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REVIEW ARTICLE

RENEWABLE ENERGY CERTIFICATION MECHANISM- A REVIEW OF MAHARASHTRA

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Renewable Energy Certification Mechanism- A Review of Maharashtra

Mr. Ashutosh Belapure

Asst. Professor -- Asm's (Ibmr) Management Institute- Pimpari Pune & Phd Research Scholar

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INTRODUCTION

The National Action Plan for Climate Change (NAPCC) announced by the Hon. Prime Minister of India on June 30, 2008, envisages several measures to address global warming. One of the important measures identified involves increasing the share of renewable energy in total electricity consumption in the country. NAPCC has set the target of 5% renewable energy purchase for FY 2009-10 against current level of around 3.5%. Further, NAPCC envisages that such target will increase by 1% for the next 10 years, thus, NAPCC envisages renewable energy to constitute approximately 15% of the energy mix of India by the year 2020. This would require a quantum jump in deployment of renewable energy across the country. Strong policy measures and a proactive regulatory framework and innovative financing instruments would be required, if the desired level of penetration of renewable energy is to be achieved. One such policy instrument prescribed in NAPCC is Renewable Energy Certificate (REC) Mechanism, which would enable large number of stakeholders to purchase renewable energy in a cost effective manner.

Accordingly, Ministry of New and Renewable Energy (MNRE) engaged ABPS Infrastructure Advisory Pvt. Ltd. (ABPS Infra) to develop the 'Conceptual Framework for Proposed REC Mechanism in India'. The national level REC mechanism was developed by studying the existing REC schemes prevailing in various countries, their applicability and relevance with respect to India and her States. Further, the REC mechanism has also been deliberated at FOR - Task Force for Renewable Energy Certificate mechanism and their view point also has been carefully considered while finalizing the scheme of REC mechanism for India. This Chapter presents the conceptual framework for REC Mechanism in Maharashtra.

1.1 DRIVERS FOR REC MECHANISM IN MAHARASHTRA

The EA 2003 stimulated the development of RE based power generation by mandating SERCs with the function of RE promotion within the State. Under EA 2003, the SERCs set targets for purchase from renewable energy sources. This target is termed as Renewable Purchase Obligation (RPO) or Renewable Purchase Specification (RPS).

In pursuance of Section 86(1)(e) of EA 2003, MERC issued the RPS Order in 2006 to stimulate RE based power generation. Although Maharashtra is abundantly gifted with variety of renewable energy (RE) sources, the State has been finding it difficult to achieve its RPS target. This can be seen from the following Table, which summarises RPS compliance levels of obligated entities in Maharashtra after issuance of RPS Order:

Table 1.1: Review of RPO Compliance of Utilities in Maharashtra

Utility	Year	RPO Target	APR Petition RPS achieved	APR Order (Approved) RPS achieved
		%	%	%
MSEDCL	FY 2006-07	3%	2.47%	2.47%
	FY 2007-08	4%	2.78%	2.78%
	FY 2008-09	5%	3.78%	3.45%
TPC-D	FY 2006-07	3%	0.41%	3.47%
	FY 2007-08	4%	4.66%	4.65%
	FY 2008-09	5%	5.90%	5.90%
RInfra-D	FY 2006-07	3%	0.00%	0.00%
	FY 2007-08	4%	0.02%	0.02%
	FY 2008-09	5%	0.67%	0.67%
BEST	FY 2006-07	3%	0.00%	0.00%
	FY 2007-08	4%	0.08%	0.08%
	FY 2008-09	5%	1.24%	1.24%

(Source: Tariff Orders of respective Utilities)

(Note: The figures of FY 2006-07 and FY 2007-08 shows the actual compliance while FY 2008-09 are based on the projections made by respective Utilities)

Further, the site specific nature of RE power generation has imposed limitations on RE purchase even within the State. This is apparent from the consolidation of large number of RE projects in the area of MSEDCL. This has been also projected as one of the concerns by the obligated entities, which could not comply with their RPO target.

While one of the Utilities in the State, viz., TPC, has been meeting its individual RPS targets, the other licensees have been continuously seeking waiver

from RPS target or exemption from levy of enforcement charge. Thus, in current scenario, in spite of having almost 10% of nation's total identified RE potential, the RE growth in Maharashtra has certain limitations due to State specific development issues.

The issues associated with RPO compliance in various States are somewhat similar in nature. Existing legal framework under EA 2003 puts responsibility on SERCs for promotion of renewable energy. However, the Regulations developed by the SERCs differ from each other on many counts. Further, these Regulations do not recognize purchase of renewable energy from outside the State for the purpose of fulfillment of RPO target set by the SERC for the distribution Utility in the State. The requirement of scheduling and higher long-term open access charges have been posing major barriers for States having abundant RE to undertake inter-State sale of their surplus RE to the States, which do not have sufficient RE based power. Consequently, the States with lower RE potential have to keep their RPO target at a lower level. In addition, the unit cost of the RE based non-firm power is higher than that of the conventional power sources in some cases particularly with old depreciated plants using domestic coal at administered prices. As a result, RE abundant States have no motivation to produce RE based power higher than that required to satisfy the RPO mandate within the State. On the other hand, RE scarce States are not able to procure RE generation from other States. In case, inter-State exchange of renewable energy through REC is enabled, it would provide a major boost not only for growth of renewable energy within the country but also provide multiple options to obligated entities for meeting their RPO targets.

1.2 OBJECTIVES FOR REC MECHANISM IN MAHARASHTRA

A mechanism that will enable and recognize inter-State RE transactions will facilitate for further promotion and development of RE sources in Maharashtra. Such a mechanism will also enable all the SERCs to raise their States' RPO targets even if necessary resources are not available in their own State. In case of Maharashtra, the following primary objectives have been identified for REC mechanism:

Effective implementation of RPO mechanism in Maharashtra

Increased flexibility for participants to carry out RE transactions

Overcoming geographical constraints to harness available RE sources

Reduce transaction costs for RE transactions

Create competition among different RE technologies

Development of all encompassing incentive mechanism

Reduce risks for local distribution licensee.

1.3 APPROACH AND METHODOLOGY

Renewable Energy Certificate (REC) mechanism is a market-based instrument to promote renewable energy and facilitate fulfillment of renewable energy purchase obligations amongst various stakeholders. RECs have been used extensively as a successful market based policy instrument to promote renewable energy in many countries, such as Australia, Japan, US, Netherlands, Denmark and UK. However, these schemes vary in detail and need to be customized for local legislations and market situations. Further, federal structure of governance as found in India and electricity being part of the concurrent list poses unique challenges for development of such scheme. Accordingly, ABPS Infra, while assisting MNRE, recognized the involvement of various stakeholders such as State Electricity Regulatory Commissions, State Utilities, RE developers, State Nodal Agencies, etc., in the development and implementation of REC Mechanism.

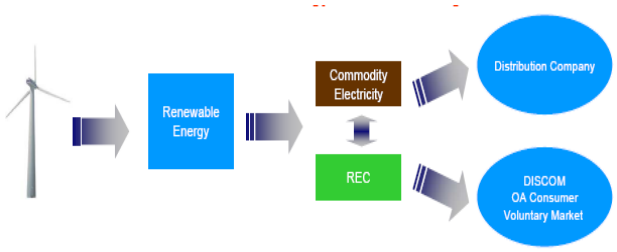
Further, the REC approach was presented to the Forum of Regulators and subsequently before Task Force constituted by FOR on REC mechanism. The detailed deliberations and suggestions made during FOR meeting held at Chennai on January 30, 2009 and Task Force meeting held at Delhi on March 2, 2009 have also been taken into consideration while finalizing the proposed REC mechanism. Hence, it is envisaged that participation of Maharashtra in national level common REC mechanism, developed by MNRE/FOR, will help the State to comply with its RPO target. Also, considering the State's identified and unexplored RE potential, such participation is more likely to fetch benefits in terms of increased investments in State's RE sector.

1.4 OVERVIEW OF REC MECHANISM

Internationally, purchase of REC is deemed as purchase of power generated from RE sources. It is acknowledged that renewable energy generation entails production of certain environmental attributes apart from electricity generation per se. Thus, RE generator can sell two different products on account of renewable energy generation. These products are the electricity and the environmental attributes associated in the form of RE Certificate. It has been proposed to adopt the same philosophy for REC mechanism in India.

The schematic in Figure 5.1 presents the concept of REC mechanism and also represents the revenue model for the RE generator in the context of REC mechanism.

Figure 1.1: Concept of REC mechanism



In the proposed mechanism, one REC will be issued to the RE generator for one MWh electrical energy fed into the grid. The RE generator may sell electricity to the distribution company and associated RECs to the same distribution company or to any other Obligated Entity. The RE generators may sell RECs to the entities with RPO target in their State or outside their State. The purchase of RECs will be deemed as a purchase of power generated from renewable sources and accordingly will be allowed for compliance of RPO target. The REC mechanism will enable Obligated Entities in any State to procure RECs generated in any of the States in India and utilise the same to satisfy its RPO target.

Thus, REC mechanism will address the issues of scarcity of RE sources in some of the States, which currently have negligible RPO targets in view of the limited RE potential in the State. In addition, in RE rich States, the REC mechanism will reduce the risks for Obligated Entities for continued procurement of renewable power beyond their RPO targets.

Important features of REC mechanism

1. REC mechanism is NOT an incentive scheme. Rather, it will enable sale and purchase of renewable component across the State boundaries.

2. REC mechanism will co-exist with all current incentive based schemes, since most of these schemes are based on certification of generation.

3. RE Certificate will not represent any fiscal attribute such as 'Accelerated Depreciation', hence, it will be different than Production Tax Credits.

4. Though RECs represent environmental attribute, it will not be related to carbon credits. These two mechanisms will operate independent of each other.

1.5 OVERVIEW OF PROPOSED OPERATIONAL FRAMEWORK FOR REC MECHANISM

The operational scheme for the proposed REC Mechanism has been developed taking into consideration experiences of prevalent RE based tradable certificate schemes in countries such as United Kingdom, Australia, etc. Although all the operational frameworks are similar in principle, the countries have customized their operational schemes to comply with their prevalent legal and regulatory framework. The operational framework for India as presented below has also been customized to comply with existing legal and regulatory framework in India.

The schematic in Figure 5.2 represents a flow diagram for various processes involved in the REC mechanism. The numbers indicate the chronological sequence of seven identified key processes. This operating framework needs to be put in place in various States, which will enable implementation of the developed REC mechanism at the national level.

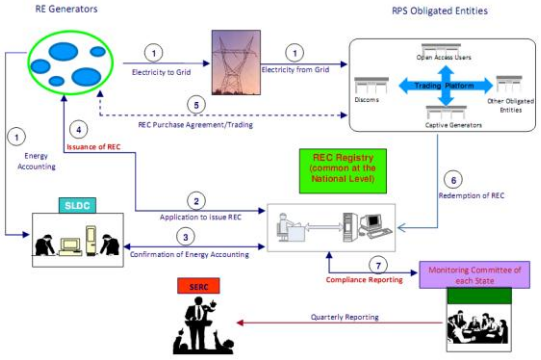


Figure 1.2: Schematic of Operational Framework for REC Mechanism

The operational framework depicted above does not envisage any major modification to the existing arrangements for renewable energy procurement. The proposed framework entails appointment of an agency at national level to facilitate the registration of eligible RE generators, issuance of RECs and maintenance of record of procurement of RECs by Obligated Entities.

The identified seven key processes can be elaborated as under:

Step 1: Electricity Generation and Feeding to the Grid

The electricity generated in RE project is injected into the grid. This electricity is consumed in real time by load prevalent in the system, which in turn is accounted against the consumption by the entities which had contract with that particular RE project. The metering of quantum of electricity injected into the grid and energy accounting will be done by the State Load Dispatch Centre (SLDC).

Step 2: Request for issuance of REC

The RE Generator will send a request to the REC Issuance Registry (i.e. Central Agency) to issue the RE certificates equivalent to the amount of electricity injected into the grid and as certified by the SLDC.

Step 3A: Confirmation of Electricity Generation

The REC Registry and SLDC shall establish the procedure for exchange of information about actual electricity generated by registered RE projects on regular basis. The SLDC shall submit the report for the energy accounts of RE projects to the Central Agency, as per established procedures on regular basis.

Step 3B: RE Generator Accreditation and Registration

The State Agency shall provide its report to the Central Agency for accreditation and recommending the RE project for registration. The RE projects will have to be accredited with State Agency and will also have to be registered with Central Agency.

Step 4: Creation and Issuance of RECs

Referring to the generation report submitted by SLDC and State Agency, the REC Registry (Central Agency) will create and issue appropriate number of RECs to the concerned RE Generator (Eligible Entity).

Step 5: REC Sale by RE Generator (Eligible Entity)

Once the RECs are issued to the RE Generator (Eligible Entity), sale/purchase of RECs amongst various RE Generators and Obligated entities is proposed to be undertaken only through Power Exchange operational under the guidance of CERC.

Step 6: Surrender/Redeeming of RECs

The Obligated Entities can procure the RECs over the Exchange Platform and need to surrender the RECs to the SERCs to meet their RPS obligation. This will facilitate convenient and effective mechanism for ensuring the RPO compliance by the obligated entities. REC Registry shall maintain record of RECs issued and RECs received for redemption on regular basis.

Step 7: Compliance Reporting

It is envisaged that the Central Commission in consultation with the National level Registry (i.e. Central Agency) may appoint from time to time Compliance Auditors to inquire into and report on the compliance of REC Regulations by the person applying for registration, or on the compliance by the renewable energy generators in regard to the eligibility of the Certificates and all matters connected thereto.

Further, REC registry will prepare a State-specific and Obligated Entity Specific REC Procurement report on the basis of the RECs redeemed by each of the Obligated Entities and send it to the State level Monitoring Committee. In addition, the report will also provide the details of RECs issued to each of the RE generators in that State. Further, State level Monitoring Committee will verify the information provided in the REC Procurement report and provide the summary of status of RPS compliance of individual obligated entities in its State to the SERC on quarterly basis.

As depicted from the schematic in Figure (5.2), the State Load Despatch Centres (SLDC) and proposed new institutions such as National level REC Registry and State level Monitoring Committees will play a pivotal role in day-to-day operation of REC mechanism. The success of the proposed REC mechanism will depend on adoption of precise definition of the roles and responsibilities of these institutions, adoption of the appropriate governance structures and capacity building to undertake defined roles and responsibilities.

The above framework can be operationalized using existing State level institutions, except that the State level Monitoring Committee can be newly established or an existing institution can be identified to carry out its tasks. Here, it may be noted that the REC registry and REC Exchange platform will be common at the national level.

1.6 INSTITUTIONAL FRAMEWORK FOR THE PROPOSED REC MECHANISM

The schematic diagram in Figure 5.3 below presents the institutional framework for implementation of the proposed REC mechanism.

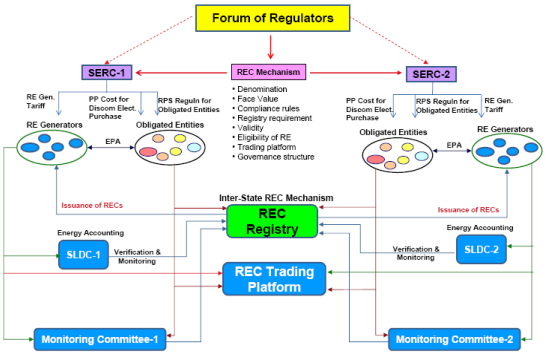


Figure 1.3: REC Mechanism: Institutional Framework at National Level

For successful implementation of the proposed REC mechanism, regulatory oversight through Forum of Regulators (FOR), various State Electricity Regulatory Commissions (SERCs) and Central Electricity Regulatory Commission (CERC) will be important. It is envisaged that Forum of Regulators shall perform an important task of development of

harmonized Regulations for implementation of REC mechanism across the States.

1.7 PRICING OPTIONS FOR ELECTRICITY AND REC COMPONENTS

The REC mechanism entails pricing of two components, namely, electricity component and RE component representing environmental attributes of RE generation. There are multiple options for pricing of 'electricity component', such as market based approach, UI price linked approach, average power purchase cost of utility approach, and normative RE feed-in tariff linked approach, etc. The merits and de-merits of various approaches have been discussed in detail under Chapter-7.

Further, REC pricing mechanism across the States in India needs to address unique situation where electricity market is still governed/ regulated to a great extent and the preferential feed-in tariff mechanism will have to continue as per provisions under Tariff Policy. Under the circumstances, REC price will have to be determined on notional basis, however, the same could be discovered through market mechanism based on volume and exchange of RECs.

Based on deliberations covered under Chapter-7, most feasible option for RE pricing is to link the electricity component with average power purchase cost of host utility, and link REC component with notional fixed price. Further, it is important to focus on the basic purpose of introduction of REC mechanism in India, which is to facilitate the inter-State exchange/transactions of RE so that all the States will be able to meet the long term RPS target specified under NAPCC. This purpose distinguishes REC mechanism proposed for India from that in most of the other countries, which have REC mechanism as an incentive mechanism. Therefore, it is proposed that the effective electricity component prices shall be equivalent to average power purchase cost of the host Utility.

REC Component Price	= Market based pricing
Electricity component Price	= Average power purchase cost of Host Utility

The suggested approach seems to be the most feasible solution in the present electricity market scenario. However, with the progressive development of the electricity sector, the pricing methodologies for Electricity component and REC component need to be reviewed at periodic intervals. The FOR Task Force on REC has supported the proposed approach for pricing of electricity component and REC component.

1.8 SOLAR REC

Since it is proposed in this Discussion paper to have Solar specific RPO targets, it is also proposed to have separate RECs, specific to Solar Energy generation, for fulfillment of Solar specific RPO targets by the Obligated Entities. Moreover, the recently issued Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 and the FOR approved SERC (Renewable Purchase Obligation and its compliance) Regulations, 2009, provides for separate RECs namely Solar REC and Non Solar REC also mandates that the obligation to purchase electricity from generation based on solar as renewable energy source can be fulfilled by purchase of solar certificates only, and the obligation to purchase electricity from generation based on renewable energy other than solar can be fulfilled by purchase of non-solar certificates.

1.9 KEY DESIGN PARAMETERS FOR REC MECHANISM

Apart from the pricing aspect, several other key design parameters as mentioned below have been evaluated for development of REC mechanism in the Indian context.

- Categories of Certificates: As discussed in the previous section, 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.

- Eligible RE sources and technologies: Renewable Energy Sources such as Small Hydro, Wind, Biomass, Bio-Fuel Cogeneration, Urban or Municipal Waste, Solar including its integration with the Combined Cycle, and such other sources as recognized and approved by MNRE. Further, there shall be two categories of RECs, one for generation based on Solar technology and another for all other (non-solar) RE technologies.

- Eligible RE generator/Project: Considering the current status of infrastructure availability, it will be appropriate to focus and give priority to grid-interactive RE technologies only and based on the status after a few years, the off-grid RE technologies may be included. This will enable the development of grid-interactive RE technologies up to commercial maturity and then such mature technologies can easily be transferred to the off-grid RE projects. Therefore, it is proposed that grid connected RE projects with 250 kW and above shall be eligible. The FOR Task Force has also concurred with this suggestion and has recommended that the

grid connected renewable energy generators of at least 250 kW should be allowed to participate in the REC Mechanism. Existing RE projects have already been covered under particular tariff and regulatory regime. Further, the long term contracts for the same are already put in place. Hence, it will not be appropriate to subject existing RE projects to be part of REC mechanism at this stage. Therefore, it is suggested that existing projects may be allowed to participate in REC scheme after the expiry of their existing PPA.

Accordingly, all Grids connected generating companies which have obtained accreditation from state agencies and which do not have power purchase agreement to sell electricity at a preferential tariff determined by Appropriate Commission and sell electricity to the distribution licensee of the area in which generating company is located, at a price not exceeding the pooled cost of power purchase of such distribution licensees or to any other licensee or to an open access consumer at a mutually agreed price or through power exchange at market determined price shall be eligible for receiving renewable energy certificates.

- Obligated Entities: It is recommended that distribution licensees, captive users and open access consumers should be considered as Obligated Entities for the purpose of RPO target under REC mechanism, in accordance with provisions of Section 86(1)(e) of EA 2003.

- REC Issuing Authority: A national level REC Registry has been proposed to be created and CERC may formulate rules for creation of such national level entity in accordance with the harmonized policies to be developed by FOR for operation of REC mechanism at national level.

Central Agency as directed by Central Electricity Regulatory Commission shall issue the REC upon ascertaining corresponding generation/energy accounting for the accredited RE generating stations.

- Creation and Redemption of RE Certificate: In the Indian context, it is proposed that RECs will be issued for the RE generation injected into the grid and duly accounted in the Energy Accounting System as per the Indian Electricity Grid Code or the State Grid Code. It is envisaged that the RECs shall be issued only in 'electronic form' to avoid issues in paperwork and also in view of the fact that the security/verification protocols, etc., can be easily implemented in case of 'electronic form'. RECs shall be redeemed when RECs are presented to common REC Registry for redemption by the owner of RECs or when shelf life of the RECs expires. Whether redeemed specifically or expired due to expiry of life, owner of the RECs shall be allowed to account these RECs for compliance with the RPO.

- Sale/Purchase of REC: Power Exchanges are expected to provide the platform for sale and purchase of RECs. While any trading platform could be used for exchange of RECs, at this point of time there is no clarity about the volume and liquidity in the market. It is envisaged that CERC in consultation with FOR would undertake the assessment of market, liquidity requirements, costs involved in setting up of the market and necessary fee structure.

Accordingly, it is proposed that the sale and purchase of REC will only be through Power Exchange operating under the guidelines issued by the Central Electricity Regulatory Commission.

- Denomination of RE Certificate: The RECs are proposed to be denominated in energy (MWh) terms in order to be consistent with RPO percentage obligation to be specified in energy terms. With the proposed denomination in energy terms, SERCs can continue to specify the RPO target as a percentage of energy consumption, which can easily be converted into the equivalent number of RECs, , required for achieving the RPO target.

- Form of RE Certificate: Proposed REC needs to contain all the information such as Unique Certificate Number, Name of the Issuing Body, Generator Identity, Type of Generation Technology, Installed Capacity of the Generator, Location of the Generator, and Signature of the Authorized person, in its electronic form. In addition, information about date of issuance of certificate and validity of certificate may also be provided on the proposed RE Certificate.

- Issuance of RE Certificates: The eligible entities shall apply to the Central Agency for issuance of certificates within three months after corresponding generation from eligible renewable energy projects. The Certificates shall be issued by the Central Agency within fifteen days from the date of application by the eligible entities on the basis of units of electricity generated and injected into the grid.

- Pricing of Certificate: The CERC shall determine price band i.e. upper limit (forbearance price) and the lower limit (floor price) within which REC transactions can be undertaken over Power Exchange. This price will be determined by the Central Electricity Regulatory Commission from time to time. The determination of floor price and forbearance price would be guided by several factors such as variation in cost of generation for different RE sources across States, variation in pooled power purchase cost of Utilities across States, expected renewable energy capacity addition, and renewable purchase obligation targets set by different State Commissions.

It is important to ensure threshold level of revenue certainty through floor price to instill confidence

amongst investors, lenders, project developers at least during initial stage of introduction, whereas forbearance price is necessary to avoid price volatility, else it may defeat the very purpose of facilitating RPO compliance by Obligated Entities through REC mechanism. The Regulations also envisage introduction of floor price and forbearance (or ceiling) price, separately for solar RECs and non-Solar RECs

- Shelf life of REC: The RECs shall remain valid for 365 days from the date of issue of such certificates.

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