

# Renewable Energy Certificate Mechanism in India

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**Abstract** — India has been richly endowed with renewable resources. Since the cost of electricity generated from such resources is expensive, large scale development of renewable resources did not take place. Concern about climate change and concerted action to reduce green house gas emissions are powerful drivers for renewable energy. Lately, in view of growing awareness about green environment, development of renewable energy has been promoted by fiscal policies of Government of India. These include tax incentives and purchase of electricity generated through renewable energy sources. Enactment of the Electricity Act 2003 (the Act) has lent further support to renewable energy by stipulating purchase of a percentage of the power procurement by distribution utilities from renewable energy sources. The renewable purchase obligation as well as preferential tariff for procurement of such power has been specified by various State Electricity Regulatory Commissions (SERCs). Renewable energy sources are not spread evenly across the state boundaries and the very high cost of generation from RE sources discourages local distribution licensees from purchasing electricity generated from RE sources. Renewable Energy Certificate seeks to address the mismatch between availability of RE sources and the requirement of the obligated entities to meet their renewable purchase obligation by purchasing green attributes of renewable energy remotely located in the form of Renewable Energy Certificate (REC). This paper discusses regulatory developments including Indian Electricity Grid Code-2010 (IEGC) for promotion of renewable energy in India and in particular the nationally tradable renewable energy credits in the form of Renewable Energy Certificates (REC) for achieving the targets set by respective SERCs for renewable purchase obligations. This would help to minimize cost of power procurement, and lead to efficient resource utilisation across the country and provide incentive for investment in appropriate technologies. The paper highlights salient features, advantages and implementation of REC mechanism in India.

## I. INTRODUCTION

Energy is a critical foundation for economic growth and social progress. As economy advances and human society requires more energy, the lack of fossil energy and its pollution on the environment has given rise to the ever-serious contradiction among energy providing, environment protection and economic development. Renewable energy, with the availability

of its renewability and non-pollution, will prove to be an effective and practical choice to guarantee the future development of the world. As India is among the largest developing countries in the world, with richly endowed renewable energy potential (India is fifth largest wind energy producer just after US, Germany, China & Spain as on 2009), developing renewable energy is its inevitable choice for sustainable economic growth. Renewable energy has been categorized as traditional and new renewable energy. The former includes large hydropower, biomass burnt directly etc; the latter includes small hydropower, solar energy, wind energy, biomass energy, geothermal energy and ocean energy, etc. This paper deals with the new renewable energy sources.

Potential & installed capacity of major renewable energy sources in India as on 30.06.2010 is tabled below.

Source	Potential (MW)	Installed Capacity (MW)
Wind	45000	12000
Biomass	17000	900
Small Hydro (<25MW)	15000	2700
Cogeneration-Bagasse	5000	1400
Waste	2700	72
Solar	>100000	12

Source: Ministry of New and Renewable Energy (MNRE)

Government of India has come out with Acts, Policies and regulations to support renewables. The major contributors are as under.

### A. Electricity Act 2003

The enactment of the Electricity Act 2003 (The Act) has accelerated the process of reform in the Indian power sector. The Act has enabled competition in the Indian power sector in bulk as well as retail electricity supply, in phases. To meet the challenges in the emerging competitive environment, the Act promotes electricity generation from co-generation and renewable energy sources through following enabling provisions:

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(i) The SERCs to specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee (Sec.86 (1) (e)).

(ii) The SERCs to promote co-generation and generation of electricity through renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any persons (Sec. 86(1) (e)).

(iii) The terms and conditions for the determination of tariff to be prescribed by the SERCs to promote co-generation and generation of electricity from renewable sources of energy (Sec. 61(h))

(iv) The National Electricity Policy (NEP) to be formulated by the central government, in consultation with the state governments for development of the power system based on optimal utilisation of resources including renewable sources of energy (Sec. 3(1)).

(v) The Central Government to prepare a national policy, in consultation with the state governments, permitting stand alone systems (including those based on renewable sources of energy and other non-conventional sources of energy) for rural areas (Section 4).

Subsequent to the enactment of the Act, the SERCs have specified a Renewable Purchase Obligation (RPO) and have specified feed-in tariff and other terms and conditions to promote co-generation and generation of electricity from renewable energy sources.

#### B. National Electricity Policy 2005

The National Electricity Policy 2005 stipulates that progressively the share of electricity from non-conventional sources would need to be increased; such purchase by distribution companies shall be through competitive bidding process; considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the commission may determine an appropriate deferential in prices to promote these technologies.

#### C. Tariff Policy 2006

The Tariff Policy announced in January 2006 has the following provisions:

Pursuant to provisions of section 86 (1) (e) of the Act, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentages for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 01, 2006.

#### D. Indian Electricity Grid Code-2010

Grid codes around the world are changing to incorporate renewables into the grid. Federal Energy

Regulatory Commission (FERC) order 661-A is an example.

Indian Electricity Grid Code 2010 (IEGC) has also incorporated special provisions of connection, operations, forecasting, scheduling and commercial settlement for wind and solar generating plants.

#### E. Central Electricity Regulatory Commission (CERC) Regulation & REC Mechanism

Contribution of renewable energy sources in the total portfolio of capacity as well as gross generation is still very low. As on 30 June, 2010, the renewable energy sources constituted only about 10 % of the total installed generation capacity (162366 MW) in the country.

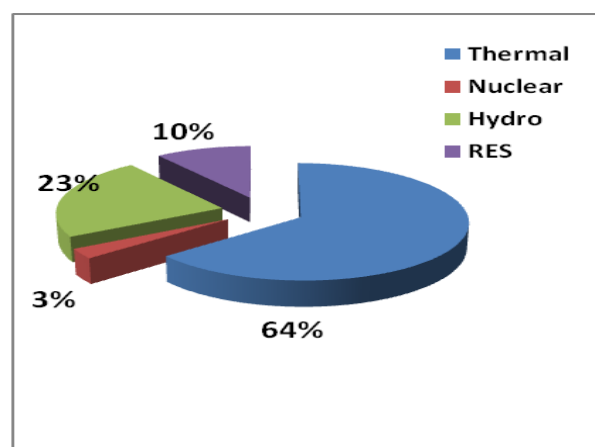


Fig1. Technology-wise distribution of installed capacity in India (Source: CEA - June, 2010)

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.

For the development of Non-conventional energy sources, efforts need to be made to reduce the capital cost of such projects. Cost of energy can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies.

While the Electricity Act, 2003, the policies framed under the Act, and also the NAPCC provide for a roadmap for increasing the share of renewable in the total generation capacity in the country, there are constraints in terms of availability of RE sources evenly across different parts of the country. This inhibits the State Commissions, especially in those states where the potential of RE sources is not that significant, from specifying higher renewable purchase obligation. For example, given the fact that Delhi does not have sufficient renewable energy

potential, the State Commission of Delhi has specified RPO of 1% for the distribution licensees in the State. There are states like Madhya Pradesh where the SERC has fixed the RPO of 10% but actual achievement of RPO is less than 1%. The prescribed level of renewable portfolio standard for some of the states in US are—California 20% by 2017, Nevada 20% by 2015, New Mexico 10% by 2011, Texas 5% by 2015 and New York 25% by 2013.

In India some states like Rajasthan and Tamil Nadu have very high potential of RE sources and the State Commissions have also specified higher RPO. In fact, in such states there are avenues for harnessing the potential even beyond the RPO level fixed by the State Commissions. However, the very high cost of generation from RE sources discourages local distribution licensees from purchasing electricity generated from RE sources beyond the RPO level mandated by the State Commission.

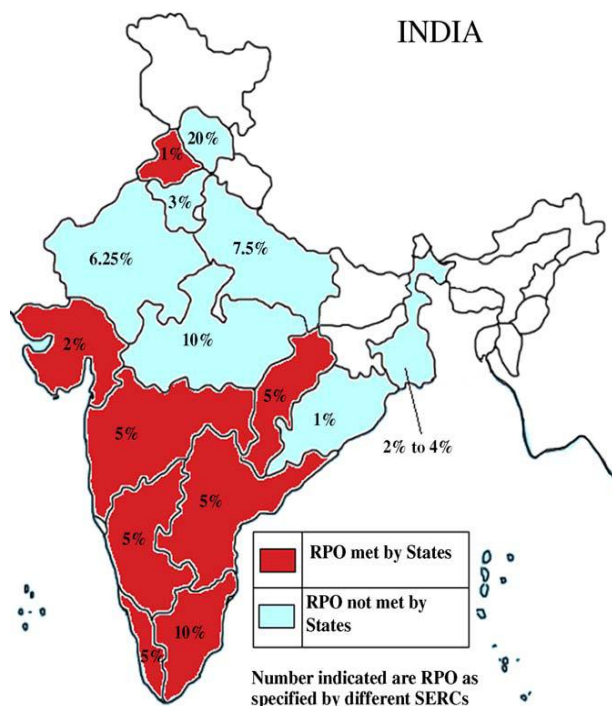


Fig.2. Snapshot of state-wise policies (minimum RPO obligation numbers for FY09) (Source: Mohit Goyal , Rakesh Jha. Introduction of Renewable Energy Certificate in the Indian scenario, ScienceDirect, Renewable and Sustainable Energy Reviews 13 (2009) 1395–1405.).

It is in this context that the concept of Renewable Energy Certificate (REC) assumes significance. This concept seeks to address the mismatch between availability of RE sources and the requirement of the obligated entities to meet their renewable purchase obligation.

In view of the above contexts and to overcome the regional constraints, after detailed deliberations

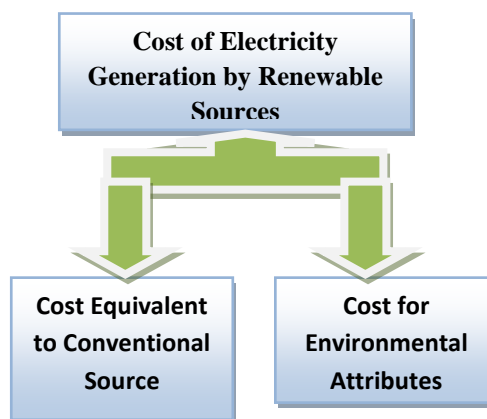
with all stakeholders, CERC notified the “Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010” on 14<sup>th</sup> Jan-2010, introducing the modalities of REC in the Indian Electricity Sector.

RECs are also known by under functionally equivalent names such as Green Tags, Renewable Obligation Certificates or Tradable Renewable Certificates

Internationally in countries like UK, US, Australia, Japan, Netherlands, Denmark & Poland the concept has been used to facilitate a robust and credible market for trading the green attributes of the electricity, with a view to provide an additional source of revenue to renewable energy generators.

## II. SALIENT FEATURES OF REC FRAMEWORK

- Renewable Energy Certificate (REC) mechanism is a market based instrument to promote renewable energy and facilitate renewable purchase obligations (RPO)
- REC mechanism is aimed at addressing the mismatch between availability of RE resources in state and the requirement of the obligated entities to meet the renewable purchase obligation (RPO).
- Cost of electricity generation from renewable energy sources is classified as cost of electricity generation equivalent to conventional energy sources and the cost for environmental attributes.



- RE generators will have two options:
  - i) either to sell the renewable energy at preferential tariff or
  - ii) to sell electricity generation and environmental attributes associated with RE generations separately.
- The environmental attributes can be exchanged in the form of Renewable Energy Certificates (REC).
- There shall be two categories of certificates, viz., solar certificates issued to eligible entities for generation of electricity based on solar as renewable

energy source, and non-solar certificates issued to eligible entities for generation of electricity based on renewable energy sources other than solar:

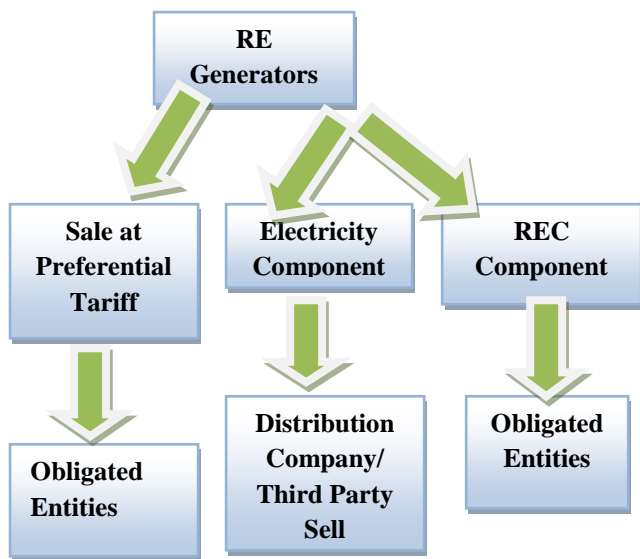


Fig 3. Block Diagram of REC Concept

- REC will be issued to the RE generators for 1 MWh of electricity injected into the grid from renewable energy sources.
- The Certificate once issued shall remain valid for three hundred and sixty five days from the date of issuance of such certificate.
- REC would be issued to RE generators only.
- REC could be purchased by the obligated entities to meet their RPO under section 86 (1) (e) of the Act. Purchase of REC would be deemed as purchase of RE for RPO compliance.
- Grid connected RE Technologies approved by MNRE would be eligible under this scheme.
- RE generations with existing Power Purchase Agreement on preferential tariff are not eligible for REC mechanism.
- SERC to recognize REC as valid instrument for RPO compliance.
- SERC would define open access consumers, captive consumers as obligated entities along with distribution companies.
- SERC to designate State agency for accreditation for RPO compliance and REC mechanism at State level.
- CERC has designated National Load despatch Centre (NLDC) as Central Agency for registration,

repository, and other functions for implementation of REC framework at national level.

- Only accredited project can register for REC at Central Agency.
- Central Agency would issue REC to RE generators for specified quantity of electricity injected into the grid.
- REC would be exchanged only in the CERC approved power exchanges.
- Central Agency will extinguish the RECs sold in Power Exchanges in its records as per information provided by the Power Exchanges. The certificates will be extinguished by the Central Agency in the 'First-in-First-out' order
- Price of electricity component of RE generation would be equivalent to the weighted average power purchase cost of the discom including short term power purchase but excluding renewable power purchase.
- REC would be exchanged within the forbearance price and floor price. This forbearance and floor price would be determined by CERC in consultation with Central agency and FOR (Forum of Regulators) from time to time.
- In case of default, SERC may direct obligated entity to deposit into a separate fund to purchase the shortfall of REC at forbearance price.
- However, in case of genuine difficulty in complying with the renewable purchase obligation because of non-availability of certificates, the obligated entity can approach the Commission for carrying forward of compliance requirement to the next year.

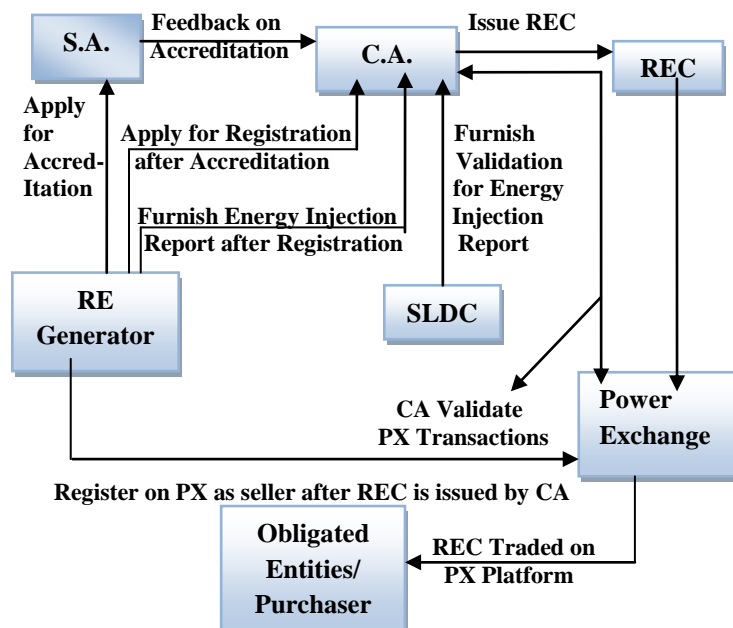


Fig. 4. REC Implementation Mechanism

### III. ADVANTAGES OF REC MECHANISM

1. *Inter state Transmission:* RECs issued for quantum of electricity generated from renewable sources do not require scheduling over long distances. Such electricity can be consumed locally and only RECs need to be transferred to the obligated entities. Renewable obligation by preferential tariff may make it uneconomical and technologically difficult to transmit electricity from renewable sources located outside the States.

2. *Promotion of stand-alone systems:* Since trade in RECs do not require transmission of electricity, the additional revenue from sale of RECs could help to improve viability of standalone systems. In usual scenario it may not be economical to transmit electricity from such regions.

3. *Competition in Electricity Market:* Separating 'RECs' from 'electrical energy', allows near cost effective renewable energy to participate in the power exchange in a competitive manner. Revenue from 'RECs' may be helpful to address the cost disadvantage for such renewable energy technologies.

4. *Overcoming the barrier of natural diversity:* Renewable Purchase obligation limit participation to the obligated entities, the distribution licensees in the Indian context. Additional cost due to such obligation is effectively allocated to all consumers in the area of a distribution licensee. Environmentally concerned consumers may be willing to consume higher proportion of 'green electricity'. Such consumers can purchase RECs. Tradability of RECs would allow wider participation by NGOs, development agencies as well as the corporate sector that may purchase RECs as a part of their social corporate responsibility.

5. *Alternative to Meet Renewable Purchase Obligation:* National level tradability of RECs would allow obligated entities/distribution licensees to fulfil their obligation despite natural diversity. RECs may be purchased from generators located in other states. Limited resource endowments in a particular state may only permit lower renewable obligation.

6. *Attract Investment:* REC market would provide appropriate opportunities for development of renewable energy based electricity generation. Through unbundling of 'RECs' from electrical energy, the later can also effectively participate in a competitively traded market for electricity. This would also allow investors in renewable energy technologies to hedge electricity price risk through electricity futures. This, in combination with 'RECs' would provide adequate risk hedging and hence encourage investment in renewable energy.

### IV. RECENT DEVELOPMENTS

1. CERC has notified National Load Despatch Centre as the Central Agency for implementation of REC Mechanism in India.
2. CERC has determined floor price and forbearance price for dealing in Certificates, which shall remain valid up to FY 2012.

	Non Solar REC (Rs/ MWh)	Solar REC (Rs/MWh)
<b>Forbearance Price</b>	3,900	17,000
<b>Floor Price</b>	1,500	12,000

3. Detailed Procedure for REC Mechanism prepared by Central Agency has been approved by CERC.
4. CERC has notified fees and Charges for REC framework vide order dated 21<sup>st</sup> September, 2010
5. CERC has notified Amendment 1 to REC Regulations according to which:
  - Captive Generators shall be eligible for REC if they do not avail promotional / concessional Wheeling Charges, Banking Facility and enjoy Electricity Duty Waiver. However, if they forgo such benefits, they will not be eligible to access the market for 3 years. Provided that the 3 year limit does not apply if the concessions are withdrawn by the state or state commission.
6. Much of the success in implementing RECs depends on state entities. Responses from various states has also been encouraging and as of now 21 states have come out with draft regulation on RPO compliance out of which 9 states have come out with final regulations. 11 states have notified State Agencies.
7. Software for Implementation of web based REC mechanism has also been prepared and this mechanism will be dedicated to the nation on 18<sup>th</sup> Nov 2010 by Hon'ble Union Minister of Power.

### V. CONCLUSION

The REC mechanism is a market based instrument, to promote renewable sources of energy and development of market in electricity, leading to the sustainable development of the country. Recognising that, like other resources the renewable resources are also not evenly distributed across the country, it

encourages setting up of larger generation capacities at resource rich locations and, through a process of Certification create a market based instrument which can be traded, on CERC approved power exchanges, to obligated entities or voluntary buyers to fulfil their Renewable Purchase Obligation/ Social Responsibility.

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