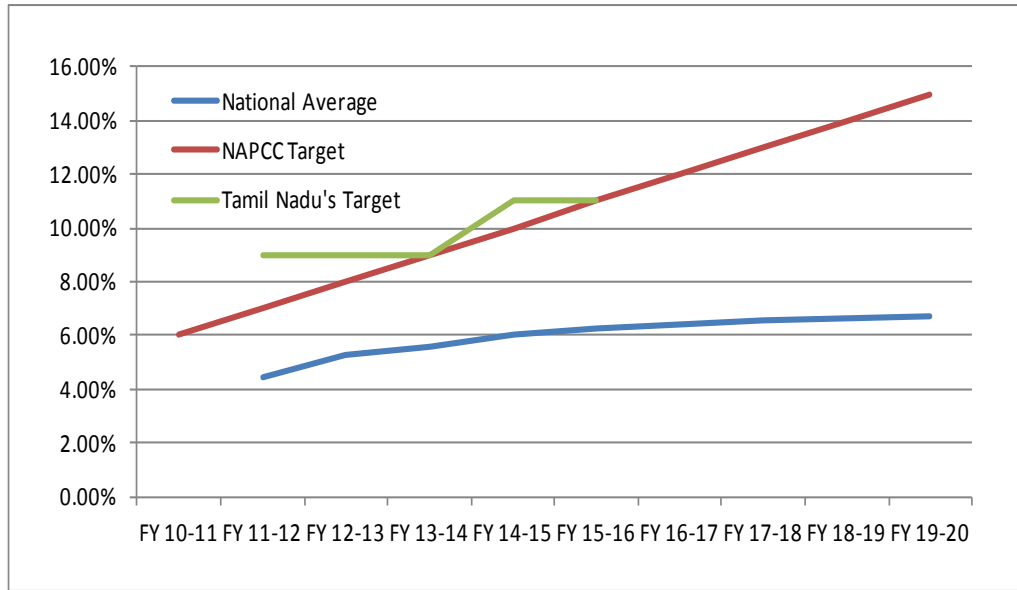
Compliance Status		
	Non Solar	Solar
DISCOMS	Data not available	Data not available
OA/CPP	Partially complied	Partially complied

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Not available	Not available
FY 12-13	Not available	Not available
FY 13-14	Not available	Not available
Penalty	Not imposed	Not imposed

Highlights



# Tamil Nadu :



## Compliance Status

	Non Solar	Solar
DISCOMS	Data not available	Data not available
OA/CPP	Partially complied	Partially complied

## Enforcement Status

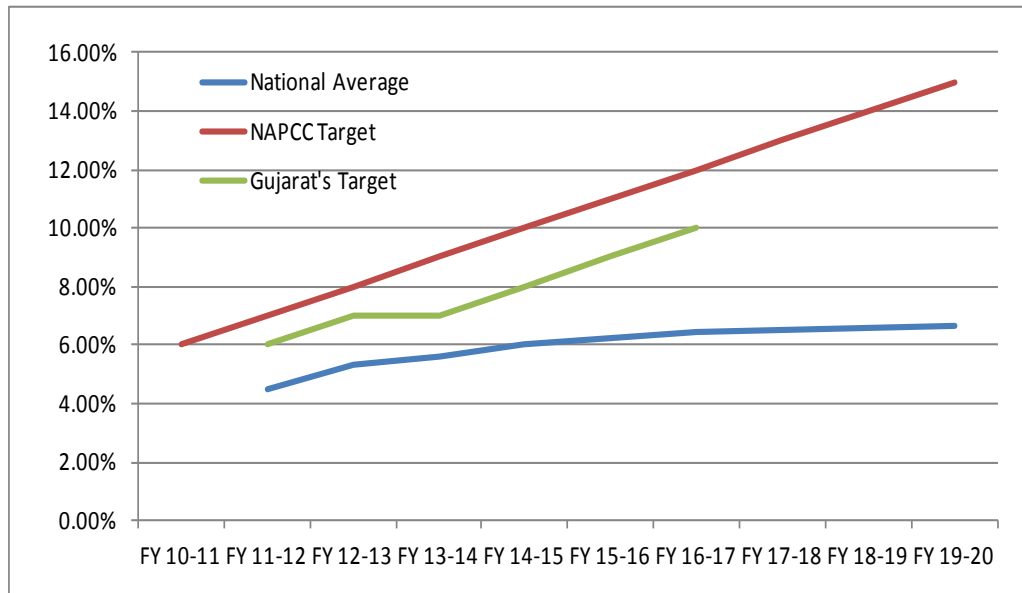
Orders	Non Solar	Solar
FY 11-12	Not available	Not available
FY 12-13	Not available	Not available
FY 13-14	Not available	Not available
Penalty	Not imposed	Not imposed

## Highlights

- Tamil Nadu solar policy was set aside by APTEL
- Draft RPO targets for FY 14-15 and FY 15-16 has been proposed by TNERC



# Gujarat:

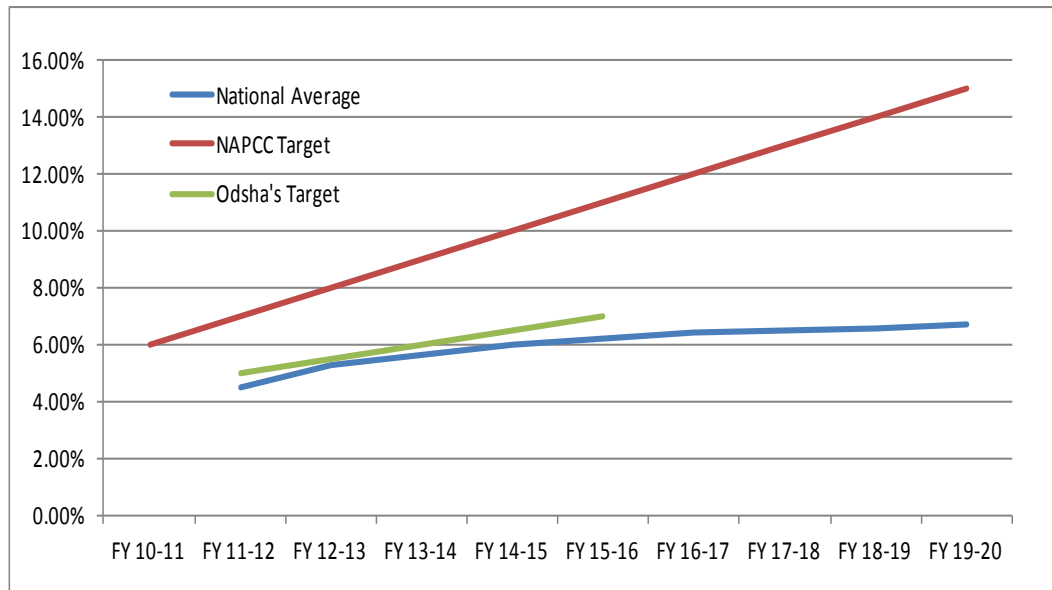


Compliance Status		
	Non Solar	Solar
DISCOMS	Partially complied	Partially complied
OA/CPP	NA	NA

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Rolled forward	Rolled forward
FY 12-13	RPO revised against actual	RPO revised against actual
FY 13-14	Not available	Not available
Penalty	Not imposed	Not imposed

Highlights
<ul style="list-style-type: none"> <li>Gujarat has revised RPO targets of FY13 as against the actual compliance, in a bid to save consumers from additional tariff hikes.</li> </ul>

# Odisha :



Compliance Status		
	Non Solar	Solar
DISCOMS	Data not available	Data not available
OA/CPP	Partially complied	Partially complied

Enforcement Status		
Orders	Non Solar	Solar
FY 11-12	Data not available	Data not available
FY 12-13	Data not available	Data not available
FY 13-14	Data not available	Data not available
Penalty	Not imposed	Not imposed

Highlights

# Observation on RPO Compliance

## 2012-13

Total Power consumed in the country: 8,40,496 Mus

Total Non-Solar Power required: 45,829 Mus

Total Solar Power required: 3,763 Mus

Total Non-Solar RPO specified: 5.45% FY 2012-13

Total Solar RPO specified: 0.45%

Total Non-Solar Power and REC purchased: 31,416 Mus

Total Solar Power and REC purchased: 681 Mus

Total Non-Solar Power obligation not fulfilled : 14,414 Mus

Total Solar Power obligation not fulfilled: 3,082 Mus

Total Non-Solar RPO fulfilled: 3.74% FY 2012-13

Total Solar RPO fulfilled: 0.08% FY2012-13

# Challenges

## **Supply Side Interventions by CERC:**

- Benefit of waiver of electricity duty for Captive Generating Plants
- Shelf-life of RECs extended from 365 days to 730 days
- Issuance of RECs within 6 months (it was earlier 3 months) from the date of corresponding generation

## **Weak RPO enforcement mechanism resulted into the following :**

- Unsold inventory of more than 80 Lakh
- De-registration of projects due to weak market sentiment - 19 Gen in 2013-14 opted out
- More than 5000 RECs expired
- More than 60,000 REC are expected to expire, if not traded in next six months

# Issues

- **Strict enforcement of RPO compliance - Only one instance of penalty (UERC Order dated 22.01.2014)**
- **Long term RPO trajectory**
- **Long term REC price visibility to enhance financing of projects**
- **Solar RECs floor price is acting as deterrent**
- **Vintage based multiplier**
- **No mention of Sunset clause**
- **Incentive to procure beyond RPO target**
- **Publication of real-time RPO status for monitoring by SERCs**
- **Bilateral transactions/Secondary/Forward market**
- **Need for buyers of last resort : REC procurement guarantee**

**REC ECONOMICS FOR STATES**

# Analysis of cost of fulfillment of RPO through FiT route and REC route for resource rich state

## Non-solar RPO Compliance Cost Economics Comparison for Rajasthan:

*All fig in Rs/kWh*

	<b>APPC including Transmission Loss</b>	<b>Transmission cost</b>	<b>Total APPC Cost (A)</b>	<b>REC Price (B)</b>	<b>Energy Cost (FiT) including transmission &amp;</b>	<b>(A)+(B)-(C)</b>
REC @ Floor Price	<b>3.68</b>	<b>0.43</b>	<b>4.11</b>	<b>1.50</b>	<b>5.81</b>	<b>-0.20</b>
REC @ Av. Price	<b>3.68</b>	<b>0.43</b>	<b>4.11</b>	<b>2.40</b>	<b>5.81</b>	<b>0.70</b>
REC @ Forbearance Price	<b>3.68</b>	<b>0.43</b>	<b>4.11</b>	<b>3.30</b>	<b>5.81</b>	<b>1.60</b>

**Cost of compliance of RPO by procuring power at feed-in Tariff route is cheaper than the REC route.**

**Distribution licensees in the resource rich states may not necessarily come to REC market for RPO compliance**

# Analysis of cost of fulfillment of RPO through FiT route and REC route for resource deficit state

## Cost comparison between REC route and FiT route for demand state Punjab

	<b>IPPC+REC</b> <i>Rs/Kwh</i>	<b>FiT</b> <i>Rs/Kwh</i>
IPPC	3.34	-
REC (floor price)	1.50	-
FiT	-	4.63
Transmission cost	0.14	0.24
Transmission loss	0.04	0.12
<b>Sub-Total</b>	<b>5.02</b>	<b>4.99</b>
Balancing Energy	-	0.29
<b>TOTAL</b>	<b>5.02</b>	<b>5.28</b>
REC @ Floor Price		<b>(0.25)</b>
REC @ Av. Price		<b>0.65</b>
REC @ Forbearance Price		<b>1.55</b>

REC route is attractive for resource deficit states only if RECs are available at Floor price.

Such states may prefer to fulfil their RPO target by procuring power through FiT route instead of REC route



# **REC ECONOMICS FOR RE GENERATOR**

# Tamil Nadu: Wind

	Pref Tariff**	APPC + REC	Captive + REC	Third party + REC	PX~ + REC
Industrial tariff				<u>5.5</u>	
Tariff to RE generator	3.51	<u>2.63</u>	<u>5.5</u>	4.95	<u>5.327</u>
REC price	0	1.5	1.5	1.5	1.5
<b>Open Access Charges:</b>					
Wheeling Charges	0	0	<u>0.17</u>	<u>0.17</u>	
Wheeling Losses			<u>0.16</u>	<u>0.14</u>	
Transmission Charges	0	0	0.75	0.75	
Transmission losses	0	0	0.15	0.15	0.23
Cross-subsidy Surcharge	0	0	0	<u>1.70</u>	<u>1.70</u>
<b>Total Open Access Charges</b>	0.00	0.00	1.23	2.92	1.94
<b>Net realisation</b>	<b>3.51</b>	<b>4.13</b>	<b>5.77</b>	<b>3.53</b>	<b>4.89</b>
<b>Upside over pref tariff</b>		<b>18%</b>	<b>64%</b>	<b>1%</b>	<b>39%</b>

% APPC for wind 75% of APPC Rs.3.11/kWh

\*\* Tariff for primary RE resource in the state

~ Annual RTC tariff

- ❑ **Clear differential in favor of REC**
- **More remunerative under Captive/Group Captive**

# Maharashtra: Wind

	<u>Pref</u> <u>Tariff**</u>	<u>APPC +</u> <u>REC</u>	<u>Captive +</u> <u>REC</u>	<u>Third party +</u> <u>REC</u>	<u>PX~ +</u> <u>REC</u>
Industrial tariff				<u>7.01</u>	
Tariff to RE generator	<u>5.05</u>	2.8	<u>7.01</u>	6.309	<u>2.456</u>
REC price	0	1.5	1.5	1.5	1.5
<b>Open Access Charges:</b>					
Wheeling Charges	0	0	0.60	0.60	
Wheeling Losses			0.45	0.45	
Transmission Charges	0	0	0.43	0.43	
Transmission losses	0	0	0.29	0.29	0.10
Cross-subsidy Surcharge	0	0	0	0.295	0.295
<b>Total Open Access Charges</b>	0	0	1.78	2.07	0.40
<b>Net realisation</b>	<b>5.05</b>	<b>4.30</b>	<b>6.73</b>	<b>5.74</b>	<b>3.56</b>
<b>Upside over pref tariff</b>		<b>-15%</b>	<b>33%</b>	<b>14%</b>	<b>-30%</b>

- Captive and third Party remunerative than F-i-T and APPC+REC

# Maharashtra : Co-gen

	Pref Tariff**	APPC + REC	Captive + REC	Third party + REC	PX~ + REC
Industrial tariff				<u>7.01</u>	
Tariff to RE generator	<u>5.81</u>	2.8	<u>7.01</u>	6.309	<u>2.456</u>
REC price	0	1.5	1.5	1.5	1.5
<b>Open Access Charges:</b>					
Wheeling Charges	0	0	0.60	0.60	
Wheeling Losses			0.52	0.52	
Transmission Charges	0	0	0.43	0.43	
Transmission losses	0	0	0.29	0.29	0.10
Cross-subsidy Surcharge	0	0	0	0.295	0.295
<b>Total Open Access Charges</b>	0	0	1.85	2.14	0.40
<b>Net realisation</b>	<b>5.81</b>	<b>4.30</b>	<b>6.66</b>	<b>5.67</b>	<b>3.56</b>
<b>Upside over pref tariff</b>		<b>-26%</b>	<b>15%</b>	<b>-2%</b>	<b>-39%</b>

\*\* Tariff for primary RE resource in the state: Co-gen

wheeling loss 11 kV: 9%, Wheeling Charges 11 kV : Rs. 0.60/kWh, Transmission losses:4.19% Transmission Charges Rs. 0.43/kWh

~ Annual RTC tariff

- **Captive remunerative than F-i-T**
  - **Sugar mills (as captive plants) benefit from REC**

# Gujarat: Wind

	Pref Tariff**	APPC + REC	Captive + REC	Third party + REC	PX~ + REC
Industrial tariff				4.45	
Tariff to RE generator	4.15	2.80	4.45	4.01	2.46
REC price	0	1.50	1.50	1.50	1.50
<b>Open Access Charges:</b>					
Wheeling Charges	0	0	0.12	0.12	
Wheeling Losses			0.45	0.40	
Transmission Charges	0	0	0.54	0.54	
Transmission losses	0	0	0.19	0.19	0.10
Cross-subsidy Surcharge	0	0	0	0.45	0.45
<b>Total O A Charges:</b>	<b>0</b>	<b>0</b>	<b>1.29</b>	<b>1.69</b>	<b>0.55</b>
<b>Net realization</b>	<b>4.15</b>	<b>4.30</b>	<b>4.66</b>	<b>3.81</b>	<b>3.40</b>
<b>Upside over pref tariff</b>		<b>4%</b>	<b>12%</b>	<b>-8%</b>	<b>-18%</b>

Transmission charges: Rs. 2970/MW/Day, Trans. losses 4.16%, wheeling losses:10%

\*\* Tariff for primary RE resource in the state: Wind

~ Annual RTC tariff

**□ REC benefit with self consumption by a  
CGP dispensation remunerative than F-i-T**

# Rajasthan : Wind

	Pref Tariff**	APPC + REC	Captive + REC	Third party + REC	PX~ + REC
Industrial tariff				5.50	
Tariff to RE generator	<u>5.46</u>	2.75	5.5	4.95	<u>2.486</u>
REC price	0	1.5	1.5	1.5	1.5
<b>Open Access Charges:</b>					
Wheeling Charges	0	0	0.32	0.32	
Wheeling losses			0.69	0.62	
Transmission Charges	0	0	0.20	0.20	
Transmission losses	0	0	0.23	0.23	0.10
Cross-subsidy Surcharge	0	0	0.00	0.13	0.13
<b>Total Open Access Charges</b>	0	0	1.44	1.51	0.23
<b>Net realisation</b>	<b>5.46</b>	<b>4.25</b>	<b>5.56</b>	<b>4.94</b>	<b>3.75</b>
<b>Upside over pref tariff</b>		<b>-22%</b>	<b>2%</b>	<b>-9%</b>	<b>-31%</b>

Wheeling Losses 33kV 3.80%, 11 kV :12.60%, Transmission Charges:161.03/kW/month, Losses 4.2%, CSS LIP 33kV Rs.0.13/kWh, Wheeling Charges 33 kV 11 Paise, 11kV: 32 P

\*\* Tariff for primary RE resource in the state: Wind

~ Annual RTC tariff

- **Wind: F-i-T remunerative than REC options**

# Karnataka : Wind

	Pref Tariff**	APPC + REC	Captive + REC	Third party + REC	PX~ + REC
Industrial tariff				4.45	
Tariff to RE generator	3.70	3.07	4.45	4.01	2.46
REC price	0	1.50	1.50	1.50	1.50
<b>Open Access Charges:</b>					
Wheeling Charges	0	0	0.99	0.99	
Wheeling Losses					
Transmission Charges	0	0	0.51	0.51	
Transmission losses	0	0	0.23	0.23	0.20
Cross-subsidy Surcharge	0	0	0	0.31	0.31
<b>Total O A Charges:</b>	<b>0</b>	<b>0</b>	<b>1.72</b>	<b>2.03</b>	<b>0.51</b>
<b>Net realization</b>	<b>3.70</b>	<b>4.57</b>	<b>5.53</b>	<b>4.64</b>	<b>5.96</b>
<b>Upside over Pref tariff</b>		<b>24%</b>	<b>49%</b>	<b>25%</b>	<b>61%</b>

Trans. losses 3.94%,

\*\* Tariff for primary RE resource in the state:

Wind

~ Annual RTC tariff

- **Wind: F-i-T remunerative than REC options**

# Madhya Pradesh: Wind

	<u>Pref Tariff**</u>	<u>APPC + REC</u>	<u>Captive + REC</u>	<u>Third party + REC</u>	<u>PX~ + REC</u>
Industrial tariff				<u>4.60</u>	
Tariff to RE generator	<u>5.92</u>	2.53	4.6	4.14	<u>2.456</u>
REC price	0	1.5	1.5	1.5	1.5
<b>Open Access Charges:</b>					
Wheeling Charges %	0	0	<u>0.18</u>	<u>0.18</u>	
Wheeling Losses			-	-	
Transmission Charges	0	0	<u>0.39</u>	<u>0.39</u>	
Transmission losses	0	0	0.24	0.22	0.13
Cross-subsidy Surcharge	0	0	0	0.81	0.81
<b>Total Open Access Charges</b>	0	0	0.81	1.60	0.94
<b>Net realisation</b>	<b>5.92</b>	<b>4.03</b>	<b>5.29</b>	<b>4.04</b>	<b>3.02</b>
<b>Upside over pref tariff</b>		<b>-32%</b>	<b>-11%</b>	<b>-32%</b>	<b>-49%</b>

% Wheeling charges and cross subsidy surcharges are not applicable to consumers availing open access from renewable sources of energy.

\*\* Tariff for primary RE resource in the state

~ Annual RTC tariff

- **FiT remunerative than REC for wind**
- **Third Party sale plus REC is for Solar**



# Andhra Pradesh : Wind

	Pref Tariff**	APPC + REC	Captive + REC	Third party + REC	PX~ + REC
Industrial tariff				<u>5.73</u>	
Tariff to RE generator	4.70	2.69	<u>5.73</u>	5.157	<u>4.97</u>
REC price	0	1.5	1.5	1.5	1.5
<b>Charges:</b>					
Wheeling Charges	0	0	<u>0.28</u>	<u>0.28</u>	
Wheeling Losses			<u>0.50</u>	<u>0.45</u>	
Transmission Charges	0	0	0.36	0.36	
Transmission losses	0	0	0.23	0.23	0.20
Cross-subsidy surcharge	0	0	0	0	0
<b>Total open Access Charges</b>	<b>0</b>	<b>0</b>	<b>1.38</b>	<b>1.33</b>	<b>0.20</b>
<b>Net realisation</b>	<b>4.70</b>	<b>4.19</b>	<b>5.85</b>	<b>5.33</b>	<b>6.27</b>
<b>Upside over pref tariff</b>		<b>-11%</b>	<b>24%</b>	<b>13%</b>	<b>33%</b>

\*Transmission Charges Rs. 69/kW/day, losses 4.02% 2013-14, 33 kV loss 3.99% & 11 kV loss 3.99%+5%

\*\* Tariff for primary RE resource in the state

~ Annual RTC tariff

# Himachal Pradesh: SHP

	<u>Pref Tariff**</u>	<u>APPC + REC</u>	<u>Captive + REC</u>	<u>Third party + REC</u>	<u>PX~ + REC</u>
Industrial tariff				<u>3.45</u>	
Tariff to RE generator	<u>3.17</u>	<u>2.17</u>	<u>3.45</u>	3.105	<u>2.484</u>
REC price	0	1.50	1.50	1.50	1.50
<b>Charges:</b>					
Wheeling Charges	0	0	<u>1</u>	<u>1</u>	
Wheeling losses			-	-	
Transmission Charges	0	0	<u>0.015</u>	<u>0.015</u>	
Transmission losses	0	0	<u>0.41</u>	<u>0.37</u>	0.30
Cross-subsidy surcharge	0	0	0	<u>0.17</u>	<u>0.17</u>
<b>Total Charges</b>	0	0	1.43	1.56	0.47
Net realisation	<b>3.17</b>	<b>3.67</b>	<b>3.52</b>	<b>3.05</b>	<b>3.52</b>
Upside over pref tariff		16%	11%	-4%	11%

\*Average clearing percentage for last 12 months X REC floor price

\*\* Tariff for primary RE resource in the state: Small Hydro

**☐SHP: Market + REC remunerative than F-i-T**

**➤Many existing SHP selling under market mode registered under REC**

# Migration of Projects to REC

S. No.	Energy Source	OLD (Commissioned upto 14.01.2010)	
		No. of projects Registered	Capacity
1	WIND	117	281.08
2	Bio-fuel cogeneration	46	532.68
3	Small Hydro	5	47.50
4	Biomass	29	293.60
5	Solar PV		
6	Others		
	<b>TOTAL</b>	<b>197</b>	<b>1155</b>

Source: NLDC



# **REC Mechanism : Issues, and remedies to resolve current deadlock**

# RPO

- A stable and long-term RPO trajectory and strong deterrent against non-compliance of RPO have worldwide been used as important intervention of promotion of Renewable energy
- Wide Divergence in RPO Specifications across States
  - Varying RPO Trajectories
  - RPO being fixed based on resources available in the States
  - Different RPO as per RE Technology
  - Differential RPO for Discoms
  - No long term visibility

# RPO : Challenges

- RPO being fixed keeping in mind availability of RE resources in State instead of availability of RE resources in the country as a whole
  - **Need for National level RPO**
  - **Need for specifying RPO as a percentage of “total consumption” of electricity in the area of a distribution licensee**
  - **Need to recognise REC as valid instrument for compliance of RPO by the obligated entities**
  - **Applicability of RPO on Captive user, Open Access users and captive cogeneration : Regulations challenged in various High Courts**
- Lack of Long Term RPO Trajectory
  - **Need for Long Term RPO Trajectory: At least for next 5 to 10 years**
- Lack of enforcement of RPO

# RPO : Challenges!!! Causes

- Financial conditions of distribution utilities
  - Higher RPO level leads to higher impact
- Section 86(1) (e) of the Act mandates SERCs to promote RE in the State
  - Traditionally, RPO being fixed based on the resources available in the States



# Issues before the Regulators

- Whether NAPCC suggested target is achievable or not?
- Whether enough RE sources are available in the country?
- What is the achievable potential for various RE sources in different states?
- How to determine optimum as well as achievable RPO trajectory for various States
- What is the impact of RPO on the power purchase cost of the state?

## FOR Initiative: Assessment of achievable potential of RE resources in States during the 12th Plan Period, determination of RPO trajectory and its impact on retail Tariff .....1/2

- NAPCC target could be achieved during the 12<sup>th</sup> plan, if the adequate steps are taken to address the following issues:
  - Infrastructure Barriers:
    - Transmission and power evacuation infrastructure and grid management
    - Land approvals (Single window clearance), specially for solar
  - Policy and Regulatory Barriers:
    - long term perspective on RPO, RE Tariffs (and inter-state difference in tariffs)
    - Sale of RE power through open access and inter-state sale
  - Incoherent Resource Assessment
  - Financing Barriers

# FOR Initiative:

## RPO Study : key take away....2/2

- 39600 MW (grid-connected) could be added during the 12<sup>th</sup> plan
  - Based on the micro-level data provided by the SNA, STU and developers business plan
- Insignificant impact on Power Purchase Cost (PPC) on Pan-India basis:
  - Incremental impact on the PPC is 1.0 paisa per unit for the first year, which gradually decreases to negative incremental impact (to the extent of 0.5 paisa per unit in FY17)
- Suggested RPO trajectory for States for 12<sup>th</sup> Plan period

# FOR Model Regulation providing for Compliance Charge

## FOR Model Regulations for REC Mechanism for SERCs

- In the event of default the obligated entity have to deposit into a separate fund, on the basis of the shortfall in the units of RPO at the forbearance price decided by the Central Commission.
- All SERC has specified above provision in the State REC/RPO Regulations

## Issues

- Very few SERCs initiated proceeding for Enforcement of RPO
  - Only GERC has initiated suo-motu proceeding
  - PSERC and MPERC acted on petition filed by utility for waiver of RPO

**FOR to develop mechanism for reporting requirement and institutional mechanism for follow up for enforcement**

# FOR Initiative: Study on Incentive scheme for States for fulfilling RPO

- Study under progress on Preparing incentive structure for States for fulfilling Renewable Purchase Obligation (RPO) targets
  - Incentive scheme for resource rich states
    - For specifying RPO up to national level
    - For fulfilment of own RPO
    - For supporting other states for fulfilment of RPO by purchasing RE at APPC
    - Support for balancing power requirement
  - Incentive scheme for resource deficit states
    - For specifying RPO up to national level
    - For fulfilment of own RPO

# CERC Statutory Advice to Government on promotion of RE

- CERC has given statutory advice to the Ministry of Power (MOP) for making specific provisions in the Electricity Act, 2003 for promotion of RE:
  - NEP And TP to provide long term RPO trajectory of 5 to 10 years
  - Act to provide that SERCs to fix RPO as per provisions of NEP and TP
  - Empowering SERCs to impose penalty (Addition to Sec. 142)
  - RPO applicability on Open Access and Captive users including Co-gen
  - Transmission planning with considering RE capacity addition

***Taking note of it, MOP constituted a Committee for accelerated development of RE through legislative & policy changes***

# Issues in REC Framework

- ❑ Floor/Forbearance Price: Longer visibility more than 5 years
- ❑ Vintage based floor price for solar REC
  - ❑ Multiplier linked to reduction in floor price: Legal interpretation
- ❑ Trading of REC
  - ❑ Secondary Market, OTC market, Multiple Trading: Liquidity issue
    - ❑ Major Issue of Tracking and Monitoring of RECs
- ❑ REC to Buyers
  - ❑ Issuance of RECs to Obligated entity for RE purchase beyond their RPO:  
Sale RECs to other obligated entities

## **Initiative:**

**CERC recently awarded a study in this regard to strengthen the existing REC framework**

# Review of REC mechanism

- A. Alternate Trading Arrangements**
- B. Bundling of RECs**
- C. Long Term REC Pricing**
- D. Number of Trading transactions of RECs**
- E. Miscellaneous**



# A. Alternative Trading Arrangements

Analyzing feasibility of permitting REC transaction through alternate trade mechanisms (bilateral arrangement), apart from power exchanges, as currently prevalent

## Key issues

- **Long term contractual clarity** : lenders/financial institutions & RE project developers tend to seek long term certainty on the REC off-take arrangement
- **Option to bundle or unbundle REC**: freedom should be there with the generator to sell his electricity in either bundled or unbundled form
- **Market off take of RECs not certain**: New RE project capacity addition would like to seek assurance of market off-take of REC along with stability of price regime on long term basis, which cannot be ensured through trading platform under existing arrangement.
- **Voluntary REC** : Voluntary REC purchase need to be mandatorily undertaken through REC market. It is perceived as major barrier.
- **Set off for RECs within group companies** : allow REC transaction between group companies to meet RPO compliance

# A. Alternate Trading Arrangements for REC Market

S No	Key Options	Details
1	Exchange based trading for Obligated entities and OTCs for Others	<ul style="list-style-type: none"> <li>Allow REC trader to undertake OTC with developers – <i>Eligibility criteria for REC trading?</i></li> <li>Obligated entities to buy RECs from exchange only</li> </ul>
2	Over-the-counter (OTC) for REC trading (Developers & Obligated entities)	<ul style="list-style-type: none"> <li>Allow developers &amp; obligated entities to enter into OTC transactions for both solar and non-solar RECs</li> <li>Such transactions can be for short term or long term through competitive bidding</li> </ul>
3	Allow transactions between Group companies	<ul style="list-style-type: none"> <li>Allow OTC transaction of RECs within Group companies to meet RPO compliance</li> <li>REC transfer at registry level - without accounting commercial transaction</li> </ul>
4	Encourage Volunteer REC purchasing	<ul style="list-style-type: none"> <li>Volunteer REC purchase through OTC to be allowed</li> <li>Enabling provisions required for the REC market – Registry to issue redemption certificate to such purchase</li> </ul>

# B. Bundling of RECs

## Key issues

The existing framework permits the renewable energy generator participating in the mechanism, to sell the electricity to the host distribution utility and the equivalent renewable energy certificates are transacted at the exchange platform.

The key issues related to such a framework are:

- **Behavioural issue:** The Obligated Entities intending to purchase the RECs along with the electricity from the same RE Generator, cannot do so as purchase of energy and REC in bundled form is not permitted under existing framework. State utilities, more used to long-term contracting for electricity are uncomfortable with the purely short-term nature of RECs for meeting their RPO requirement.
- **Lack of Incentive beyond RPO targets:** Utilities exceeding RPO targets by procurement under FIT/competitive bidding framework do not have any incentive for exceeding RPO targets.

# Bundling of RECs : Option 1

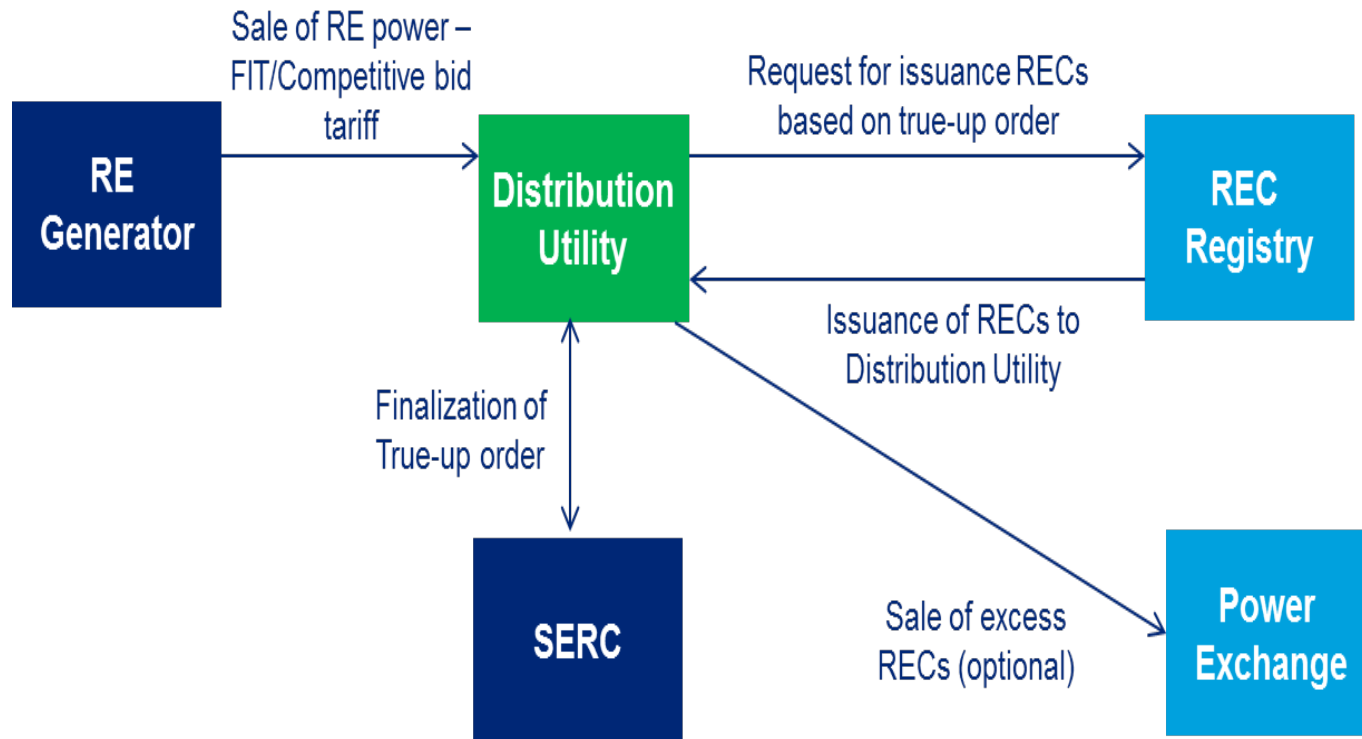
## Option 1: Issuance of RECs to distribution utilities exceeding RPO targets

• Issuance of RECs to distribution utilities (Discoms) exceeding RPO targets. Solar RECs can be issued against solar RPO and non-solar RECs against non-solar RPO compliance.

	Pros	Cons
1	Will incentivize resource rich states to encourage RE generation.	Distribution Licensees may insist RE generator to sign PPA at FIT.
2	provide flexibility to resource rich states to undertake RE procurement without worrying about RPO targets	Will move away from the existing framework of issuing RECs only to RE Generators.
3	Utilities will become active in the REC market as they will get REC issued against the excess RPO	RE Project specific monitoring may not be possible as compliance will comprise of procurement from different projects.
4		Will require changes in the existing IT infrastructure in the operating & monitoring mechanism of RECs.
5		Lag of few months for benefits to flow through to the discmos.
6		Issuance of REC to distribution licensee may flood RECs into market

# Issuance of RECs to distribution utilities exceeding RPO targets – Implementation Framework

---



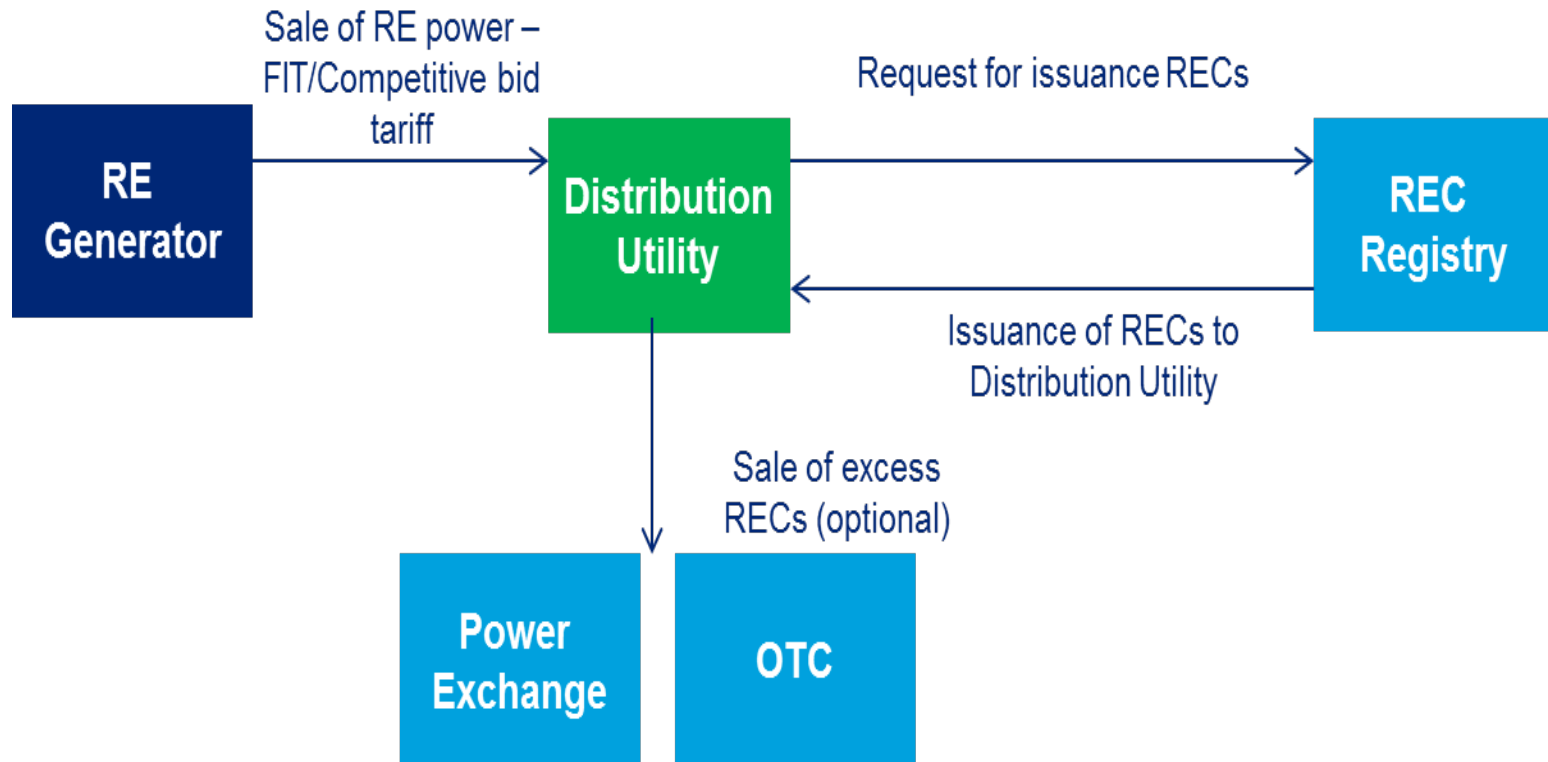
# Bundling of RECs : Option 2

## Option 2: Issuance of RECs to obligated entities - RECs to be only option for RPO compliance in long term

•The option aims at issuing RECs to distribution utilities for all RE power procurements undertaken at FIT or competitively determined tariff. The RECs issued to distribution utility against such procurement can be redeemed for meeting RPO compliance.

	Pros	Cons
1	Will strengthen REC market & provide long term clarity	Will be different from the already established REC framework.
2	Utilities to become an active player in the REC market	Difficult to implement in short term as change in IT infrastructure is required for REC mechanism
3	Strengthen the RPO monitoring framework. Redemption in Discoms account to instantly detail level of RPO compliance at the end of FY	Resource rich Discoms may dominate the REC market
4	Facilitate monitoring of RE generation at a central level for all the projects	

# Issuance of RECs to Obligated entities – Implementation Framework



# C. Long term REC pricing

## Key issues

- Lack of long-term price signals, contracts, and other commitments greatly increases the risk to potential investors
- Lack of long-term tariff certainty under REC framework greatly increases the risk to potential investors for their energy sales beyond control period of REC price
- Lack of technologically differentiated framework to support new and diverse sources of energy
- Review of the current underlying principles for determination of floor & forbearance prices
  - Relevance of floor price & should it be continued and if yes what should be the methodology
  - Relevance of forbearance price in long term ?
  - Solar REC price at a high level vis-à-vis current cost of generation
  - Legal Issue: Whether concept of multiplier will meet the requirement of Section 86(1) (e) of the Electricity Act, 2003.
- Developers dependence on REC revenue is high as APPC component is lower in select states



# Long term REC pricing - Key Options

S NO	Key Options	Key details
1	Vintage multiplier	<ul style="list-style-type: none"> <li>• High multiplier to existing solar projects under REC framework vis-à-vis new or future solar projects</li> <li>• Applicability of Vintage Multiplier linked to debt repayment period.</li> </ul>
2	Technology multiplier	<ul style="list-style-type: none"> <li>• High multiplier to high cost technologies to enhance their competitiveness in REC market vis-à-vis low cost technologies</li> <li>• Upcoming technologies requiring support in initial phase of its development be given higher REC credit</li> </ul>
3	Floor price determination	<ul style="list-style-type: none"> <li>• Change in floor price determination methodology during the current control period</li> <li>• Requirement of floor price</li> </ul>
4	Forbearance Price	<ul style="list-style-type: none"> <li>• Current framework to continue for REC forbearance price determination</li> </ul>
5	Definition of APPC	<ul style="list-style-type: none"> <li>• Increase APPC price to reduce the REC requirement</li> <li>• APPC definition to include a) marginal cost only or b) RE cost</li> </ul>

## D : Number of Trading Transactions of RECs

### Key Issues

- Present mechanism allows transaction of REC only once
- Limited participation in REC market

	Options	Key details
1	Allow multiple trading	<ul style="list-style-type: none"> <li>• For REC traders to participate provision of multiple trading may be required - aspect of possible hoarding of RECs by participants</li> <li>• Whether to define margin restrictions on multiple REC transaction by Traders</li> <li>• Whether to define limit on number of multiple trading on same REC</li> <li>• Monitoring through registry for multiple trading to avoid double counting</li> </ul>
2	Periodicity of REC trading sessions	<ul style="list-style-type: none"> <li>• Whether to increase the number of trading sessions during a month?</li> <li>• The frequency of auctioning may be reviewed and changed from monthly to fortnightly or weekly basis in due course depending on volume of REC transactions/ number of participants on Power Exchange.</li> </ul>

# E. Other Issues

Issue	Suggested Action
1      Validity period	<ul style="list-style-type: none"><li>• Validity of RECs increased to 730 days.</li><li>• Some RECs near to validity period</li><li>• Increase validity period only RECs near validity period by say another 1 year.</li><li>• The REC market has remained sluggish even after the increase of validity period and RECs still face the risk of extinction without getting traded</li></ul>
2      Electricity component of CPPs And Third party based generators higher than APPC	<ul style="list-style-type: none"><li>• Change eligibility of Captive Power Producers (CPPs) &amp; third party sale based generators for issuance of RECs</li><li>• Third party sale availing concessional transmission / wheeling charges and losses and banking facility may not be eligible for issuance of REC</li><li>• Possibility to provide different multiplier</li></ul>

**THANK YOU**