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IEX INDIAN ENERGY EXCHANGE

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MARKET UPDATE

India's energy sector is at the cusp of transformation. We have been witnessing an increased push towards adoption of technology and automation across the industries with power sector being no exception. Therefore, in line with this transition, IEX has been continually advancing its technology infrastructure to elevate its ease, reliability, security, scalability to provide the best-in-class experience to our market participants. Parallelly, a digital transformation has been underway even within the organisation as we strengthen the enterprise technology. We have implemented enterprise resource planning; the manual efforts that were involved in uploading data into SAP have been removed to make way for automation. The back-office system now provides real-time flow of data to the SAP system and gives access of API to integrate with any external enterprise resource planning system, even for our members and clients. We have further invested in creating a data warehouse for consolidating all internal data and have been using Power BI for visualising all trade related data. The Power BI dashboards with real-time data have been aiding us in taking faster decisions.

More recently, the Power System Operation Corporation (POSOCO) released the integration guidelines for NOAR, paving for an automated processing of information related to approvals, rejections, revisions, curtailment and payment scheduled for all regional load despatch centres and national load despatch centres. We will soon integrate the same with our exchange platform.

TECH DEVELOPMENTS @ IEX

Launch of Web-based Platform

- In April 21, IEX launched the phase-1 of its new web-based platform. The platform features include: ease to onboard the member, clients, and also access to the transactional and financial data, Online client registration/update, secured access to all reports anytime anywhere, and facility for members to provide access of the platform to the clients. Furthermore data analytics and visibility will be provided to all 6000+ clients, CXO level leaders across the customer base, and senior stakeholders in the power sector. With this initiative, we have further strengthened our cyber security by including comprehensive monitoring.

Mixed Integer Linear Programming (MILP) for the Day-Ahead Market.

- IEX has adopted the advanced Mixed Integer Linear Programming (MILP) for its Day-Ahead market. The MILP provides greater flexibility to the market participants, including offering the new bid types and making the trading experience seamless and far more intuitive. The algorithm was developed in collaboration with N-Side, a key player in the power market of Europe.

INCREASING EFFICIENCY THROUGH GROSS BIDDING MECHANISM: AN ALTERNATE TO MBED

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Background

India has moved from a power deficit scenario to a surplus scenario, achieving an installed capacity of 382 GW against the peak demand of 187 GW during fiscal year 2020-21. In this scenario, it is important that the generators are dispatched based on merit order i.e., from lower cost to higher cost for efficient utilisation of resources. However, this has been difficult to achieve in the current scenario, where the distribution utilities are mostly procuring their power through long-term contracts on a self-scheduling basis. Under this mechanism, the utilities are providing the schedule to their contracted capacity on a day ahead basis without having visibility of any other cheaper generating station available in the system. As a result, there are situations where the capacities in the efficient and cheaper generating stations have remained unutilised whereas the costlier ones have got dispatched.

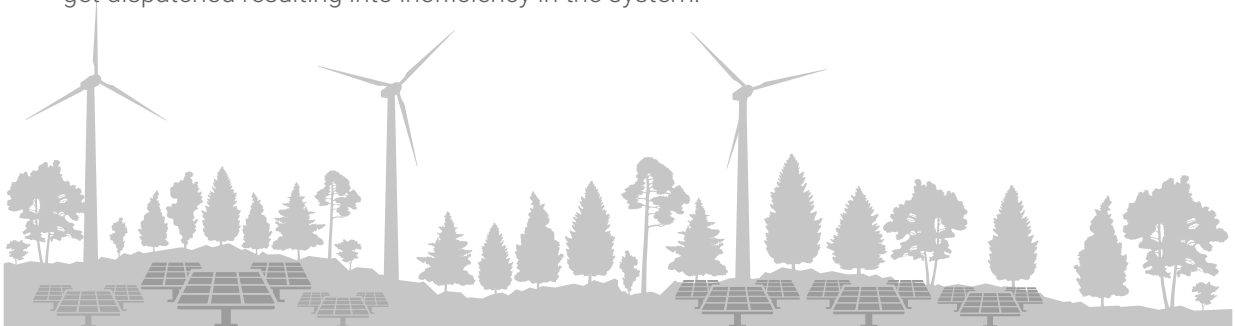
The Central Electricity Regulatory Commission (CERC) in its discussion paper dated 31.08.2018, has analysed the above issue in detail and suggested Market Based Economic Dispatch (MBED) mechanism for dispatch of all generators through the market mechanism for achieving the efficiency. The Ministry of Power has also recently issued a consultation paper on Market Based Economic Dispatch on 01.06.2021, echoing similar views as that of CERC. The introduction of MBED however requires structural changes in the power market and substantial changes in the existing regulatory framework.

An alternate mechanism, namely the 'Gross Bidding' mechanism suggested by IEX can be introduced in the power exchanges without requiring any change in the existing regulatory framework and could achieve the purpose of efficient dispatch through the market mechanism.

Gross Bidding Mechanism

Presently, the distribution utilities are participating on the power exchanges on a 'net pool' basis, which essentially means that after fulfilling their demand mostly from the bilateral sources, the utilities participate in the spot market to fulfil their residual requirement. A few limitations associated with utility participation on a 'net pool' basis approach are briefly discussed below:

- **Poor liquidity in the market:** The liquidity in the spot market continues to be in the range of 4-5% of the overall electricity transactions in the country of the order if ~1400 billion units and does not help the cause of providing efficient pricing signals and dispatch of low-cost generators.
- **Limited cost optimisation by the distribution utilities:** The utilities are unable to avail the benefit of low prices in the spot market, particularly while scheduling their requirements from marginal stations due to uncertainties associated with transactions in power exchanges. For instance, in case a generator's energy charge is Rs 3.5/unit and the prevailing rate at the Exchange is Rs. 3.00/unit, the utility may still not prefer to replace such power looking at uncertainties involved with the clearing in the exchange.
- **Under-utilisation of cheaper generating assets:** A generating station, which is efficient and has low cost/cheaper power in an overall scenario but relatively a costlier one within a utility portfolio, will not get dispatched resulting into inefficiency in the system.

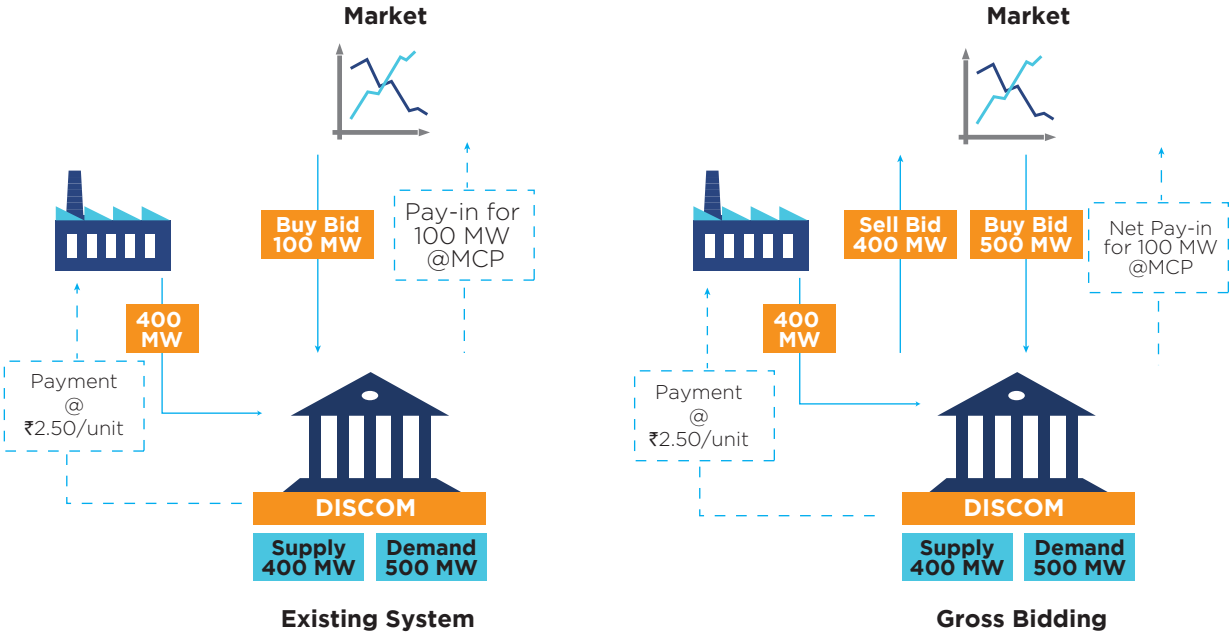


The above shortcomings to a large extent can be addressed through the 'Gross Bidding' mechanism. Under this mechanism, both the generator and the utilities having long-term power purchase agreement (PPA) will participate in the market and schedule their transactions through the market. The utility will place both buy and sell bids simultaneously for the contracted capacity in the market, under a Gross Bidding portfolio, to be provided by the power exchange. The utility will place the sell bids at the agreed upon energy charges in PPA and buy bids as price inelastic bids in the Day-Ahead market. Based on the demand and supply situation in the spot market, three different scenarios may emerge as provided below:

- **MCP < Energy Charge:** In this scenario, the sell bids will be rejected as power will be available at a cheaper price at the Exchange. The utility will buy from the market at a price lower than the energy charges. As the sell bid will not get cleared and the power will not get dispatched, the utility will not be paying any energy charges to the generator. The distribution utility will gain in this scenario by procuring power at a cheaper price.
- **MCP = Energy Charge:** In this scenario, both buy and sell bid will get cleared. The utility will buy from the market at the same price as energy charges and pass it on to the generator under PPA. In comparison to PPA, the utility will not have any loss or gain.
- **MCP > Energy Charge:** In this scenario, the sell bids will be selected whereas the buy bids will get rejected. The pay-in and pay-out of the utility will get exactly netted out with no additional obligation for the utility. In case the utility has lesser requirement i.e., buy quantum is less than the sell quantum then the utility will be able to gain on account of positive difference between market clearing price and energy charges.

Assume that a distribution utility has a demand of 500 MW and has entered into a PPA with a generator and contracts a capacity of 400 MW at Rs. 2.50/unit. The bidding as per the existing system i.e., net pool basis compared with the Gross Bidding is given in the figure below:

Illustration of Gross Bidding Mechanism



The different scenarios that can emerge in the market along with the utility power procurement cost in these scenarios are presented in the table below:

Discom Power Procurement Cost in Different Scenarios

S. No.	Scenario	MCP	PPA Price	Discom power procurement cost (Rs. in Lakhs in a Day)						Net Gain/Loss
		Rs./ Unit	Rs./ Unit	Existing System			Gross Bidding			
				Pay-out to Genco	Pay-out to Market	Total Pay-out	Pay-out to Genco	Pay-out to Market	Total Pay-out	
1	MCP<PPA Price	2	2.5	240	48	288	0	240	240	48
2	MCP=PPA Price	2.5	2.5	240	60	300	240	60	300	0
3	MCP>PPA Price	3	2.5	240	72	312	240	72	312	0

It is quite clear from the above illustration that when MCP<PPA Price, the generator who is not in the merit order will not get dispatched resulting into net savings in the power procurement cost of the utility. In the other two scenarios, as MCP>=PPA Price, the Generator will get dispatched through the market, however, the distribution utility's financial position will remain neutral without any net gain or loss in its power procurement cost.

Benefits of Gross Bidding

Gross Bidding will be beneficial to the distribution utilities, generators and the power market at large. It will be a win-win proposition for all the market participants as briefly described below:

- **Benefit to the Distribution Utility:** The utility will be able to optimise their power procurement cost by replacing the costlier power with the cheaper power available in the market. As discussed above, not event in one scenario, the utilities will incur any loss. Besides, the utilities would not be required to pay upfront for the procurement of power as envisaged under the CERC MBED consultation paper.

- **Benefit to Generator:** Generator will be paid fixed charges and energy charges as agreed upon in the PPA based on its dispatch through the market. In case the utility does not require the capacity, then the generator may still get the dispatch through the market where other buyers are participating to meet their demand.

- **Benefit to the Overall Market:** The Gross Bidding will bring additional capacity to the Day-ahead Market thereby increasing the liquidity in the market. Enhanced liquidity in the market will lead to further improvement in efficiency and robustness of price discovery. As a matter of fact, Gross Bidding was introduced by Nord Pool in 2011, followed by Japan Electricity Power Exchange (JEPX) in 2017, primarily to enhance liquidity in their spot market. Apart from increase in liquidity, the low-cost generators will also get dispatched before the costlier ones leading to most efficient resource utilisation. Particularly, the generators who are on the margins and distribution utilities find it difficult to schedule such generators and can be scheduled bilaterally through the Gross Bidding mechanism benefiting the utility, generators and the overall market.

Win-Win Proposition for All

Another version of Contract for Difference (CfD) is 'Guaranteed Floor Price based CfD'. In this model, guaranteed floor price is declared for renewable energy projects by government through nodal agencies. The PPA is executed with the generator at the guaranteed price and renewable energy power is scheduled and traded through the Exchange. The sharing of upside gains between generating and distribution utility can be graded and slab based, and downside risk can be fully borne by the utilities. The tenure of the PPA under CfD may be decided by the government as deemed appropriate.

Buyer

Cost Optimisation

Discoms will save power procurement cost by replacement of costlier power with cheap power available

No Loss to Discoms

Discom will not incur any loss & also no additional financial burden to pay upfront by the Discoms

Seller

Higher Dispatchability

Probability of generators getting dispatched will increase with presence of additional buyers in the market

No Change in PPA Conditions

Generators will continue to be paid fixed charge and energy charge as per the long-term PPA

Market

Efficient Price Discovery

Enhance liquidity in Day-Ahead Market will improve efficiency & robustness in price discovery

Efficient Utilisation of Resources

Cheaper generating stations will get dispatched leading to efficient utlisation of resources

Implementation Challenges

There are few implementation challenges associated with Gross bidding like:

- How to participate in gross bidding portfolio when a generator has PPAs with multiple distribution utilities
- How to ensure technical minimum through gross bidding
- Applicability of additional transmission charges & losses due to participation through gross bidding mechanism particularly for intra-state generators etc.

However, these issues are all operational in nature and decision regarding this can be taken by the parties involved taking into consideration their own commercial interests.

Conclusion and Way Forward

The Gross Bidding is easy to implement in the power exchanges with hardly any changes required in the existing regulatory framework. The power exchanges can introduce Gross Bidding by making suitable modification in their business rules subject to approval of Central Commission. The Gross Bidding on a voluntary basis will achieve most of the efficiency related objectives, envisaged by the regulator and policymaker. The gross bidding will enable the generators and distribution utilities having PPAs to participate in the Exchange and schedule their transactions through the Exchange in a competitive market scenario without deviating from their existing PPA terms & conditions, which are of binding in nature. This will enable the utilities to optimise their power purchase cost by replacing expensive power with low-cost power available in the market. Gross Bidding will also bring more liquidity into the market and hence comparatively, it is more efficient and robust price discovery mechanism benefiting the sectors and consumers at large.

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