Renewable Energy Certificate Trading through Power Exchanges in India

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ABSTRACT
Renewable energy certificate (REC) trading through power exchanges commenced in March 2011 in India. The enactment of Indian Electricity Act 2003 along with mandatory obligation of purchasing renewable power for distribution companies imposed by Central Electricity Regulatory Commission and State Electricity Regulatory Commissions has propelled REC trading in Indian Electricity market. In this study we review REC trading in India, role played by power exchanges in facilitating REC trading, policy framework promoting renewable energy, renewable purchase obligation imposed and suggests the possible policy considerations for the regulators in future.

JEL Classifications: C22, C53, C01

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1. INTRODUCTION

India is the third largest producer of electricity in the world and one of the largest producers of renewable energy. The All India total installed generation capacity stands at 249488.31 MW as on June 31st 2014 out of which 72422.14 MW of electricity is from renewable energy sources i.e., 29.03% (Central Electricity Authority of India, 2014). Table 1 gives the details of total installed generation capacity of Centre, State and Private sectors based on the mode of electricity generation i.e., electricity generation using thermal energy i.e., by coal, gas or diesel, power generation using hydro, nuclear and electricity generation using renewable energy sources. It is clearly evident that the role played by private players post deregulation and enactment of the Indian Electricity Act 2003 has become critical especially in generating electricity from renewable energy sources.

The enactment of Indian Electricity Act of 2003 paved way for reforms in power sector which have completely transformed the power sector in India (Girish et al., 2013). The Act has created a conducive environment for development of power industry in India, rationalization of electricity tariffs, enhancing and promoting policies which ensure efficiency and are environmental friendly, paved the way for constitution of an independent regulatory commission (Central Electricity Regulatory Commission [CERC] and State Electricity Regulatory Commissions [SERC]) and helped in establishing appellate tribunals for resolving any conflicts/issues related to power sector ensuring and protecting interests of all stakeholders (Girish et al., 2014; Girish and Vijayalakshmi, 2014). The latest development has been renewable energy certificate (REC) trading through power exchanges which commenced in March 2011 in India. In this study we review REC trading in India, the policy framework promoting Renewable energy, role of power...
exchanges in REC trading and possible policy considerations. The rest of the paper is structured as follows: In Section 2, we give a brief overview of policy framework to promote renewable energy, Indian electricity market and role of power exchange. In Section 3 we take a closer look at what REC’s are and analyse REC trading in India. In Section 4 we discuss the possible policy considerations which can further enhance REC trading and conclude our study.

2. POLICY FRAMEWORK AND INDIAN ELECTRICITY MARKET

In order to promote renewable energy, Government of India has taken a vanguard by enacting the Indian Electricity Act 2003 which made it mandatory for all the power distribution public utilities to purchase a certain fixed percentage of their power from renewable energy sources. The National Electricity Policy of 2005 provided financial incentives like feed in tariff; generation based incentive and accelerated depreciation for promoting renewable energy. The tariff policy 2006 prescribed by Power Ministry, Government of India, National Action Plan on Climatic Change and Jawaharlal Nehru National Solar Mission have propelled growth of renewable energy in India (Shereef and Khaparde, 2013). Figure 1 and Table 2 gives the map and structure of Indian electricity market post enactment of Indian Electricity Act 2003 which has ensured that electricity trading is a separate and distinct activity and has paved way for power exchanges including REC trading (Girish et al., 2013; Girish et al., 2014; Shereef and Khaparde, 2013; Aggarwal et al., 2009; Girish and Vijayalakshmi, 2015).

3. REC AND REC TRADING IN INDIA

REC’s are exchange tradable, intangible attributes of electricity commodity which represents the attributes of power generated from renewable energy resources (Shereef and Khaparde, 2013). REC represents attributes of electricity which is generated from renewable energy sources. The attributes of REC are unbundled from electricity. The commodity electricity and the REC are brought/sold separately. The producer of green power can sell the electricity generated to a distribution utility at a preferential tariff and also obtain green attributes issued for every 1 MWh for the green energy supplied to the grid (i.e. 1 REC = 1 MWh). The green attributes obtained by generating firm in the form of REC can be separately traded at Indian Energy Exchange (IEX) or Power Exchange India Limited (PXIL) i.e., power exchanges (Girish and Vijayalakshmi, 2015). The salient features of RECs is given in Table 3.

Table 1: All India total installed generation capacity as on June 31st 2014

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Thermal</th>
<th>Nuclear</th>
<th>Hydro (renewable)</th>
<th>RES</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coal</td>
<td>Gas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>54678</td>
<td>6974.42</td>
<td>602.61</td>
<td>0</td>
<td>27482</td>
</tr>
<tr>
<td>Private</td>
<td>47875.38</td>
<td>8568</td>
<td>597.14</td>
<td>0</td>
<td>2694</td>
</tr>
<tr>
<td>Central</td>
<td>45925.01</td>
<td>7065.53</td>
<td></td>
<td>4780</td>
<td>10554.09</td>
</tr>
<tr>
<td>Total</td>
<td>148478.4</td>
<td>22607.95</td>
<td>1199.75</td>
<td>4780</td>
<td>40730.09</td>
</tr>
</tbody>
</table>

Source: Central Electricity Authority of India, RES: Renewable energy sources

Table 5 gives details of REC’s transacted through power exchanges in India in the year 2012-13. The gap found between the volume of buy/sell bids of REC’s placed using power exchange platform shows that in general there was more demand for solar REC’s when compared to the demand for non-solar REC’s.

Tables 6 and 7 gives details about the market clearing volume and price of solar and non-solar RECs transacted in the year 2012-13 on both the IEX and PXIL. We see a general trend of increase in trading volume of solar and non-solar REC’s in both the power exchanges i.e., IEX and PXIL for the year 2012-13.

Table 8 gives details about the summary measures i.e., number of REC buy/sell bids, clearing volume, clearing price, total number of participants for both solar REC and non-solar REC month-wise for the year 2014 which were transacted through IEX.
The Indian Electricity Act 2003 has made it mandatory for all the power distribution public utilities to purchase a certain fixed percentage of their power from renewable energy sources i.e. Public utilities have Renewable Energy Purchase Obligation (RPO). The enactment of Indian Electricity Act 2003 along with mandatory obligation of purchasing renewable power for distribution companies imposed by CERC and SERC’s has propelled REC trading in Indian Electricity market. Table 9 gives details about state-wise RPO for the year 2012-13 to 2014-15 where we observe a general trend of increasing RPO further providing impetus for REC trading in India.
4. CONCLUSION

India as a nation is heading in the right direction as far as renewable energy is concerned and it is strongly believed that Indian Power sector would benefit if there is more backing from policymakers considering the practical aspects of huge capital investment for power projects and long gestation period associated with power projects. Further, evolution of regulations regarding open access, power exchanges and RECs are steps in the right direction. In spite of many measures taken by Government of India to promote renewable energy, there is still a lot of potential which can be harnessed if: (a) There is clear and consistent policy regarding renewable purchase obligation by considering the existing and estimated renewable energy potential for future in consultation with SERC’s and CERC, (b) in order to avoid rush towards the end of financial year, RPO compliance can be made half yearly or quarterly, (c) proper imposition of penalty for non-compliance of renewable purchase obligation, (d) providing incentive for compliance of renewable purchase obligation, (e) extending the validity of REC, (f) long-term pricing for REC and (g) provision for bilateral trading of REC (Shereef and Khaparde, 2013; Girish et al., 2014). The role played by private sector in future will be very crucial and critical.

### REFERENCES