

# Analysis of Indian Renewable Energy Certificate (REC) Market

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**Abstract** — India's grid connected installed capacity as on 30<sup>th</sup>, June, 2012 was about 205 GW with renewable capacity of about 25 GW which constitutes about 12% of total installed capacity. India has a huge renewable energy potential, which is estimated around 85,000 MW for non-solar sources and more than 100,000 MW for solar. The Electricity Act, 2003, the policies framed under the Act and the National Action Plan on Climate Change (NAPCC) provide for a roadmap for increasing the share of renewable in the total generation capacity in the country. Central Electricity Regulatory Commission (CERC) notified Regulation on Renewable Energy Certificate (REC) dated 14th January, 2010, in fulfilment of its mandate to promote renewable sources of energy and development of market in electricity. REC Mechanism, a market based instrument, has been introduced in India on 18th November 2010. REC Mechanism provides a means to address the dispersed availability of renewable energy sources across various States in the Country. It separates the 'green' component from the 'electricity' component and facilitates the obligated entities in meeting of the Renewable Purchase Obligation (RPO) by addressing the issues of geographical Constraints and Inter-State Transfer of Power from Renewable Energy Sources. One REC represents one MWh of energy generated from renewable sources. A pan-India market has been created for trading in RECs through the Power Exchanges. National Load Despatch Centre has been designated as the Central Agency. Since, the launch of REC Mechanism, the REC Market has grown in depth and volume. The paper highlights the progress of REC Market and the challenges ahead.

## KEYWORDS

Renewable Energy Certificates (REC), Indian Electricity Market, Central Electricity Regulatory Commission (CERC), National Load Despatch Centre (NLDC), Renewable Purchase Obligation (RPO), Accreditation, Registration, Issuance, Redemption

## I. INTRODUCTION

**E**NERGY consumption is increasing at an exponential

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rate due to the increase in the population and the quest for improvement of living standards.

Recognizing the importance of energy security for sustained growth & development and conservation of limited fossil fuel resources, India has put into place a National Action Plan on Climate Change. The National Action Plan of Climate Change (NAPCC) has set the target of 5% renewable energy purchase for FY 2009-10 which will increase by 1% for next 10 years. The NAPCC further recommends strong regulatory measures to fulfil these targets. Further, Central Electricity Regulatory Commission (CERC) notified Regulation on Renewable Energy Certificate (REC) dated 14th January, 2010, in fulfilment of its mandate to promote renewable sources of energy and development of market in electricity. Renewable Energy Certificate (REC) Mechanism, a market based instrument, has been introduced in India on 18th November 2010. REC Mechanism provides a means to address the dispersed availability of renewable energy sources across various States in the Country. It separates the 'green' component from the 'electricity' component and facilitates the obligated entities in meeting of the RPO by addressing the issues of geographical Constraints and Inter-State Transfer of Power from Renewable Energy Sources. One REC represents one MWh of energy generated from renewable sources. A pan-India market has been created for trading in RECs through the CERC approved Power Exchanges. National Load Despatch Centre (NLDC) has been designated as the Central Agency. NLDC is responsible for registration of Renewable Energy Generation Facilities, issuance of Renewable Energy Certificates, maintenance and settlement of Renewable Energy Certificate Account, information pertaining to Renewable Energy Certificates, repository of transactions in certificates, etc. as may be necessary for coordination and implementation of Renewable Energy Certificate Mechanism.

In accordance with the CERC Regulations, the Central Agency has made available the procedures for

Registration of eligible entities, Issuance of RECs, Redemption of RECs and model Guidelines for Accreditation. The block diagram depicting the conceptual framework is shown below:

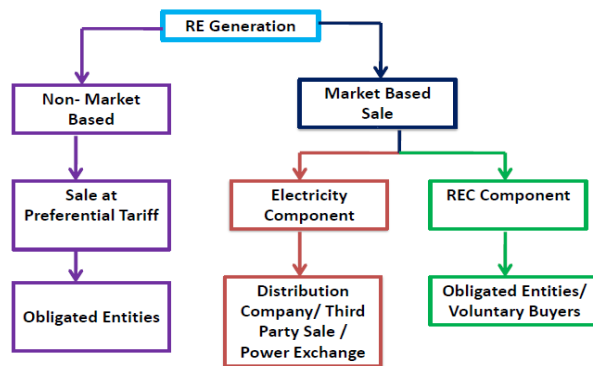


Figure1: Conceptual Framework for REC Mechanism

## II. REC PROCESS

REC Mechanism is a fully automated Mechanism, a unique application of its kind. The REC process comprises of four stages i.e. Accreditation, Registration, Issuance and Redemption which are discussed below.

- A. *Accreditation:* The State Agencies, as may be designated by the SERCs, act as the agency for accreditation and recommending the renewable energy projects for registration, subject to fulfilment of eligibility conditions for participating in REC mechanism in accordance with conditions outlined under the CERC REC Regulations. An application for availing accreditation may be made by the generating company to the host State Agency through the centralized web based application. The State Agency, after duly inspecting/verifying conditions, grants a ‘Certificate for Accreditation’ (valid for five years unless revoked) to the concerned Applicant for the proposed RE Generation project, which is also called the ‘Eligible Entity’. The process of accreditation is normally completed within 30 days from date of receipt of complete information by State Agency.
- B. *Registration:* After accreditation, an application for availing registration is made by the RE Generator to the Central Agency, through the centralized web based application. The Central Agency, after duly inspecting/verifying conditions, grants ‘Certificate for Registration’ (valid for five years unless revoked) to the concerned Applicant as ‘Eligible Entity’ confirming its entitlement to receive Renewable Energy Certificates for the proposed RE Generation project. The process of registration is normally completed within 15 days from date of

receipt of complete information by Central Agency.

- C. *Issuance:* An application for issuance of Renewable Energy Certificate is made by the Eligible Entity to the Central Agency on the Web based application. An eligible entity can apply for RECs within three months from the month in which renewable energy was generated. The application for issuance of certificate includes Energy Injection Report duly certified by the concerned State Load Despatch Centre. The application for issuance of Renewable Energy Certificates may be made on a fortnightly basis, i.e., on the first day of the month or on the fifteenth day of the month. The Central Agency issues RECs to the Eligible Entity after verifying the claims made by the Eligible Entity, with the Energy Injection Report submitted by the State Load Despatch Centre (SLDC).
- D. *Redemption:* The Eligible Entity may place for dealing the RECs, both ‘Solar’ and ‘Non-Solar’ Certificates, on any Power Exchange, where the trading in RECs takes place. Successful trades are intimated to the Central Agency for redemption and extinguishing of the RECs. RECs are currently traded on two power exchanges, Indian Energy Exchange and Power Exchange India Ltd. Currently, RECs are traded once in month i.e. normally on last Wednesday of the month.

## III. ANALYSIS OF REC MECHANISM

### • ACCREDITATION AND REGISTRATION:

In CERC order on REC fees and charges, approach for determination of fee and charges was based on three scenario i.e. ‘Pessimistic Scenario’ wherein 77 Projects with capacity 400 MW were expected to participate, ‘Realistic Scenario’ wherein 106 Projects with capacity 600 MW were expected to participate and the ‘Optimistic Scenario’ wherein 177 Projects with capacity 1000 MW were expected to participate under REC Mechanism. The response to the REC Mechanism in the first year of its operation was very encouraging right from the beginning and during the period of one year from the date of launching of REC Mechanism (18th Nov, 2010), even the most optimistic targets were surpassed and till 18th Nov, 2011, a total of 227 projects with capacity 1466 MW were registered under REC Mechanism by the Central Agency. Further, in the subsequent months the projects have been registered with more than double the rate of 1<sup>st</sup> year and as on 30<sup>th</sup> September 2012, a total of 602 projects with capacity 3152 MW have been registered by Central Agency.

The first project was accredited in December, 2010 and Registered in January, 2011. Thereafter 671 projects with capacity 3505 MW at an average rate of 32 projects with capacity 170 MW per month have been accredited under REC Mechanism till 30<sup>th</sup> September, 2012. Among the total registered under

REC Mechanism, RE Generators based on wind energy contributes the maximum i.e. about 57%. First time 2 MW Solar Project from the State of Madhya Pradesh was registered by NLDC in April, 2012. Interestingly, RE Projects with capacity as low as 0.11 MW (Solar) and capacity as high as 44 MW (Wind) has been registered under REC Mechanism. The monthly trends for growth in accreditation and registration are shown below:

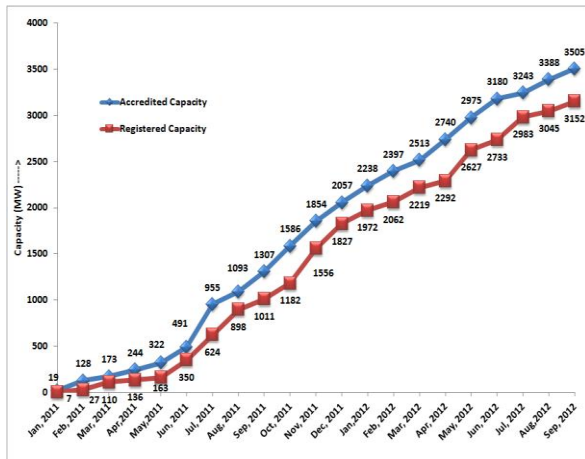


Figure- 2: Growth in Accredited & Registered Capacity

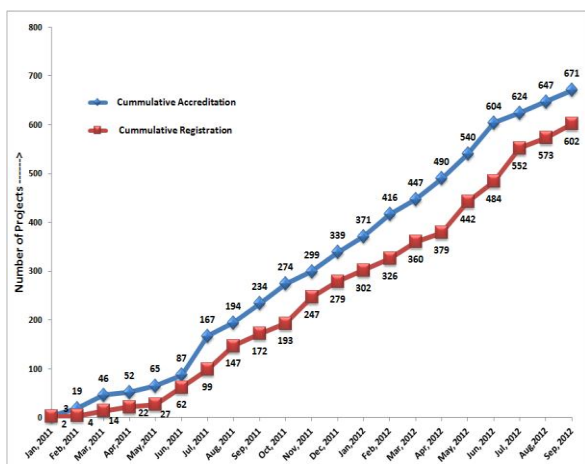


Figure- 3: Growth in No. of Accredited & Registered Projects

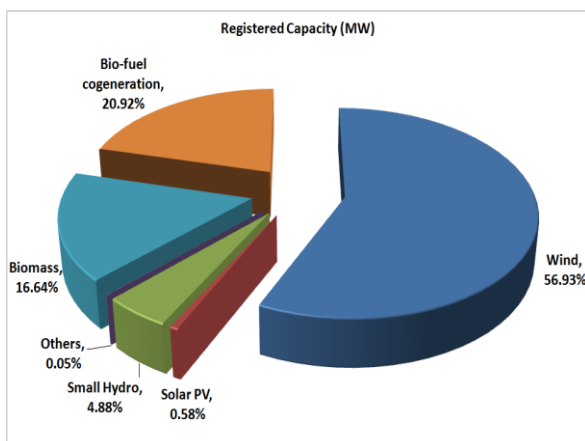


Figure- 4: Source wise composition

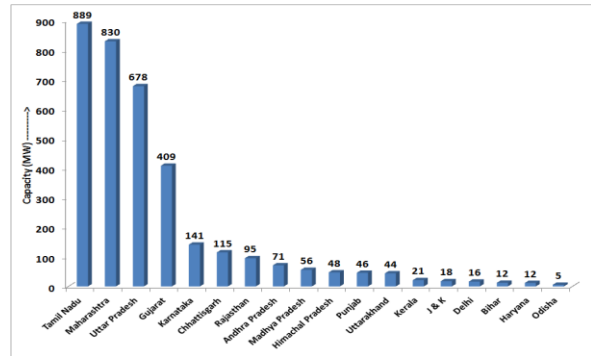


Figure- 5: State wise capacity registered

Uneven distribution of RE sources is clearly visible from the pattern of state wise capacity registered under REC Mechanism depicted in figure 5.

• *ISSUANCE OF RECs*

Issuance of RECs started with a modest figure of 532 RECs in the month of March, 2011 and touched the mark of over 3 lakhs RECs per month. Cumulative issuance of RECs touched 1 millionth mark in March, 2012. As on 30<sup>th</sup> September, 2012 more than 3 million RECs have been issued by Central Agency. The issuance of RECs registered an average monthly growth rate of 96%. Trend of monthly issuance of RECs is mentioned below:

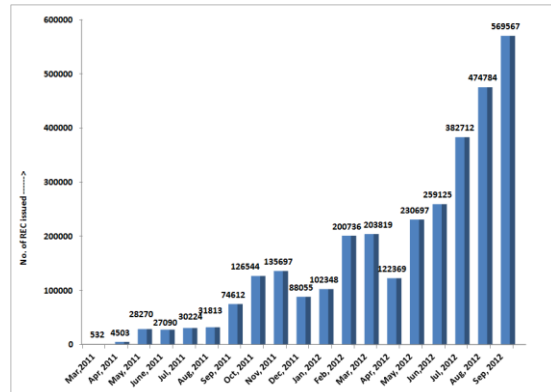


Figure- 6: Monthly issuance of RECs

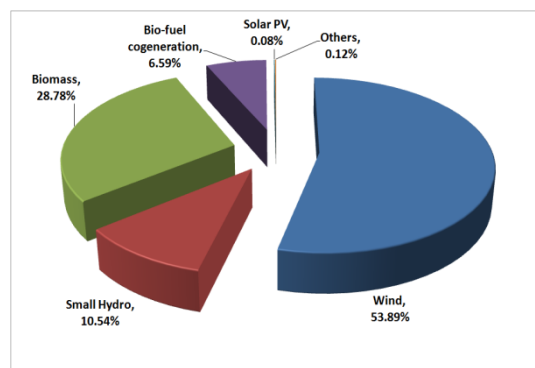


Figure- 7: Source wise share in RECs

• *REC TRADING*

First trading session under REC mechanism took place on 30<sup>th</sup> March, 2011. During March, 2011, 424

RECs amounting to Rs 12 Lakhs were traded and till the closing of financial year 2011-12, it touched the mark of 1,90,432 RECs amounting to Rs 63 Crores. First time Solar RECs were traded in the month of May, 2012. As on 30<sup>th</sup> September, 2012, 19 trading sessions has taken place in which a total of around 2.19 million RECs, worth Rs 517 Crores which includes sale of solar RECs worth Rs. 2.63 Crores have been traded. A remarkable feature throughout the trading sessions was that in most of the times, the demand for RECs was always higher than the RECs put for sale. Various trends related to trading of RECs are mentioned below:

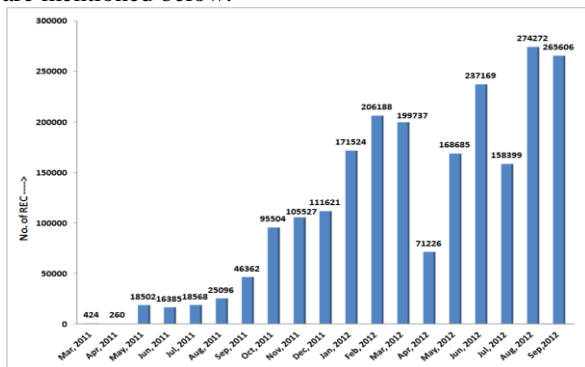


Figure- 8: Monthly RECs traded

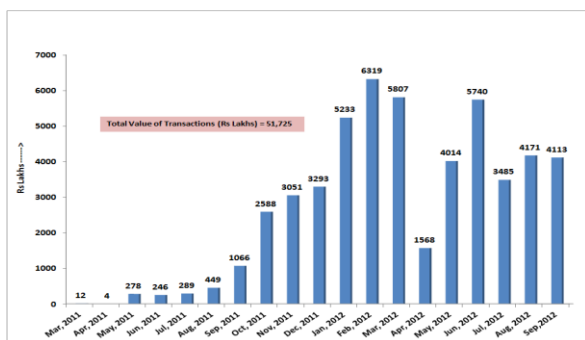


Figure- 9: Monthly RECs traded

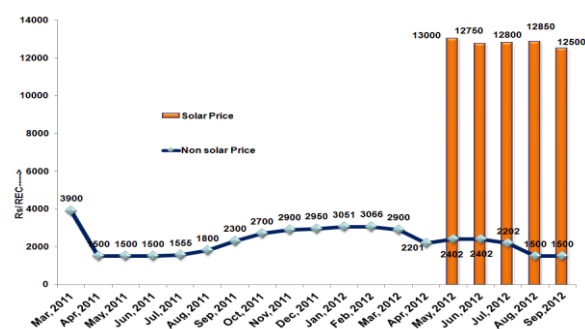


Figure- 10: Prices discovered @ IEX

From the trend of prices discovered, the effect of yearly RPO compliance is visible. It can be seen that the prices moves slowly upward as the closing of financial year arrives, for instances, price in March, 2011 trading session was at forbearance price and suddenly with beginning of new financial year it came down to floor price then again it moved upward till closing of financial year 2011-12. For financial year 2011-12, the prices are again following the previous

trend. However, from August, 2012 onwards there has been steep increase in the REC liquidity whereas demand for RECs remained almost constant. This has lead to fall in the market clearing price of Non Solar RECs to the level of floor price. This needs a regulatory intervention for strong enforcement of RPO in order to make REC market sustainable.

#### IV. CHALLENGES

Although, the REC Mechanism has picked up at a faster pace than expected, there are some challenges which need to be addressed for the sustainable success of this mechanism. Some of the Challenges are discussed below:

1. **RPO Compliance:** Periodicity of RPO compliance monitoring is presently on an annual basis. Effect of annual compliance is visible on market behaviour as buyers tend to buy more towards the end of financial year. Also, the maximum buy bids in a single trading session till date is just over 4 lakhs and in coming future it is expected that over million RECs would be issued in a single month. Therefore, for balancing the supply and demand a strict enforcement of RPO compliance is required. In addition, for driving the market, a more frequent compliance monitoring frequency may be needed.
2. **Voluntary Market:** The voluntary buyers have purchased RECs in past but the contribution is not very significant. As the supply of RECs is expected to increase at a faster rate, the demand should also increase at the same rate for a better market design. Since, the mandatory market is already identified, there is a need to sensitize voluntary buyers like industries and corporate about their contribution to green energy & environment. This would create another set of buyer which would increase the demand for RECs.
3. **Capacity Building:** Capacity building of stakeholders on a large scale is a challenge. Central Agency has conducted 16 workshops and participated in many conferences/ workshops as resource person during 2010 to 2012 to educate various Stake Holders like the SERCs, State Agencies as well the project developers about the regulatory procedures and the technical aspects of the REC scheme. Some state regulatory agencies have also organized workshops for promoting the RPO regulations and REC scheme.
4. **Integration of Renewables:** Encouragement for setting up of more RE Generation facilities is a prerequisite behind REC Mechanism. With more and more renewable energy projects coming, the development of an adequate and robust transmission system assumes significance. This is

also important from the perspective of maintaining secure and reliable grid operation which is non-negotiable. Further, suitable commercial mechanisms to handle deviations such as the proposed Renewable Regulatory Fund (RRF) are required to handle variable generation sources.

5. *Compliance Audit:* Role of Compliance Auditors engaged under REC Mechanism is very critical to ensure integrity and probity of the entire mechanism of the highest order along with the transparency.

#### V. WAY FORWARD

Liquidity of RECs is expected to grow at a substantial rate. An estimate of expected RECs based on capacity registered till 30<sup>th</sup> September, 2012 is shown below:

Expected RECs available based on Registered RE Generators as on 30th September, 2012			
Source	Capacity (MW)	CUF/PLF	Expected RECs Available (Monthly)
Wind	1794	23.72%	306468
Small Hydro	154	41.25%	45649
Bio Mass	526	80.00%	303028
Bio Fuel Cogeneration	660	52.67%	250110
Solar PV	18	19.00%	2484
<b>Total</b>	<b>3152</b>		<b>907,739</b>
<b>Yearly</b>			<b>10,892,869</b>

Figure– 11: Expected RECs

*Voluntary Market and Department of Public Enterprises (DPE) Guidelines:* The Department of Public Enterprises acts as a nodal agency for all Public Sector Enterprises (PSEs) and assists in policy formulation pertaining to the role of PSEs in the economy as also in laying down policy guidelines on performance improvement and evaluation, financial accounting, personnel management and in related areas. DPE included Sustainable Development as a compulsory element under Corporate Social Responsibility for Memorandum of Understanding (MoUs) signed by CPSEs. Guidelines cover projects, activities, expenditure, documentation and monitoring of Sustainable Development. CPSEs have to select their SD Projects from items given under Schedule A (core) and Schedule B (specific). The guidelines for budget required to be invested for sustainable development has been defined by DPE as under:

S.N.	Category of CPSEs Net Profit after tax (Previous Year)	Minimum Expenditure for SD Projects (Financial Year) % of Profit
1.	Less than 100 Crore	0.5 % of Profit After Tax
2.	100 Crore & above	Rs 50 Lakhs + 0.1 % of Profit after Tax exceeding Rs 100 Crore

On 19<sup>th</sup> December, 2011, DPE notified an addendum to the guidelines for sustainable development wherein DPE has included the RECs under Schedule A & Schedule B of clause 2.5 of Sustainable Development Guidelines for the CPSEs for financial year 2012-13. Once, the CPSEs start purchasing RECs, it would create significant demand for RECs in the REC Market which would go a long way. However, initially a lot of home work like sensitization programs and capacity building programs would be required to create awareness among the CPSEs. In this regards, Central Agency in coordination with CERC has participated actively in 3 capacity building programs organised by DPE in different parts of India.

#### VI. CONCLUSION

The REC Mechanism has achieved success in a very short span of time, however there are some challenges which needs to be addressed to maintain a sustainable REC market. This mechanism would help to promote renewable sources of energy and development of market in electricity, leading to the sustainable development of the country. It also provides avenue for voluntary buyers to go green and contribute to the sustainable development of the country.

#### VII. ACKNOWLEDGEMENT

Authors are grateful to the power system fraternity, POWERGRID and POSOCO Management for the encouragement. The views expressed in this paper are those of the authors and not necessarily of the organization they belong to.

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