Issue Related To an Open Access of Power Mechanism to Distribution Utilities in an Indian Scenario -A Case Study

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Abstract: This paper presents the view of Open Access of power mechanism and evaluates the implication on the Distribution Utilities in an Indian context or in energy deficit area. After de-regulation, energy sector had witness reforms and important one was an Open access of energy. An implementation of Open Access of energy from anywhere by using existing transmission lines, paying applicable charges and system losses helps in accessing of energy from anywhere in the country. But this regulatory frame work come up with the impact on the Distribution Utilities and creates two major concern to the Distribution Utilities (1) Power mis-management (2) Revenue Loss. These concerns are being illustrative with the case-study.

Keywords: De-regulation, Distribution Utilities, Over-Drawl, Under- Drawl, Unscheduled Interchange (UI), Open Access of Power, Open Access consumers.

I. Introduction

Power sector was de-regulated and re-structured to create competition among power generating companies at the wholesale generation and retail level [5][6][7][8][11]. At the retail level competition has been done through an open access distribution system or permitting direct customer access, or customer choice of electric suppliers with existing transmission and distribution networks and equipments. In regulatory framework, power was assumed as commodity, which can be traded in open market. The need for de-regulating of power sector was felt due to improving the technical and commercial efficiency. In India during 1998 the Regulatory Commissions were formed under the Electricity Regulatory Commissions Act 1998 (Central Law) to promote competition, efficiency and economy in the activities of the electricity industry. Central Electricity Regulatory Commission (CERC) [1] has a key role in rationalizing tariff of generating companies owned or controlled by the Central Government. Ministry of Power [2] has undertaken Accelerated Power Development and Reform Programme (APDRP) from the year 2000-01 with the twin objectives of financial turn-around in the performance of the power sector especially in electric distribution and improvement in quality of supply. Electricity Act 2003 [3] has come into force from June 2003. As the act allows third party sales, it introduces the concept of trading bulk electricity. The act also provides open access to transmission as well as distribution of electricity. This particular Act opened the power sector to multiple players by providing for a power market satiated with competition. A key objective of EA 2003 was to provide ‘open access in electricity transmission and distribution. In other words, the Act mandates competition and choice, which were non-existent in the pre-EA 2003 era. Section 42, read along with other sections of EA 2003, is clear that the states ‘shall’ introduce open access to all consumers above one megawatt load. EA 2003 mandated open access in electricity transmission and distribution. It envisaged that all consumers above one megawatt will be free to source electricity from a supplier of their choice. So there remains no ambiguity whether or not to provide open access.

1.1 Definition of Open Access

Enabling of non-discriminatory sale/purchase of electric power/energy between two parties utilizing the system of an in-between after paying applicable transmission, wheeling charges, system losses, and not blocking it on irrational justification. Figure-1 and Figure-2 shows the principal and
Broad picture of open access mechanism.

Table 1 Summary of Open Access in Energy sector

<table>
<thead>
<tr>
<th>Why Need for Open Access Mechanism?</th>
<th>To who open access can be granted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Injection and utilization of short time surplus power.</td>
<td>When the power requirement is greater or equal to 1MW and drawer is connected to the grid.</td>
</tr>
<tr>
<td>3. Non-discriminatory/transparent process.</td>
<td>2. Surplus power of state generating companies.</td>
</tr>
<tr>
<td>4. Open market for sell/buy power.</td>
<td>3. Surplus power of state power utilities of the state and other Distribution Licenses.</td>
</tr>
<tr>
<td>5. Efficient market scenario to address imbalance due to demand &amp; supply mismatches.</td>
<td>4. Un-requisitioned power of CSGS.</td>
</tr>
<tr>
<td>7. Injection of cheap green energy into the grid.</td>
<td>6. Captive Power Plants for their use</td>
</tr>
<tr>
<td><strong>Types of Open access</strong></td>
<td><strong>7. Surplus power of CPP’s/IPP’s.</strong></td>
</tr>
<tr>
<td>1. Long Term open Access more than 3 years.</td>
<td>8. Collective transactions through exchange.</td>
</tr>
<tr>
<td>2. Medium Term open Access 3 months to 3 years.</td>
<td>9. Purchase of power by a consumer.</td>
</tr>
<tr>
<td>3. Short Term Open Access up to 3 months.</td>
<td>10. Renewable power with limitation on scheduling.</td>
</tr>
</tbody>
</table>

Fig. 1 Showing the Open Access mechanism

Fig. 2 Showing the Broad Picture of Open Access mechanism

Fig. 3 Types of Short-term Open Access
II. Issues related to open access of power

In present scenario open access consumers:

2.1 They only furnish the day-head schedule to distribution utilities for energy which they purchase from open market through trading in Energy Exchanges i.e. Indian Energy Exchange.

2.2 They purchase power as per the tariff rates prevailing in the open market through bidding or through open access agreements with CPP’s, IPP’s and RE generators. Open access consumers bid for lower tariff rates in open market in respect of prevailing HT tariff rates of distribution utilities. Bidding rate is generally depends on the UI rate prevailing in 15 minutes time blocks.

Case-1 As per (2.1) and (2.2) , when open access consumers furnish only day-head schedule for power purchase from trading process and not from distribution utilities. It creates typical situation in front of the Distribution Utilities in terms of revenue and power management problem.

Case-2 As per (2.1) and (2.2) if bids of Open Access consumers were not cleared, than they drawal energy from distribution utilities through its HT connection. Many times distribution utilities also have to overdraw from the grid to maintain demand and supply. Over drawal rates are based on the frequency in the 15 minutes time blocks. Sometimes these over drawal rates reached to Rs.17 per KWH and it will lead huge financial losses. In Rajasthan state HT tariff is around Rs.5.50/KWH.

Case-3 If open access consumers used only half of energy which they purchase from open market/bidding process than balance half of energy being come into the grid. For this inadvertent power what will be the charge for settlement.

Case-4 If open access consumers drawal more power that of day-head IEX schedule i.e through bidding in 15 minutes time block as per (2.1) and (2.2).this excess power is drawal from distribution utilities, for this open access consumers pay as per HT connection tariff. Which were very less as compare to market overdrawling rates?

III. Problem Due to Open Access in a current scenario

As due to access of energy from open market it will create complexity in the Distribution Utilities system [9][10]:

3.1. Power Mismanagement.

3.2. Revenue Loss to the Utility.

3.1. Power Mismanagement:

Power mismanagement in the system is mainly due to the mismatch in supply-demand, but many time it has been seen that this problem was created due taking of undue advantages flawed market design and inconsistent rules. This aspect is mainly termed as “Gaming”. In the Open Access the problem a rises when energy is more or vice- versa. This problem is widening when there is less capacity of generation (MW) in state and healthy quantity of open access consumer.

Problem arises when open access consumers bid for power in the open market. Bidding rates are generally lower that of the H.T tariff. If there bid was cleared than open access consumers purchase power .But if the bid was not clear, it leads to alarming signals to Distribution utilities. Now the open access consumers will drawal energy from utilities. For which the utilities are not ready, as they have not taken this demand in its day-head scheduling. To meet out the demand utilities will have to overdraw from grid and it will lead to power mismanagement in the state grid .Another condition may also arises when the utilities take account of open access consumer energy in their account in day-head schedule .But consumers do not consume energy from them and it take energy from the open market through bid process. This situation will lead to the power mismanagement in the system. Both the above situation may be part of “Gaming”.

3.2. Revenue Loss:

Due to open access agreement and open market scenario, open access consumers purchase power from open market. It will lead to revenue loss to the Discoms .As the open access consumers are mostly of large industry and they are having a 100% realization in terms of revenue. As also from above discussion stated in part (3.1) due to “Gaming” by the open Access consumer Discoms will have to over drawl and revenue loss scenario has already been illustrated in previous section II.
IV. Case Study

The case study has been done to know the impact of open access of power mechanism on the Distribution Utility. Here Rajasthan Discos have been account for Distribution utility. Suppose Open access consumers are having a capacity of 1MW or more.

For the 15 minutes time block consumer furnish the schedules for open access power purchase from open market. As for case study we have taken the data of 17 April-12 from Rajasthan SLDC site as shown from Table-2

In this open access consumers showing schedule for injection & drawl from Indian Energy Exchange, but not showing drawl schedule from Distribution Utility. If the open access consumers furnish the drawl schedule from distribution Utility than the overdraw units from NR grid by the Rajasthan Discos from 00:15 Hrs to 24.00 Hrs may be less than that of 134.43750 LU .It will also reduce the UI payable i.e. Rs.527.20 Lacs as shown from Table -2

Table-2 showing the case study of Open Access consumers on 17 April-12.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Time Blocks(Hrs)</th>
<th>Avg. UI Rate (Rs.)</th>
<th>Avg. Purchase(MW) by open access consumers</th>
<th>Avg. Sell(MW) by open access consumer</th>
<th>Over drawl Unit(LU)by Distribution Utilities</th>
<th>Under drawal Units(LU) by Distribution Utilities</th>
<th>UI payable(Rs.Lacs) by Distribution Utilities</th>
<th>UI receivable Rs.Lacs by Distribution Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>00:15 to 24:00</td>
<td>3.65</td>
<td>197.37</td>
<td>56.61</td>
<td>134.4375</td>
<td>9.115</td>
<td>527.20</td>
<td>20.03</td>
</tr>
<tr>
<td>2</td>
<td>00:15 to 04:30</td>
<td>2.23</td>
<td>186.79</td>
<td>56.53</td>
<td>0</td>
<td>9.115</td>
<td>0</td>
<td>20.03</td>
</tr>
<tr>
<td>3</td>
<td>04:45to18:00</td>
<td>3.24</td>
<td>160.64</td>
<td>56.87</td>
<td>101.31</td>
<td>0</td>
<td>336.06</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>18:15 to 23:00</td>
<td>5.46</td>
<td>311.33</td>
<td>56.39</td>
<td>29.2725</td>
<td>0</td>
<td>163.03</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>23:15 to 24:00</td>
<td>6.39</td>
<td>171.05</td>
<td>54.49</td>
<td>3.8575</td>
<td>0</td>
<td>28.11</td>
<td>0</td>
</tr>
</tbody>
</table>

Case-1: In the Table-2 it has seen that from time blocks 00:15 Hrs to 04:30 Hrs distribution utilities are having under drawal of 9.11500 LU for average UI(unscheduled Interchange) rate Rs.2.23 KWH. This time period is generally a low load hours, it means open market rate will be near around Rs.2.50 to Rs.3.00 per KWH. Now the open access consumers will bid into open market for Rs.3.00 per KWH and purchase cheap power. It has also seen from data that open access consumer’s purchase Average quantum of power 186.79 MW from IEX. At the same time a distribution utilities are having under drawal and creates power mis-management as well as revenue loss problems.

Case-2: In time blocks 4:45 Hrs to 18:00 Hrs average purchase quantum of power was 160.13 MW and average UI rate was Rs. 3.24 per KWH. As comparing from time blocks 00:15 Hrs to 4:30 Hrs average power quantum purchases was 186.79 MW and average UI rate was Rs. 2.23 per KWH. This means that now the price in the open market tends to increasing and the open access consumers will have to bid for higher energy rate as previous rate. If bids for energy were not cleared than it will have to drawal energy from the HT connection of Rajasthan Discos. In this time block period UI amount payable by Rajasthan Discos was Rs.336.06 Lacs.

Case-3: As from time block 18:15 Hrs to 23:00 Hrs, this particular time blocks are generally peak load hours in Indian context. During this time period country is having high consumer load and average UI rate was Rs.5.46 per KWH as shown in Table-2. At this duration of time block open access consumers sell less amount of power as per previous blocks and distribution utility overdrawal of 29.2725 LU units and under drawal zero units. The Over drawals UI payable by distribution utilities was Rs.163.03 Lacs. To avoid load shedding by distribution utility an open access consumers will have to purchase more power from market. This thing was also clear from Table-2, now an open access consumers had average purchase had reached to 311.33 MW during peak load hours. If the open access consumers will provides the day-head schedules for their purchase from open market and also schedule for energy drawal from distribution utilities than both entities will definitely benefited.

Case-4: During the time block from 23:15 Hrs to 24:00 Hrs average UI rate had been increased to Rs 6.39 per KWH, because from here summer season starts in northern India. It was also clear from Table-2, open access
consumers average purchase was 171.05 MW and over drawal by the distribution utilities during this time had reached to 3.8575 LU and UI amount payable was 28.11 Lacs.

V. Results

As from above case studies, it has been viewed that due to ambiguity in regulatory framework, flawed market design and inconsistent rules will create problem to distribution utilities. This aspect is mainly termed as “Gaming” and creates problem in terms of Power mis-management and revenue loss to distribution utilities as shown in Figure 4(a) to (d).

![Fig.- 4(a) Power Mismanagement](image)

![Fig.- 4(b) Power Mismanagement and Revenue Loss](image)

![Fig.- 4 (c) Power Mismanagement and Revenue Loss](image)
VI. Conclusion

Open access of power is an important reform in the power sector. But at the same time a transparent mechanism must be developed, so that it will able to mitigate the liability on distribution utilities. In view of above impact a real time balancing mechanism must be developed. But it must be regulated by regulators so that the Gaming can be the avoided. Real time balancing mechanism must be such that it will eliminate the dispute between distribution utilities and large industrial consumers.

References