

REPORT ON DEVELOPMENT OF REC
FRAMEWORK IN INDIA
PRICING OF RENEWABLE ENERGY
AND
RENEWABLE ENERGY CERTIFICATES

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Introduction: India has sustained one of the most detailed and comprehensive renewable energy sectors since a very long time. As far back as the 1980s, solar thermal and solar photo voltaic technology and bio gas was available in the market, for consumption of the masses and the focus was primarily the rural sector because of ,perhaps two major reasons: firstly the requirement for power was substantially lower in the rural sector and secondly, rural sectors' demand for a consistent supply was also not too strict. In many ways, the effect of this policy was salutary to the nascent Indian renewable energy market. A primary focus on the rural sector, which lacked grid connectivity allowed the technologies to grow and also focussed the research efforts of many leading institutions like IISC and TERI towards developing new renewable energy technologies and improving upon the existing ones.

By nature renewable energy is geography dependant, thus early on, its development and use were both confined to the areas producing it. Rajasthan was endowed with abundant INSOLATION, Tamil Nadu with wind and Maharashtra, owing to extensive sugarcane farming-with bagasse. The generation and consumption were both localised in nature and no plans were in place for its transmission and distribution. Being costlier in nature, without any incentives, there would have been no reason for a distributor to buy any renewable energy to supply to his customers.

But with the progression of time and subsequent development in the country, starting from the final decade of the previous century, several factors have started contributing to a sudden emphasis on the development and consumption of renewable energy. The most important factor is the spectre of global warming and consequent environmental fallouts that the traditional sources of energy have. Thermal power plants based on coal, belch out pollutants in the atmosphere which have cause irreparable damage to the fragile ecosystems that sustain all life on earth. The requirement of energy cannot be practically reduced, so the only way out seems to reduce the dependence on the traditional sources of energy. This is where renewable energy scores as a viable option. Second major factor is the highly fluctuating nature of oil prices in the international markets. Most nations especially developing countries found their development plans completely thrown off-gear during the last price spurt of oil. Another major contributing factor is the quest for energy security which the policy makers of the country have been pursuing right from the time of independence and as has been formally stated in the Integrated Energy Policy 2006.

These three, together have laid the groundwork for renewable energy to become a viable option in terms of both sound policy and economic viability. Most renewable energy technologies are still in a developing phase and in order for them to compete with established sources of energy there needs to be, a policy support mechanism in its favour to allow it to mature technologically and achieve economies of scale that are so essential for a reduction in its price vis-a-vis fossil fuels.

In India, the Electricity Act 2003 is one such legislation which envisions a developed market for renewable energy in future and took the first steps towards the development of a comprehensive demand supply mechanism for it. The EA allows the generation to be delicensed and gives a framework for its procurement by the distributors. So it's a 'carrot and stick' policy as incorporated into the legal framework of EA 2003. There are several incentives that are allowed to the generators of renewable energy and there are statutory requirements for its procurement and supply to the end consumers. As the generation of renewable energy is fairly decentralised in both nature and form, the act rests the responsibility of its promotion on the SERCs. According to EA, it is the mandate of SERCs to ensure that the electricity mix in their respective states has a fixed percentage of renewable energy. This mechanism is known as the Renewable Purchase Obligation or the RPO. But there is an inherent flaw in this mechanism. As each state has its own potential, different states have different RE potentials and thus supply mixes. Also as the RPO mechanism concentrates mainly on the intra-state use, a state devoid of any potential didn't have either incentive for using renewable energy nor was there any mechanism for inter-state sale of RE. Without such a mechanism, the entire effort can turn into a sham as RE would still be generated and used in isolated pockets only. Also, as RE is a costlier form of power, states would not want to generate any more than their respective RPOs and those states with a meagre RE potential also do not use any RE in absence of any mechanism promoting its inter-state purchase.

The National Action Plan for Climate Change announced by the Prime Minister of India in the year 2008 advocates a greater use of RE in the country. It targets a minimum of 5% RE in the supply mix of the entire country by 2010, 15% by 2015 and 20% by 2020. To carry its objectives out, a mechanism has been formed which, the states generating the RE would be able to use to ensure, that the cost they incur to produce and use RE is spread though out the system and also to those who cannot or will not produce RE. This mechanism was essential because the existing RPO mechanism is not enough to ensure that the vision of NAPCC comes to life.

To remove this anomaly, there was a need for an incentive mechanism, which would result in commercial benefits for the RE generators on the one hand and which would ensure that even those

states which are deficient in RE generation are able to meet their individual RPOs, thereby facilitating interstate RE transactions.

This mechanism would allow even the SERCs of RE deficient states to increase the RE component in their electricity mix without having to actually generate it.

To address all these challenges and to turn the environmental salubrity of renewable energy into a marketable entity, the concept of Renewable Energy Certificates was developed. Apart from facilitating inter-state RE transactions, RECs also have some other objectives as well, which can be identified as:

- a. Effective implementation of RPO obligations across all states
- b. Creating competition among competing RE technologies
- c. Protecting the local distribution licensee selling RE
- d. Overcoming geographical impediments to use RE
- e. Reduce the costs for RE transactions

The development of RECs- Approach Adopted in India

As a mechanism, the concept of REC has been around in developed economies since a bit of a while. Countries like Denmark, Germany, Norway, Japan which meet a substantial portion of their electricity requirements through RE, have faced and overcome similar challenges as India in the past and they were the ones which initially had propounded such a mechanism. But the context between them and us is different. The mechanism had to be adapted to the local legislations and other unspoken concerns, most important of which, is the presence of electricity in the concurrent list in India. The federal structure of the country, the presence of separate entities which make a fragmented market and regulatory bodies, were to be taken into consideration while formulating policy concerning RECs.

What India did borrow from international experience regarding RECs was the generally accepted view that generation of RE represented two disparate products. One was the electricity itself and the other one was the environmental benefits of the power. This outlook divides the RE power generated into two separate marketable entities. The electricity sold to the distributor and the environmental benefit for which the economic system has to pay the price, in the form of REC. Thus, REC is a tradable certificate.

Another important observation to be noted is that the RE generators will have two options - either to sell the renewable energy at preferential tariff fixed by the concerned Electricity Regulatory Commission or to sell the electricity generation and environmental attributes associated with RE generation separately.

Operational framework of the REC mechanism

Fig. (1.2): Schematic of Operational Framework for REC Mechanism

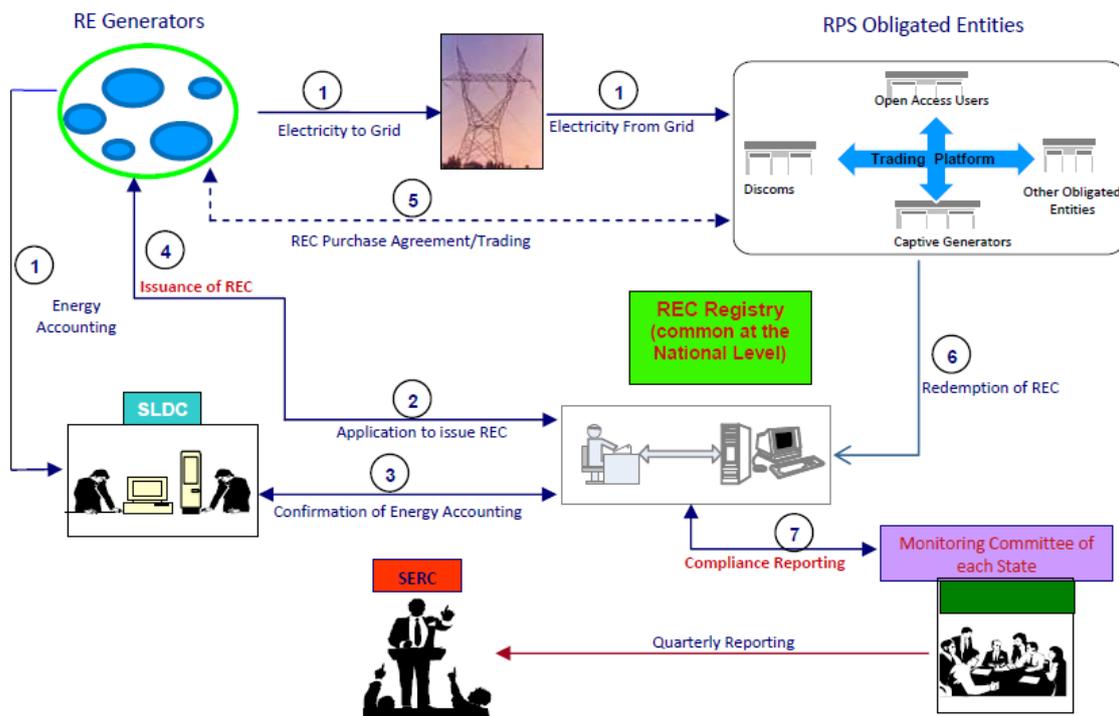


Figure 1-courtesy MNRE

In the Indian context, generation of 1 MW of RE allocates a REC to the generator, which can be sold in an energy exchange to an “obligated entity” which cannot find a RE generator to fulfil its RPO obligations, thereby overcoming the geographical constraints the transaction of RE poses.

There are some important points of note here. REC mechanism is not an incentive scheme. It is simply a market mechanism to enable various obligated entities to meet their RPO norms as set by their respective SERCs. The mechanism co-exists with all the current incentive schemes as, these schemes offer incentives for generation only. Also it is not related to carbon credits. The two mechanisms operate parallel to each other for the benefit of RE generators.

As can be seen from the figure above, the easiest route of selling RE to the obligated entities is through the grid, as established by the connection (1). The accounting of the RE produced by the generators is carried out by the SLDCs (1) the information of which is forwarded to the national registry (3). If the generator chooses to sell their RE electricity through the REC route, he makes an application to the national registry (2), after which a RECs is issued to the generators (4) as per the amount of power generated, which they can trade in the power exchanges. If these obligated entities cannot achieve their RPOs, they buy RECs in the exchange to make up for whatever is the deficit in their supply mix (5), which are redeemable at the national registry itself (6). The compliance reporting is done to the monitoring committee of each state (7), which submits a quarterly report to each state's SERC.

CERC has issued detailed outline of various activities related to issuance and trading of RECs, along with the fees for the same. According to the commission, the central agency has to issue a registration to the generating company within a period of three months unless it finds a discrepancy in the application. The generating company has to meet one of the eligibility criteria, as defined by the CERC, and given below, to be designated as an "Eligible Entity" before the central agency can grant it registration.

- a) RE Generator does not have any power purchase agreement for the capacity with any entity which is still in force at the time of his making an application for selling of RECs against the RE power he produces.
- b) The applicant RE generator does not have a PPA with another entity, which has been terminated within a period of three years prior to his submission of application. Even if the PPA has been terminated due to non-compliance with the contractual obligations by the RE generator, RE generator is not eligible to sell his power through the REC route for a period of three years.
- c) Only if the PPA has been terminated with mutual consent of both the RE generator and the obligated entity or if the contract has been terminated due to a breach of contract by the obligated entity to which the RE generator is selling, the RE generator may submit his application inside a period of three years from the date of termination of the PPA.

- d) RE generator has not availed or does not propose to avail any benefit in the form of concessional/promotional transmission or wheeling charges, banking facility benefit and waiver of electricity duty (this is not related to the generation based incentives that he gets).
- e) A period of three years has elapsed from the date of forgoing the benefits of concessional transmission or wheeling charges, banking facility benefit and waiver of electricity duty.
- f) The benefits of concessional transmission or wheeling charges, banking facility benefit and waiver of electricity duty has been withdrawn by the State Electricity Regulatory Commission and/or the State Government

The NLDC has been nominated by it to act as the central agency

Role of various entities in the REC mechanism

The functions of the various parties involved in the mechanism are:

- CERC: Rule making and transaction charge fixation. The fee and charges payable by the Eligible Entities(approved RE generators) to participate in the REC Mechanism include:
 - a) One-time Registration fee and charges-Rs. 1000 as the application fee, along with Rs. 5000 on acceptance of the registration application, payable to the central agency.
 - b) Annual fee and charges, of Rs. 1000 payable by April 10 of each year, payable to the central agency
 - c) Transaction fee and charges for issue of certificate- charges for issuance of each certificate is Rs. 10, payable to the central agency.
 - d) Charges for accreditation- accreditation application charges of Rs. 5000 payable to the state agency. On acceptance of the application a further one-time charge of Rs. 30000 payable to the state agency. The eligible entity is to also pay a annual charge of Rs. 10000 per application and in case, a revalidation is required-a fee of Rs. 15000 for a validation period of 5 years or such a period as determined by the commission.

Also, as per the CERC-“REC Regulation clearly specifies that certain percentage of the proceeds from the sale of certificates and not from the transaction fees , shall be utilized for the purpose of training and capacity building of the State Agencies and other facilitative mechanisms for the implementation and monitoring of the detailed procedures issued by the Central Agency.”

- NLDC: The NLDC has been nominated by it to act as the central agency. The CERC REC Regulations envisage functions of the Central Agency as follows:

“Registration of Eligible Entities, Issuance of Certificates, Maintaining and Settling Accounts in respect of certificates, Repository of Transactions of Certificates and such other functions incidental to the implementation of Renewable Energy Certificate Mechanism as may be assigned by the Commission.”

- SLDCs: Certification –they will account for the amount of accredited RE injected into the grid by each of the eligible entities within a state to the central agency and also to the state agency.
- Power Exchanges: Actual Trading of REC
- Compliance Auditors: comply with the duties as specified by the CERC. In case of a revocation of the license of any eligible entity, submit a detailed investigation report to the central agency/ CERC.
- State Nodal Agencies: Accreditation of the RE generators for the grant of their registration applications as eligible entities.

Institutional framework

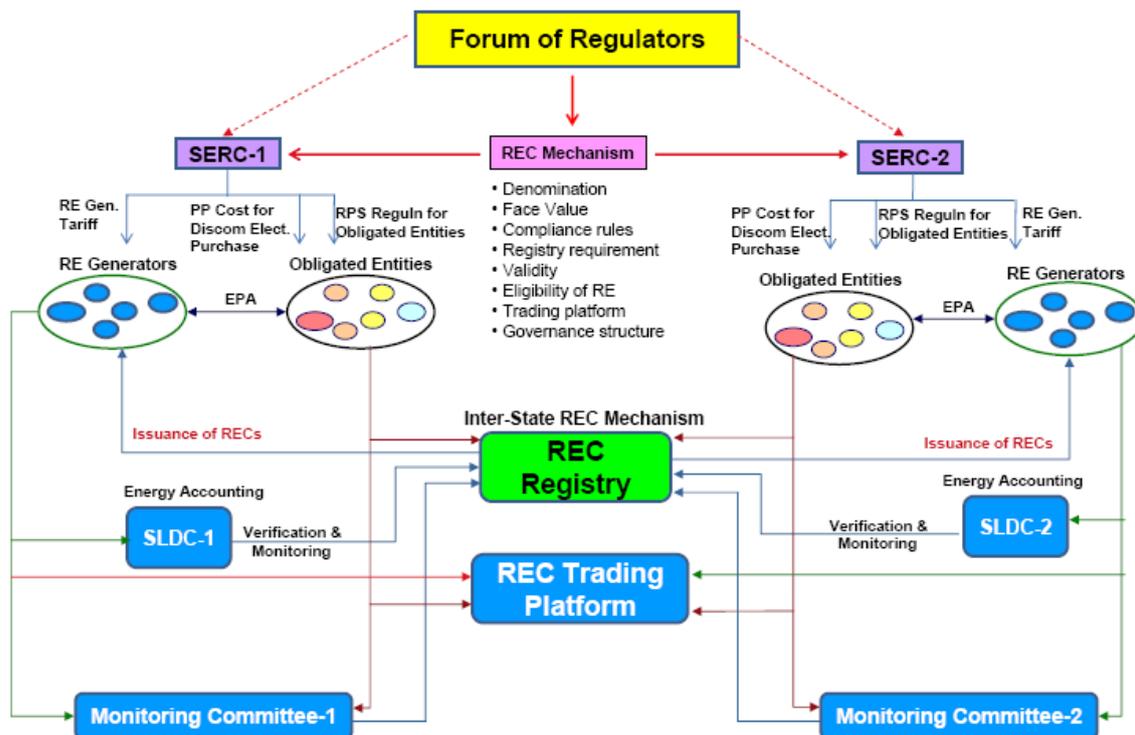


Figure 2: *courtesy MNRE*

The diagram above shows the interaction of the SERCs, RE generators and obligated entities of various states and the roles they play in the mechanism. In the mechanism, the forum of regulators comprising of the SERCs of the various states and CERC decide upon the RE tariffs, the power purchase cost for the DISCOMs, and the renewable power supply regulations for the obligated entities. This forum of regulators also decides upon critical issues related to RECs like denomination, face value, compliance rules, registry requirements, validity, eligibility of RE, trading platforms to be used and the governance structure required by the mechanism.

Pricing Of Electricity and RE Components

As mentioned before, the RE generated has two components which are marketable- the electricity generated, and the environmental benefits that such a power bestows on the society. Generating RE has a cost associated with it, which is larger than the generation of conventional power from fossil fuels. Thus there is always a risk that the RE generator would feel unfairly constrained in the conventional market unless there is a separate policy support advocating the use of RE. Also the mechanism has to ensure that the RE produced is optimally priced to adequately compensate the RE generator.

The pricing of the electricity and the REC has to follow separate mechanisms. The electricity tariff may be fixed according to the following mechanisms:

- a) Market prices for electricity- this is done based upon the supply-demand dynamics present in the market for electricity. The price discovery may be done through competitive bidding for long term contracts or through the power exchanges for short term contracts. The competitive bidding route reflects a wide variation in tariffs due to a large number of factors specific to the contract and has a capacity and an energy charge component. The capacity charge remains constant while the energy charge allows for an escalation factor dependant on the fuel price escalation. But in the case of RE projects the tariff is based on a single component, the price discovery through the power exchanges is considered a better option. The use of this avenue is already proven in the case of conventional energy and it also allows different RE technologies to compete amongst each other and also with other conventional technologies. But there are some demerits to this method as well. The amount of power sold through the exchanges is very small in comparison to the total

power sold in the country and the prices discovered through this method thus, may not reflect the true price of power. Also as has been recently noticed, the price of power sold through the exchanges has escalated rapidly, due to the demand supply gap in the country, and there are concerns in policy circles that the price simply doesn't reflect the cost that may be involved in the generation of the power.

- b) UI Price- in the present system, the buyers and dispatchers of power are supposed to follow a schedule for generation and consumption as drawn up by the respective load despatch centre. Any deviation from the same leads to a fluctuation in the grid frequency from 50Hz and based on the same the tariff changes. This is defined as the unscheduled interchange charge for electricity. As the RE itself is a form of power that is not guaranteed, its tariff may be fixed based on such schedules. The tariff based in these schedules is fixed by the CERC and is much higher than that arrived at using any other method and thus there is a possibility that the RE project will gain higher revenues although they may be uncertain (dependant on the frequency). To reduce the uncertainty the price may be fixed at the UI frequency of 50Hz.

- c) Average power purchase price of the distribution licensee- this is the method that is presently being used across all the states to fix the tariff for electricity. The respective SERCs regulate all sources of power purchase and the procurements of all distribution licensees. The power purchase expenses are thus calculated on the basis of the aggregate revenue requirements of the generators. This is the basis of the 'cost plus' approach. The most important benefit of this method is that it doesn't unnecessarily overburden the consumer. Also the average power purchase (APP) cost is calculated by pooling the price of all the sources of power and information pertaining to this is available well in advance. Thus there is increased certainty both for the project developers and the end consumers regarding the price of power. But there are serious flaws in this mechanism. Firstly several SERCs do not include the cost of short term power purchased from traders and UI pool while calculating the APP cost. Thus in many cases when a DISCOM is buying mainly from short term sources, its cost may go higher than the approved APP cost. Apart from this, there is a wide variation between the APP costs of different utilities spread across the states.

Due to this, the RE project implementer would sense better opportunities where the APP cost is higher rather than where there are better opportunities for generating the power. Due to these shortcomings this particular methodology isn't considered very suitable for price determination of electricity from the RE sources.

- d) Normative or feed-in tariff for particular renewable technology- as per the New Tariff Policy, the SERCs can specify the preferential tariff for power procurement from the RE generators. In most cases the tariff is based on a cost plus approach. Representative sample studies are conducted by the SERCs to calculate a normative price for different types of RE electricity. This is considered to be one of the best methods for setting tariff from both legal and operational point of view. This approach has already been in use in the case of RE in several states and with a harmonization of the guiding principles for tariff fixation across states. There are some risks for the generators upon the adoption of this mechanism though. Most of the RE generators are using government subsidies in one way or the other. Once these subsidies start to go down, the cost of RE project will go up in comparison to the tariff decided using this method.

Apart from pricing of the electricity generated through RE sources, another issue is the pricing of the REC that the generator is given by the NLDC. The pricing of REC can be done using two approaches:

1. Price discovery thorough the market- this is the price discovery using the basic principles of matching of the supply and demand curves and arriving at an equilibrium price for the REC. This mechanism is essential for the long term sustainability of the market itself and is being already used for pricing of electricity. But due the fact that the REC concept is still in a development stage in the country, this method has to depend on several policy measures that make pricing through this route viable-for example the RPOs. Also certain issues like the base price, and minimum denomination etc can only be clarified with adequate degree of precision only after closely monitoring the existing REC mechanism over a elaborate period of time. Thus this method, although is a recommended method in the long term, for the initial phases this may not be the best suited method.
2. Price linked to the notional price of electricity generated through RE sources- this is the method that is currently being used to fix the price of the REC and according to the current system 1MW of electricity generated through RE is considered equivalent to 1 unit of REC

and the generator is allocated 1 REC for every MW of RE electricity produced. This methodology has many associated benefits. The end consumer is not over burdened; also the methodology may be changed as the maturity of the REC market increases. As such this method doesn't have any demerits.

Conclusion: the above paper goes into the development of the REC framework in the country and the pricing of the electricity as well as the RECs. It delves into the considerations that were taken into account before finalising the REC mechanism in India. CERC has released the detailed procedures under the REC mechanism, the roles of the various players involved in this mechanism, the responsibilities, along with the fee for all the transactions. The pricing of REC has been linked to the notional price of the electricity and presently the minimum quotable price in the Power Exchange India Ltd of each REC is 1 paisa. The types of RECs have already been differentiated in the form of solar and non-solar certificates, due to the presumably vast difference in the price of solar electricity and other competing RE technologies. Going forward, a close monitoring of the development of the market has to be ensured for better regulatory structure and mechanisms to sustain the same.

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