



# **REC Mechanism in India**

## **Market Analysis, Lessons Learned and Way Forward**

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## Salient Features Of The REC Mechanism

Participation	Voluntary
REC denomination	1 REC = 1MWh
RE technology	MNRE approved technologies are eligible for participation
Validity	1095 days after issuance of REC, increased from time to time
Categories	<ol style="list-style-type: none"> <li>1. Solar (unique certificate number)</li> <li>2. Non-solar (unique certificate number)</li> </ol>
Sellers	Eligible RE Generators / Distribution Licensees (DISCOM)
Buyers	<ol style="list-style-type: none"> <li>1. Obligated Entities (DISCOM/ Captive consumers / OA Consumers)</li> <li>2. Voluntary Buyers</li> </ol>
Trading platform	CERC approved Power Exchanges
Trading periodicity	Last Wednesday of the month
Self-retention	Registered plants can retain RECs for RPO compliance of their consumption units located in different States
Banking / Borrowing	Not Allowed
Transfer type	Single transfer only, repeated trade of the same certificate is not allowed
Solar RECs	Floor price: Rs. 1000 / MWh Forbearance price: Rs. 2400 / MWh
Non-solar RECs	Floor price: Rs. 1000 / MWh Forbearance price: Rs. 3000 / MWh

# Processes In The REC Mechanism

## STAGES UNDER REC MECHANISM

ACCREDITATION

REGISTRATION

ISSUANCE

TRADE & REDEMPTION

- In line with the CERC REC Regulations, Central Agency has developed procedures for each process
- 5 times the procedures have been modified since launch of the mechanism
- RECs can be traded through CERC approved Power Exchanges (PXs) i.e. **Indian Energy Exchange (IEX)** and **Power Exchange India Limited (PXIL)**

### 1. ACCREDITATION

- ✓ RE GENERATOR & DISCOM APPLIES ONLINE
- ✓ STATE AGENCY VERIFIES DETAILS
- ✓ STATE AGENCY ACCREDITATE/ REJECTS

### 2. REGISTRATION

- ✓ RE GENERATOR & DISCOM APPLIES ONLINE
- ✓ CENTRAL AGENCY VERIFIES DETAILS
- ✓ CENTRAL AGENCY REGISTER/ REJECT

### 3. ISSUANCE

- ✓ RE GENERATOR & DISCOM APPLIES ONLINE (10th ,20th AND LAST DAY OF MONTH)
- ✓ SLDC VALIDATES ENERGY INJECTION REPORT
- ✓ CENTRAL AGENCY ISSUES REC

### 4. REDEMPTION

#### Redemption through Power Exchanges (PX)

- ✓ BUYERS & SELLERS PLACE BIDS AT PXs
- ✓ POWER EXCHANGES SEND PROVISIONAL FILE TO CENTRAL AGENCY FOR VALIDATION OF SALE BIDS
- ✓ CENTRAL AGENCY SENDS EXCEPTION REPORT IF ANY
- ✓ PXs PROCESS FINAL TRADE

#### Redemption through Self-retention of RECs by RE generators

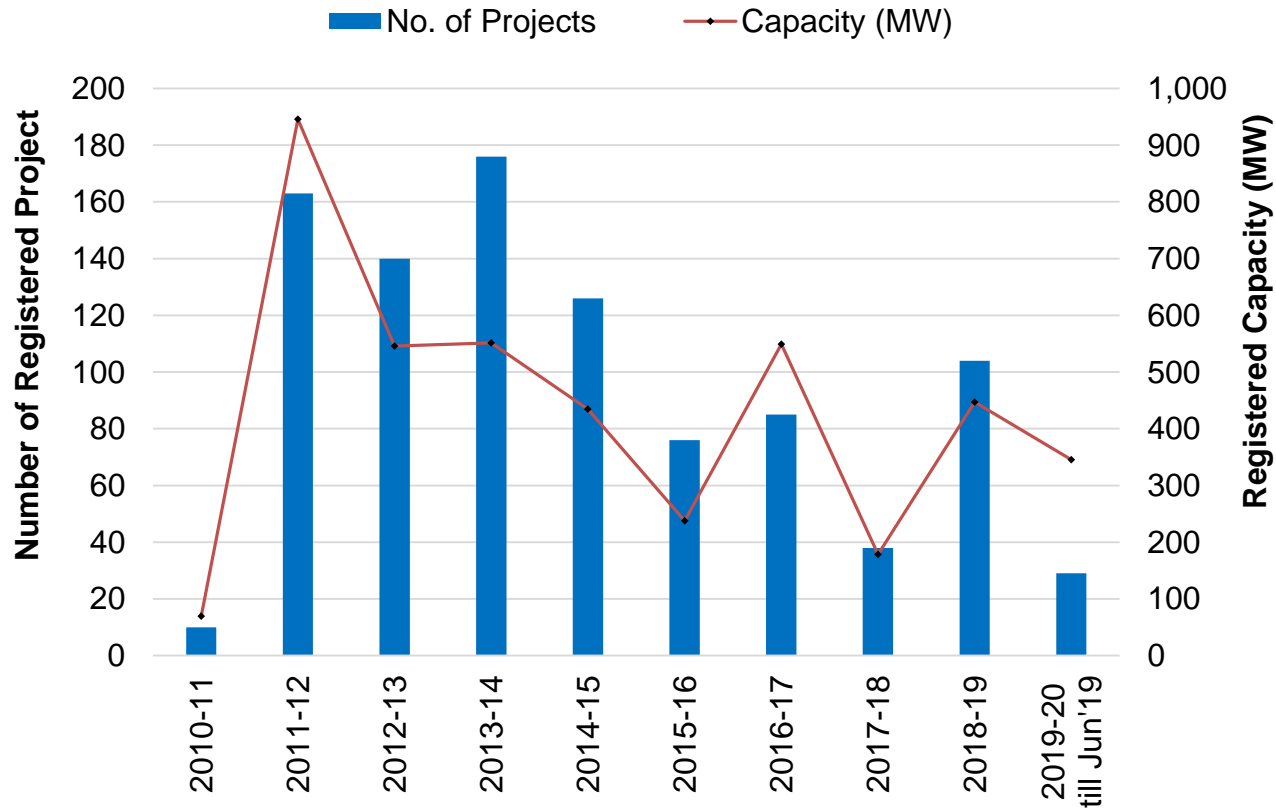
## Break Up of Renewable Energy Projects Under REC Mechanism

Source wise break up of RE projects								As on June 30, 2019	
SN	RE Technology	Accredited		Registered		RECs Issued	RECs Redeemed Through Power Exchanges	RECs Redeemed Through Self Retention	Closing Balance
		Capacity (MW)	No. of Projects	Capacity (MW)	No. of Projects				
1	Wind	2,535	460	2,508	448	21,782,815	18,975,654	1,751,952	1,055,209
2	Solar PV	769	378	747	369	8,990,284	8,758,173	113,377	118,734
3	Biomass	500	46	416	39	9,581,447	9,325,931	147,549	107,967
4	Bio-fuel cogeneration	862	96	412	56	8,344,450	8,225,482	5,001	113,967
5	Small Hydro	220	34	220	34	4,263,924	4,250,416	6,899	6,609
6	Others	4	2	3	1	16,843	9,970	5,010	1,863
7	Urban or Municipal Waste	0	0	0	0	72,892	72,892	0	0
<b>Total</b>		<b>4,890</b>	<b>1,016</b>	<b>4,306</b>	<b>947</b>	<b>53,052,655</b>	<b>49,618,518</b>	<b>2,029,788</b>	<b>1,404,349</b>
Break up of Distribution Licensees									
SN	Particular	No. of Accredited Distribution Licensees		No. of Registered Distribution Licensees		RECs Issued	RECs Redeemed Through Power Exchanges	RECs Redeemed Through Self Retention	Closing Balance
1	Distribution Licensees	4		4		2,420,078	1,851,440	0	568,638
<b>Break-up of Total RECs (RE Projects + Distribution Licensees)</b>						<b>55,472,733</b>	<b>51,469,958</b>	<b>2,029,788</b>	<b>1,972,987</b>

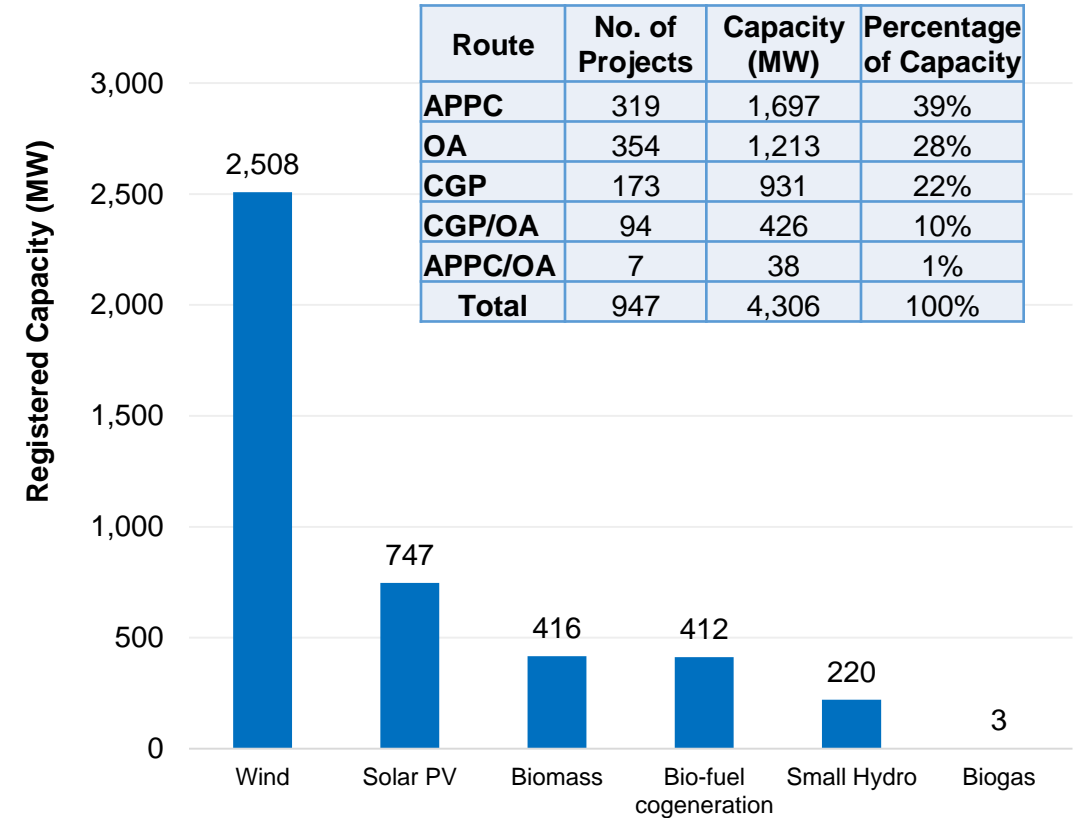
# Market Data Analysis

As on June 30, 2019

## FY-wise registered projects and capacity (MW)



## Technology and off-take route wise registered capacity (MW)

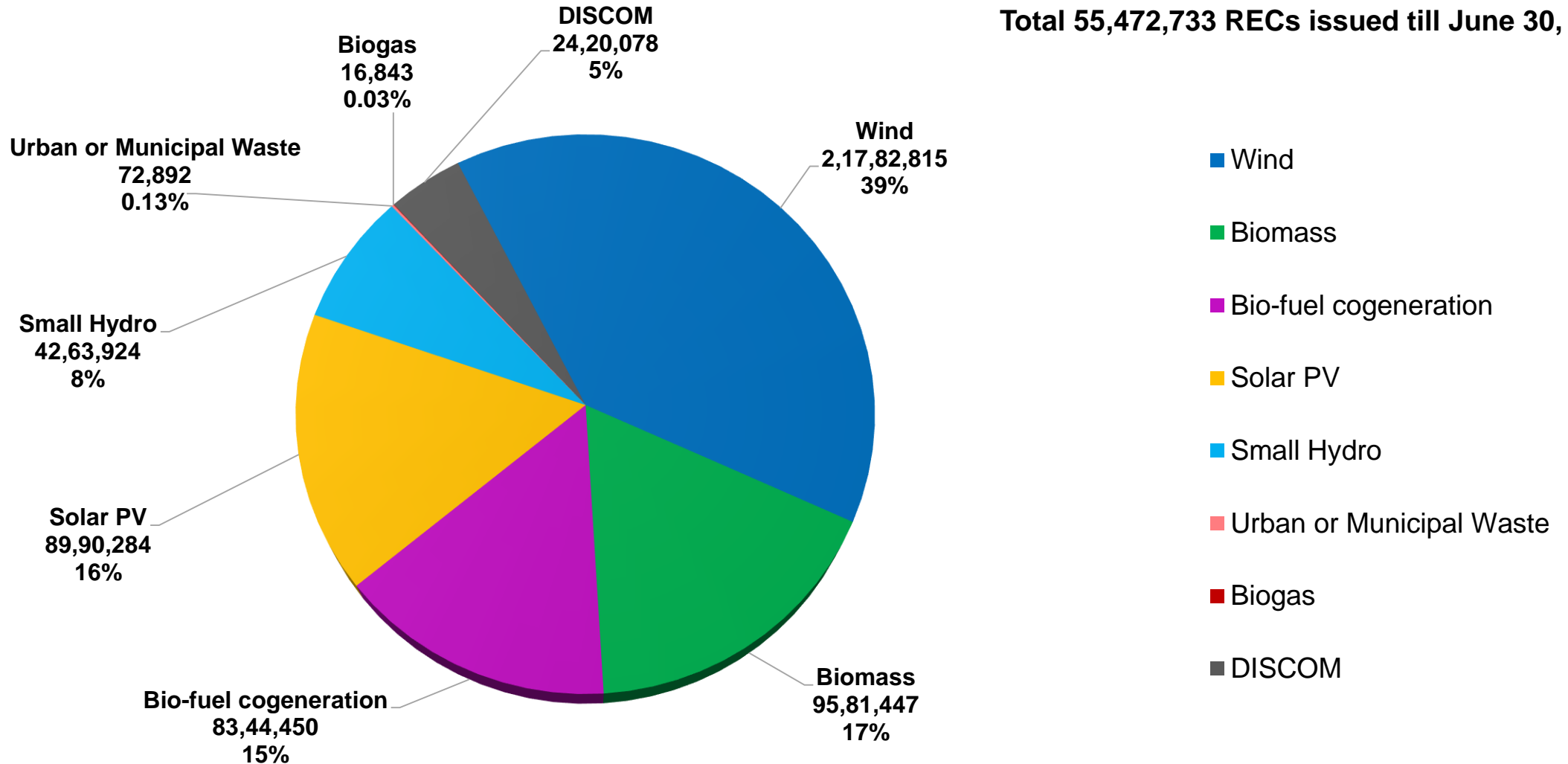


Total 947 eligible RE projects having capacity 4,306 MW from 19 states have been registered under REC mechanism

# Market Data Analysis

## Technology wise breakup of RECs issued to Eligible Entities under REC Mechanism

Total 55,472,733 RECs issued till June 30, 2019



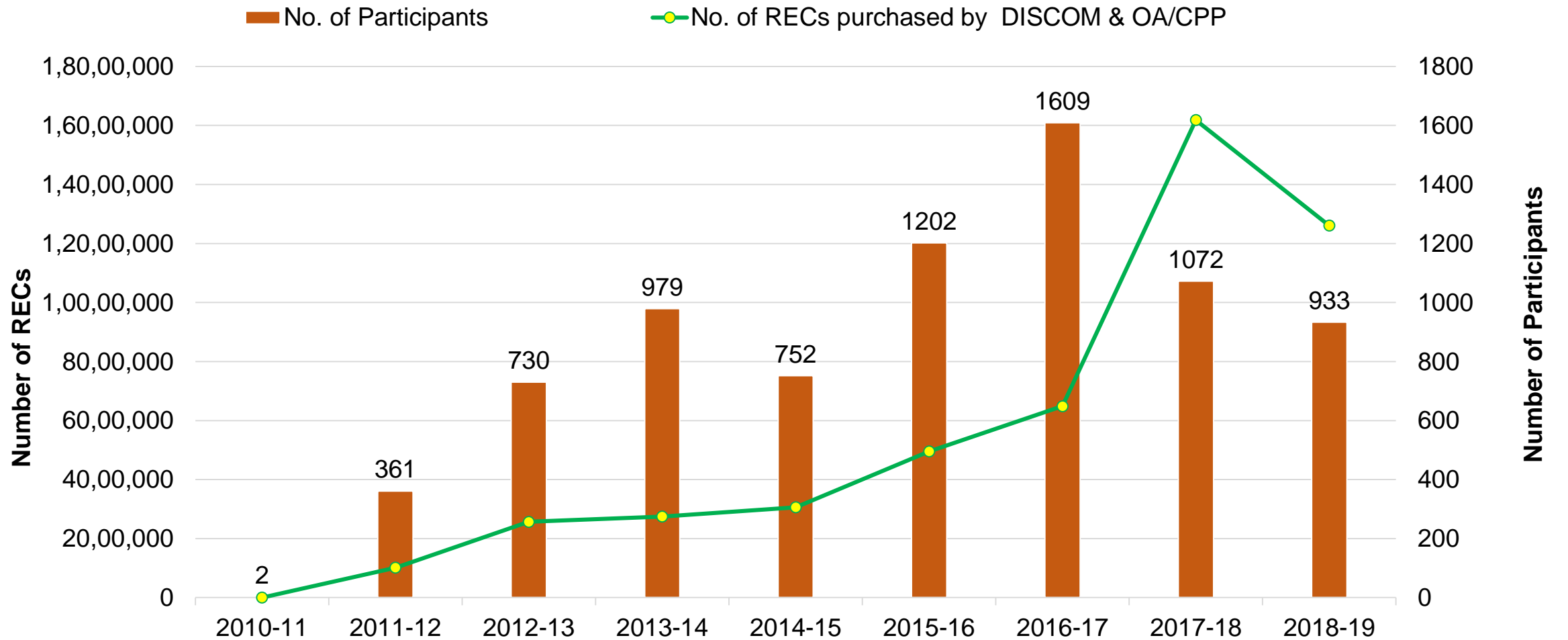
# Market Data Analysis

## PXs and FY wise number of buyers & sellers and transacted RECs till June 30, 2019

Financial Year	Number of Buyers of RECs		Number of Sellers of RECs		Transacted RECs		Total Transacted RECs
	PXIL	IEX	PXIL	IEX	PXIL	IEX	
2010-11	1	2	1	1	274	150	424
2011-12	38	359	39	158	64,266	951,008	1,015,274
2012-13	158	644	279	404	598,825	1,990,989	2,589,814
2013-14	179	904	447	597	1,424,371	1,324,323	2,748,694
2014-15	158	663	628	750	1,514,298	1,547,624	3,061,922
2015-16	240	1,092	679	833	1,816,263	3,138,890	4,955,153
2016-17	378	1,382	699	888	1,869,120	4,618,619	6,487,739
2017-18	234	938	685	914	6,854,898	9,329,253	16,184,151
2018-19	182	830	476	675	3,653,223	8,955,572	12,608,795
2019-20 till Jun'19	42	353	152	450	622,457	1,195,535	1,817,992
<b>Total Number of RECs Transacted through PXs</b>					<b>18,417,995</b>	<b>33,051,963</b>	<b>51,469,958</b>

# Market Data Analysis

FY-wise number of RECs purchased by DISCOMs and OA/CPP consumers till FY 2018-19





# Market Data Analysis

## RECs purchased by DISCOMs till June 30, 2019

S. No.	Name of DISCOM	Total RECs purchased till Jun'19	S. No.	Name of DISCOM	Total RECs purchased till Jun'19
1	Maharashtra State Electricity Distribution Company Limited	6,246,910	18	North Bihar Power Distribution Company Limited	399,517
2	Reliance Infrastructure Limited	2,576,156	19	Electrical Dept UT Daman and Diu	388,904
3	Brihan Mumbai Electric Supply & Transport Unde	2,363,300	20	BSES Rajdhani Power Limited	333,332
4	Tata Power Delhi Distribution Limited/ NDPL	2,284,942	21	Electricity Wing of Engineering Dept UT Chandigarh	311,911
5	Torrent Power Limited - Ahmedabad Distribution	2,035,083	22	Electricity Department Government of Goa	292,000
6	Bihar State Power Holding Company Limited- Patna	1,699,849	23	Jindal Steel and Power Ltd Distribution License	213,640
7	Punjab State Power Corporation Limited	1,243,862	24	Gujarat Urja Vikas Nigam Limited	150,000
8	Damodar Valley Corporation West Bengal	1,153,347	25	Kerala State Electricity Board Limited	100,000
9	The Tata Power Company Limited	1,131,761	26	BSES Yamuna Power Limited	66,660
10	Dadra and Nagar Haveli Power distribution company	951,681	27	Torrent Power Limited - Dahej Distribution	61,540
11	Tata Steel Limited Power Distribution Licensee	935,755	28	Power and Electricity Department Government of Mizoram	31,754
12	Torrent Power Limited - Surat Distribution	921,364	29	Manipur State Power Distribution Company Limited	3,997
13	Assam Power Distribution Company Limited	705,120	30	Meghalaya Power Distribution Corporation Limited	3,875
14	Damodar Valley Corporation Jharkhand	693,470	31	Himachal Pradesh State Electricity Board Ltd	3,863
15	Uttarakhand Power Corporation Limited	560,680	32	Tripura State Electricity Corporation Limited	297
16	South Bihar Power Distribution Company Limited	459,492	<b>Total RECs Purchased by DISCOMs</b>		<b>28,755,011</b>
17	Electricity Department Government of Puducherry	430,949			

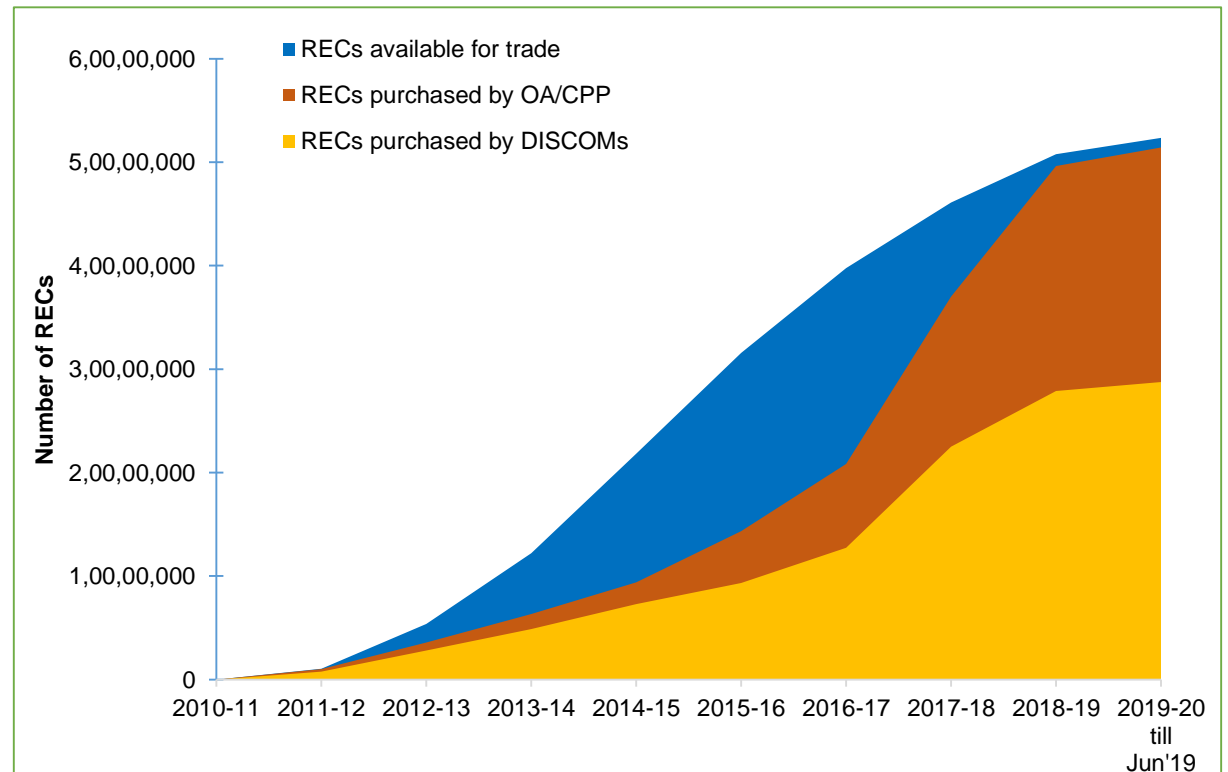
# Market Data Analysis

## State-wise RECs purchased till June 30, 2019

SN	State	RECs Purchased	Percentage RECs Purchased
1	Maharashtra	14,280,141	28%
2	Gujarat	6,364,304	12%
3	Odisha	4,027,208	8%
4	Delhi	3,586,723	7%
5	Jharkhand	3,008,897	6%
6	Madhya Pradesh	2,623,643	5%
7	Rajasthan	2,574,683	5%
8	Bihar	2,559,707	5%
9	Punjab	1,611,633	3%
10	Chhattisgarh	1,343,901	3%
11	Karnataka	1,339,952	3%
12	West Bengal	1,153,354	2%
13	Dadra and Nagar Haveli	1,075,152	2%
14	Tamil Nadu	934,475	2%
15	Assam	928,368	2%
16	Andhra Pradesh	853,429	2%
17	Uttarakhand	708,741	1%
18	Daman and Diu	447,965	1%
19	Pondicherry	432,950	1%
20	Chandigarh	311,911	1%
21	Goa	292,000	1%
22	Uttar Pradesh	232,294	0.5%
23	Telangana	215,483	0.4%
24	Haryana	198,595	0.4%
25	Kerala	146,440	0.3%
26	Himachal Pradesh	137,857	0.3%
27	Meghalaya	44,104	0.1%
28	Mizoram	31,754	0.1%
29	Manipur	3,997	0.01%
30	Tripura	297	0.001%
<b>Total RECs Purchased</b>		<b>51,469,958</b>	<b>100%</b>

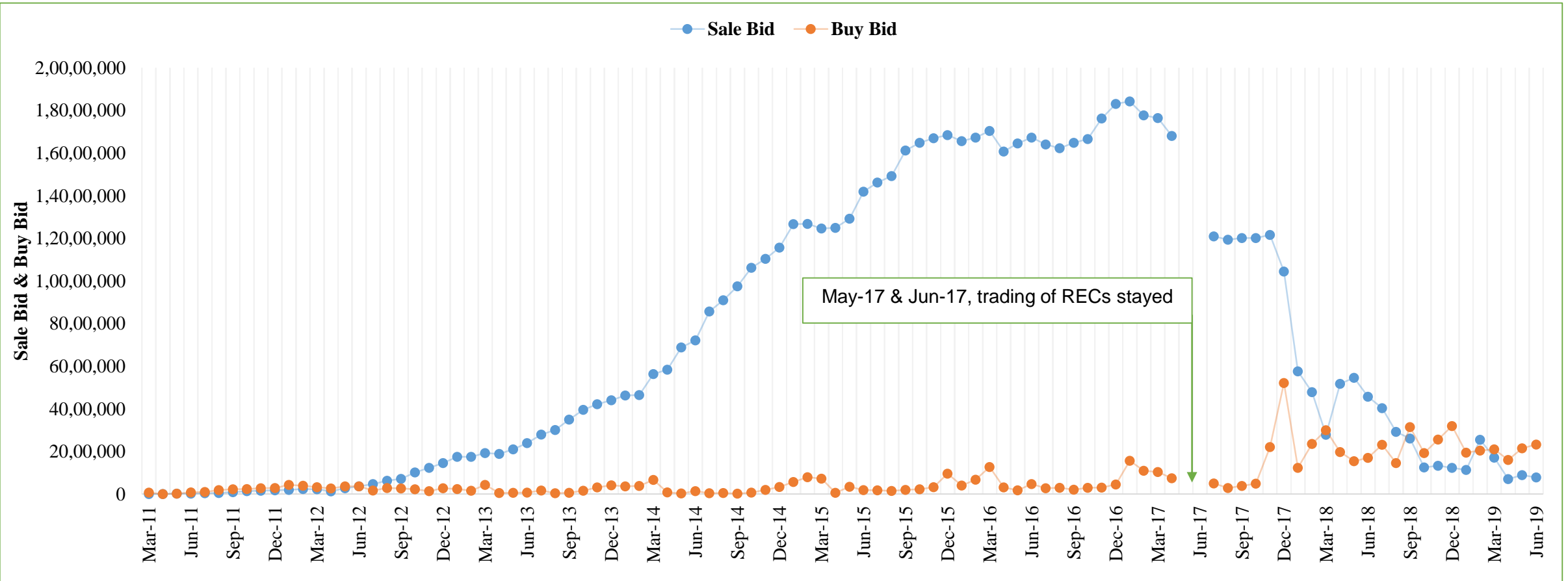
- Since, REC is a pan-India mechanism, stakeholders and voluntary buyers from 30 States/UTs have purchased more than 51 million RECs through Power Exchanges up to June 30, 2019
- More than 3,500 obligated entities have purchased more than 51.5 million RECs since 2011

## RECs Issuance and Redemption



# Market Data Analysis

## Sale and Buy bids of monthly trading till June 30, 2019



- Buy bids are approximately more or less equal to the sale bids during March 2011- August 2012
- During September 2012 - August 2018, the sale bids are more than the buy bids, which resulted into the huge inventory of RECs
- Post September 2018, buy bids are more than the sale bids - which has changed the nature of market from buyer's market to seller's market

## Market Data Analysis

### Floor and Forbearance price of non-solar RECs

	01.06.2010 - 31.03.2012	01.04.2012 - 31.03.2017	w.e.f. 01.04.2017
<b>Forbearance Price (Rs./MWh)</b>	3,900	3,300	3,000
<b>Floor Price (Rs./MWh)</b>	1,500	1,500	1,000

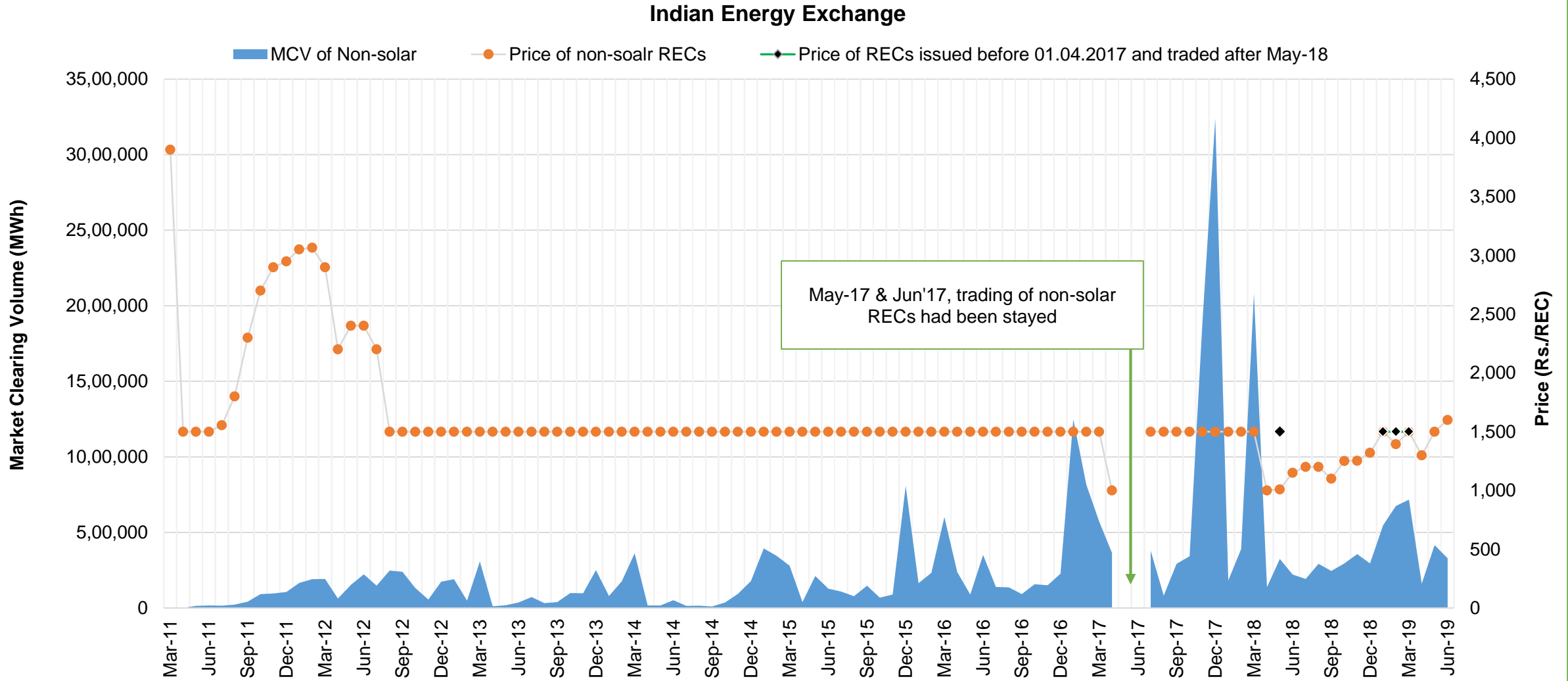
### Floor and Forbearance price of solar RECs

	01.06.2010 - 31.03.2012	01.04.2012 - 31.12.2014	01.01.2015 - 31.03.2017	w.e.f. 01.04.2017
<b>Forbearance Price (Rs./MWh)</b>	17,000	13,400	5,800	2,400
<b>Floor Price (Rs./MWh)</b>	12,000	9,300	3,500	1,000

- As per Hon'ble Supreme Court order dated May 14, 2018, the trading of non-solar RECs after May 2018 onwards are being held separately for RECs issued pre and post April 01, 2017
- RECs issued before April 01, 2017 are being traded at floor price of Rs. 1,500/REC, and
- RECs issued after April 01, 2017 are being traded as per prices effective from April 01, 2017

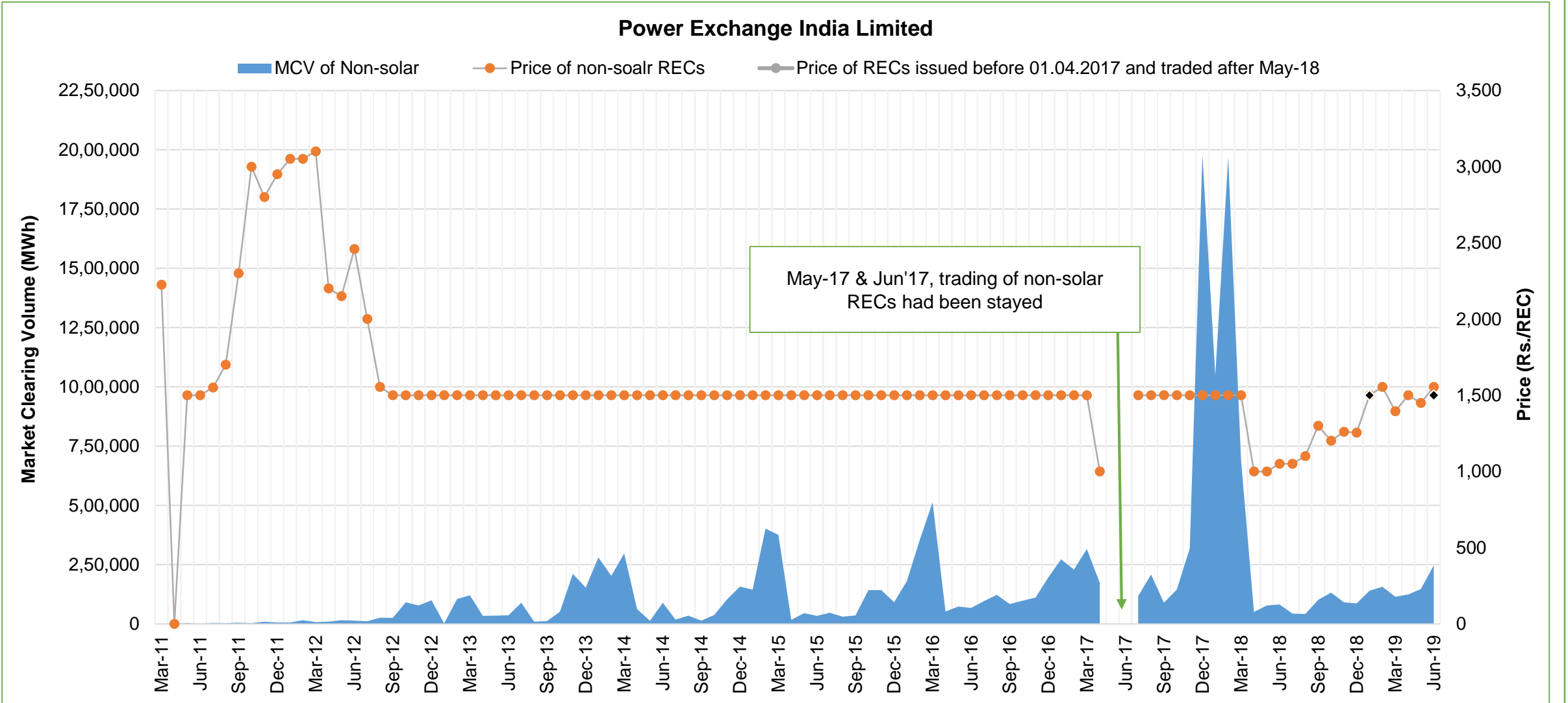
# Market Data Analysis

## Market Clearing Price and Market Clearing Volume for Non-Solar RECs at IEX



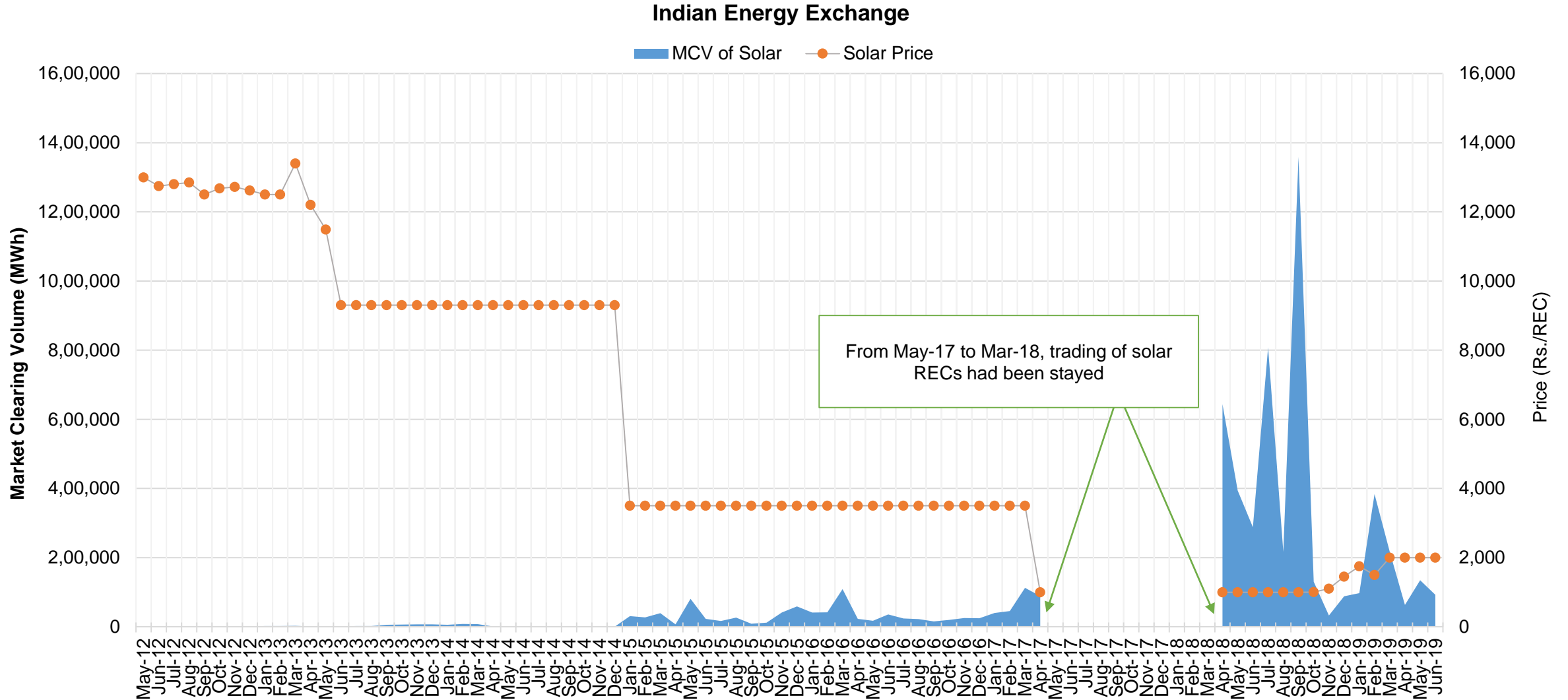
# Market Data Analysis

## Market Clearing Price and Market Clearing Volume for Non-Solar RECs at PXIL



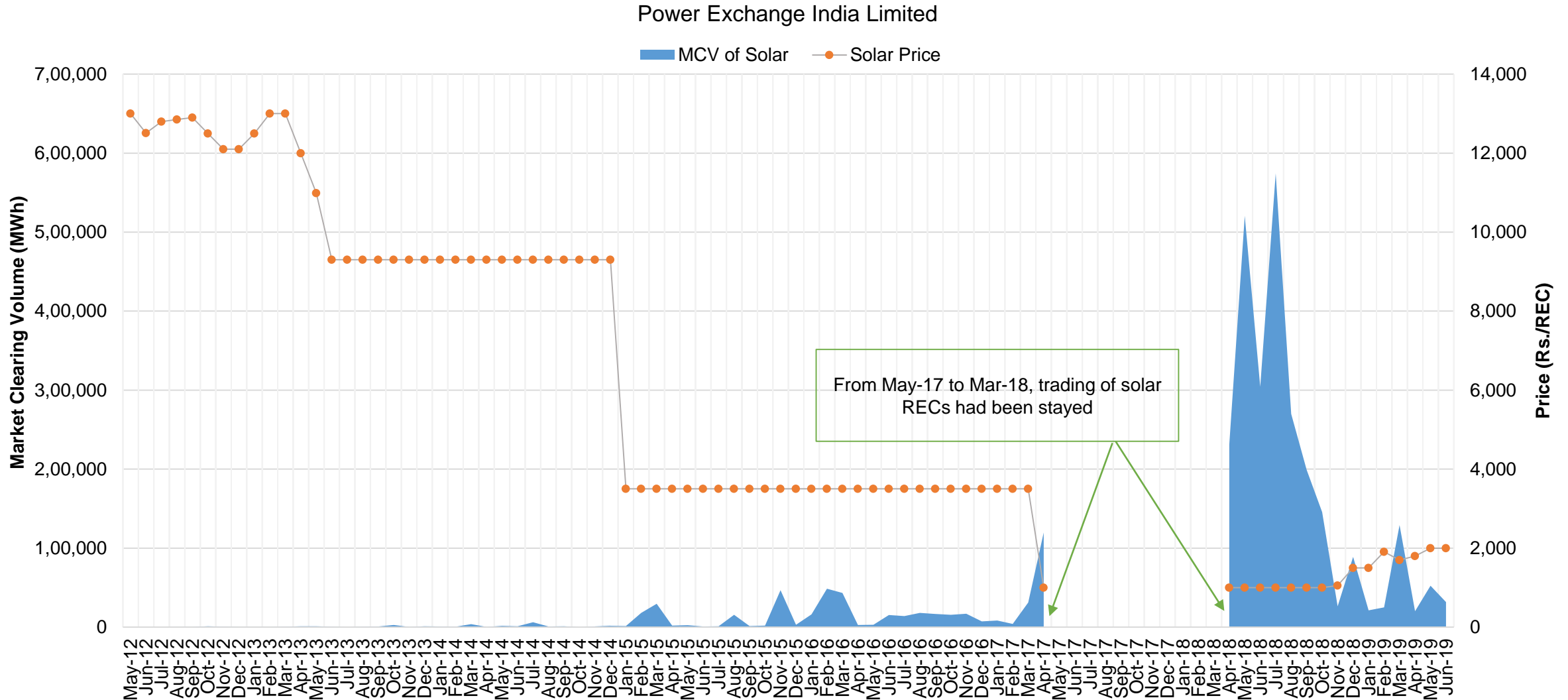
# Market Data Analysis

## Market Clearing Price and Market Clearing Volume for Solar RECs at IEX



# Market Data Analysis

## Market Clearing Price and Market Clearing Volume for Solar RECs at PXIL





## Lessons Learned

### ➤ Experience of the REC Registry

- ✓ REC web application helped all stakeholders in the implementation of the REC mechanism
- ✓ User friendly dashboards has been provided to the RE generators/State Agencies
- ✓ REC web portal helped State agencies to monitor RPO compliance of obligated entities with regard to purchase of RECs
- ✓ On the basis of experience of management of REC Registry, Ministry of Power authorized POSOCO to establish the necessary framework to discharge the functions under Perform Achieve Trade (PAT) scheme

### ➤ Impact of REC Mechanism

- ✓ More than 3,500 obligated entities have purchased 51.5 Million RECs for RPO compliance
- ✓ Around 7% of new renewable energy investment in the period 2010-2017 came through REC mechanism
- ✓ Traded value of RECs about Rs. 7,845 crores gives signal to investors to consider REC mechanism as an option for investment
- ✓ Provided an avenue for small and large RE generators to take the benefit of REC mechanism without worrying about the power purchase agreement for sale of green energy to the buyers
- ✓ CPPs / Open Access consumers can procure RECs through Power Exchanges
- ✓ Facilitated inter-State transaction of RECs
- ✓ RE generators are also permitted to self-retain RECs to offset RPO of their consumption units located in different parts of the country

### ➤ Compliance audit of RE projects

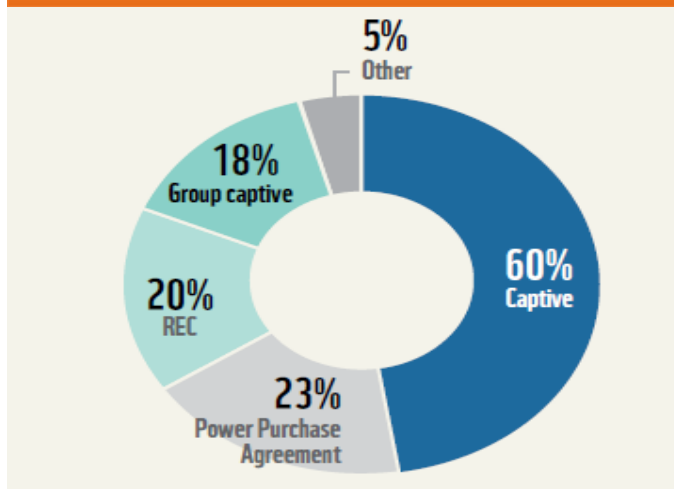
- ✓ CERC empaneled compliance auditors audited registered RE project and appropriate action has been initiated against non-complying RE Projects
- ✓ In first phase during 2012-2013, 100 RE projects were selected and in second phase of compliance audit during 2018-19, 217 projects/State Agencies/SLDC have been Audited.

# Lessons Learned

## ➤ Purchase of RECs vis-a-vis RE for RPO compliance

SN	Particular	Compliance of RPO by Purchase of	
		Renewable Energy	REC(s)
1	Technology Agnostic	Specific RE Tech.	Yes
2	Competition among different RE technologies	Not Possible	Possible
3	Transaction Costs	High	Low
4	Flexibility in procurement in terms of timing	Yes	No
5	Location Dependent	Yes	No
6	Exit Load, Barrier for Utility/ Beneficiary/ Developer/generator	Significant barrier/ only option to terminate the existing PPA	Freedom and flexibility to purchase in terms of quantum/ timing

### Renewable Energy Demand in India

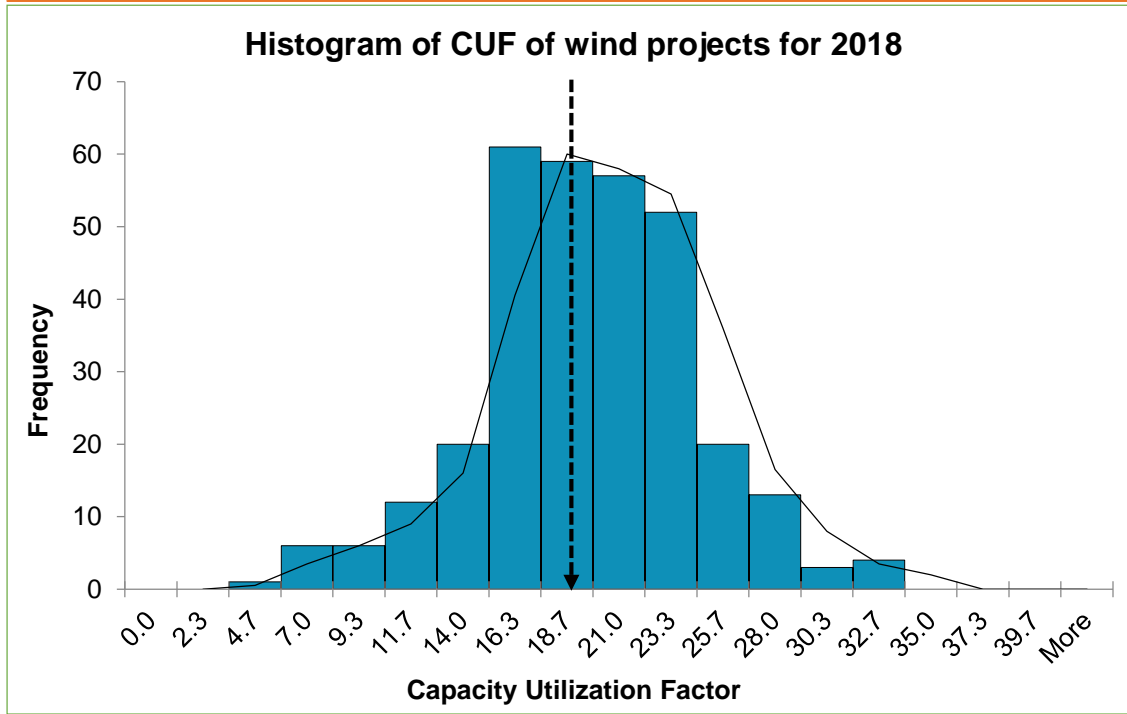


Source: RENEWABLE ENERGY DEMAND IN INDIA – Corporate Buyer's Perspective by WWF-India 2019

- ✓ Provided freedom and choice to obligated entities (buyers) in terms of the accessibility and availability for procurement of certificates through Power Exchanges
- ✓ In a survey, it has been found that 20% corporates preferred REC as one of the option for procurement of renewable energy

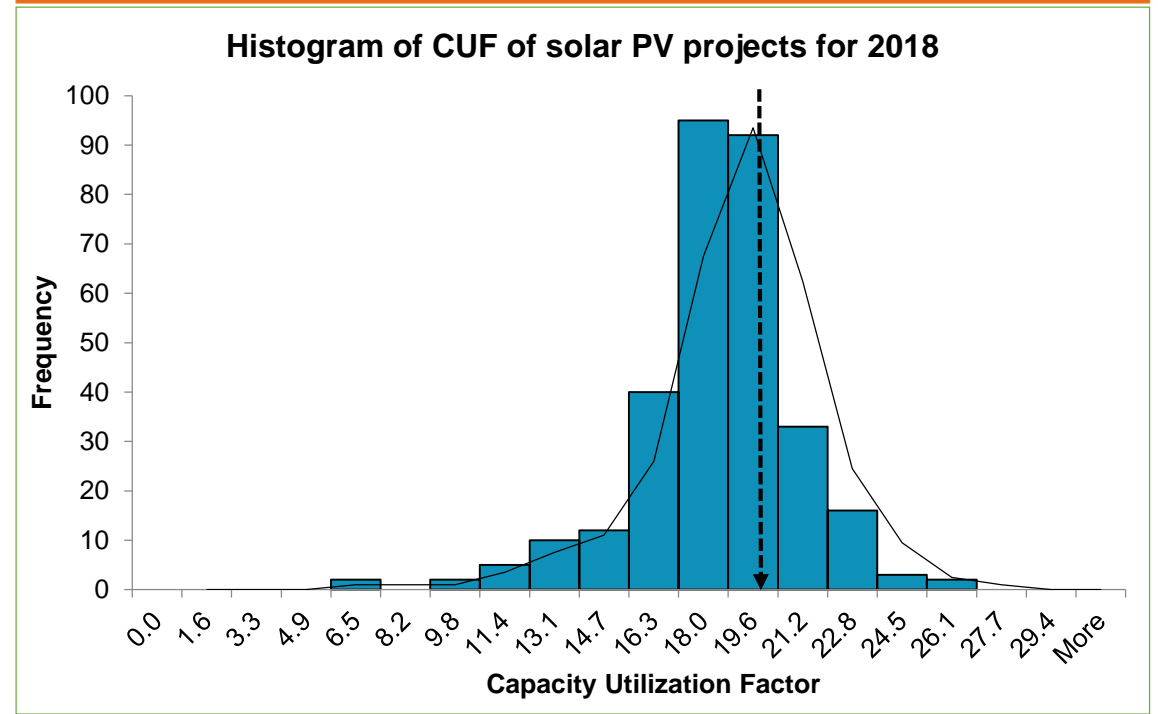
# Challenges And Way Forward

## Analysis of Capacity Utilization Factor (CUF) of Wind projects



No. of wind project	314
Capacity	1936 MW
Min	4.5
Max	32.5
Mean	18.3
Median	18.4
StDev	4.8

## Analysis of Capacity Utilization Factor (CUF) of Wind projects



No. of solar project	312
Capacity	633 MW
Min	5.6
Max	25.2
Mean	17.6
Median	17.8
StDev	2.6

## Challenges And Way Forward

- ✓ Non-compliance of the RPO by the obligated entities is a cause of concern for the stakeholders
- ✓ There are gaps in the RPO target for purchase of green energy vis-a-vis availability or procurement of RE in many States
- ✓ Many SERCs have also imposed penalties on the obligated entities for non-compliance of the concerned RPO Regulations
- ✓ MNRE has setup an RPO compliance cell, which will coordinate with the concerned authorities for periodic reporting and apprise the authorities for compliance of RPO and it will help SERCs to enforce the compliance of RPO regulations
- ✓ Hon'ble Supreme Court, Hon'ble Appellate Tribunal of Electricity (APTEL) and SERCs have also recognized REC as an instrument for RPO compliance
- ✓ Contribution of voluntary buyer in purchase of RECs is quite less in comparison to the market potential
- ✓ RE100 is a global corporate leadership initiative bringing together influential businesses committed to 100% renewable electricity

## References

- ✓ <http://www.cercind.gov.in/2015/regulation/GZT49.pdf>
- ✓ [https://www.recregistryindia.nic.in/pdf/REC\\_Regulation/Gazette\\_Notification\\_for\\_designating\\_NLDC\\_as\\_Central\\_Agency.pdfhttps://www.cercind.gov.in](https://www.recregistryindia.nic.in/pdf/REC_Regulation/Gazette_Notification_for_designating_NLDC_as_Central_Agency.pdfhttps://www.cercind.gov.in)
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**Thank You !!!**