BEFORE THE CENTRAL ELECTRICITY REGULATORY COMMISSION

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IN THE MATTER OF:

Comments/suggestions on "Regulatory Compliance Application by IEX for introduction of New Bid (Order) Types at the exchange platform"

SUBMISSIONS OF PRAYAS (ENERGY GROUP), Pune

4th June, 2019

The CERC vide public notice dated 15th May 2019, invited comments and suggestions from all stakeholders on the "Regulatory Compliance Application by IEX for introduction of New Bid (Order) Types at the exchange platform." The present submission is in response to the said notice and the *Petition No. 11/RC/2019* by India Energy Exchange (IEX) published thereunder. We request the Commission to accept this submission on record.

1 Approach and perspective

Given the increase in open access and captive consumption, continued dependence on short-term power by DISCOMs, technical and operational constraints of thermal and renewable generation units, the proposal of the IEX is welcome and is a positive step towards broadening and deepening markets.

While new bid orders are needed, many stakeholders seemed to be concerned about the impacts on the clearing price, compared to the existing system with only single and block bids. Further, there are also concerns raised that many of these bid order types are complex to file and process as compared to the current bid orders. Our submission highlights process-related issues in introducing these new bid orders and also notes areas where more clarity is needed. Clarity on certain issues will help consensus building and instill confidence among stakeholders that the robustness of the system will not be compromised.

It is our submission that the introduction of any new bid order should:

- Be done after extensive and intensive public consultation by CERC after taking into account concerns of stakeholders and lessons from international experience
- Be simple to use and understand by buyers and sellers
- Result in options for bidders which are not possible with existing bid orders

- Result in outcomes that are closer to the optimum in terms of price discovery and quantum of electricity being cleared
- Not be simple to game by users of the system
- Not result in adverse outcomes which increases the quantum of real-time settlement and instances of no supply to many buyers
- Result in computationally efficient and timely settlements even in case of iterative processes

2 Need for extensive stakeholder consultations

The stakeholder consultations held by IEX brought out some issues and concerns of specific generators and bilateral traders.

However, the power exchanges are used extensively by distribution companies, open access consumers and captive consumers as well. The participation of generators, especially state-owned generators with unrequisitioned capacity will also increase in the coming years with increased uncertainty in demand, rise in procurement of renewable energy and the potential implementation of gate closure. Even if some of the participation is via traders themselves, the risks and benefits will accrue to these consumers and generators and thus they should be consulted. Further, from the petition, the views of IEX have been made clear but the position of the Power Exchange India Limited (PXIL) is not on record.

Hence, it is essential that CERC ensures in-depth consultation with all these parties. As part of the consultations, the mechanisms, risks and benefits of these new bid orders should be clearly explained, deliberated and to some extent, addressed. This process should take place before any change in CERC regulations and power exchange business rules. Such proceedings will also inform the public consultation process as views and insights from users and beneficiaries of the system will highlight fundamental operational and technical issues, which can be considered for further analysis.

3 Need for draft amendments and public hearings to deliberate changes

Once the consultation process (as proposed above) has been completed by CERC, it is imperative that:

- CERC notifies draft regulations with the proposed amendments along with an explanatory memorandum and a public notice seeking comments from the public.
- The regulations should be amended only after a public hearing on the matter.
- CERC directs both power exchanges to upload the draft amendments to its business rules as well. This draft also should be available for public consultation. All final amendments should

take into cognizance the concerns of the public and should be in line with CERC power market regulations.

4 Sharing minutes and presentations from past meetings

According to IEX petition, the power exchange has conducted and been part of several meetings and presentations deliberating the benefits of introducing new bids orders and also discussing ways and means to operationalise this. In order to ensure informed participation on the issue from various stakeholders, it is suggested that the minutes of the meetings and the presentations referred to in the petition are made available on CERC website in relation to the current process. A list of meetings and presentations referred to in the petition are listed in chronological order in Table 1.

Table 1: List of meetings and presentations referred to by IEX

Date	Meeting or Presentation on
14th June, 2017	CERC meetings with POSOCO to understand issues related to block bids
13th July, 2017	Presentation by S.A. Soman and Rajeev Gajbhiye on "Introduction to Power Exchange"
25th August, 2017	Meetings with IEX by CERC to understand issues related to block bids
7th September, 2017	Presentation on "Advanced Bid Structures" by IIT-B professor S.A. Soman and Dr. Rajeev Gajbhiye to NLDC
27th September, 2017	NLDC presentation on "Discussion of Market Design related to block bids"
May, 2018	Report on "Review of Block Bids at Power Exchanges" submitted by Committee to CERC
19th February and 14th March, 2018	Presentations on "Introduction of new bid order types", based on study of international exchanges at CERC and at NLDC
22nd June, 2018	IEX seminar on introduction of new bid order types to various stakeholders, seeking comments

5 Need to document and share lessons from international experience

Many of the bid orders have been implemented in markets internationally, particularly, Nord Pool Spot[1] and N2EX[2] (Flexi Bids) and OMIE[3] (Minimum Income Condition, Scheduled Stop

[1] Nord Pool Spot is a power market which operates in Norway, Denmark, Sweden, Finland, Estonia, Latvia, Lithuania, Germany and the UK

[2] N2EX is a power market launched by Nord Pool in cooperation with NASDAQ operating in the United Kingdom.

Condition, Load Gradient bids). CERC and IEX should document and share international experience with implementation of these bid orders to inform stakeholders.

In fact, it is interesting to note that several mature power markets have not introduced Minimum Income Condition Bids, Scheduled Stop Conditions and Load Gradient bids. It would also be worthwhile to note the observations by regulators and implementing agencies in these markets as to why these complex bids orders were not adopted as done with OMIE.

As many of these complex bids, especially in OMIE have only been introduced recently, there are not many studies to evaluate its performance and efficacy in the public domain. However, even in the available literature, areas of concern have been highlighted which are detailed below:

Computational and pricing difficulties with complex bid orders: As per Gil et al., (2017)[4], Minimum Income Condition as implemented in OMIE, *"presents a major burden for price formation and compromises transparency and optimality".* Further the paper also highlights computational difficulties in price discovery by stating that:

"Just for the clearing of the MI-orders, the simple market clearing optimisation has to be run hundreds of times in the search for the optimal set of MI-fulfilling generators. To make matters more challenging, the publication of the electricity prices out to the market has to conform to a strict schedule. If the branch-and-cut algorithm has not converged within 20 min of execution, the process has to be stopped. As a consequence, global optimality cannot be guaranteed, distorting the price formation process and bringing important economic implications for all market participants. The solution may become arbitrary as just slight changes in the solution may turn off some generators in favor of others with little economic justification."

The paper also highlights reservations expressed by the European Agency for Cooperation of Energy Regulators (ACER) in 2016 relating to implications of incorporating complex orders to the European Price Coupling Regions. ACER notes that:

"Project parties […] mentioned possible improvements to the algorithm performance […], and trading changes, such as the limitation of complex orders to alleviate the computational difficulty. This topic is of outmost importance for NRAs (National Regulatory Authorities), as they will soon have to decide whether the current solution, including the algorithm, is suitable for the whole of Europe".

[3] OMIE refers to Operador do Mercado Ibérico de Energia which runs the spot power market in the Iberian Peninsula under the Spanish jurisdiction.

[4] In the paper titled "Minimum Income Orders in the European Price Coupling of Regions: Use or abuse?" published in *The Electricity Journal*. For more details, please see: https://www.sciencedirect.com/science/article/pii/S104061901730194X

Koltsaklis and Dagoumas[5], in their 2018 paper also highlight that the inclusion of complex bid order types increase the computational costs and complexity of price discovery in the Day Ahead Market.

Mogyorósi and Divényi[6] in their 2017 paper show that average solution times increased by 93.55 seconds with the implementation of load gradient conditions in a European power exchange. Further, the paper also mentions reduction in social welfare with complex bid orders due to conditions which need to be considered.

Possibility of gaming and adverse risk sharing: Gil et al., (2017) also notes that while the option Minimum Income Condition in the bid order is worthwhile for the generators, implementation difficulties imply that the risks of such an option are being borne by the entire market itself.

The authors of the same paper also note that *"the consistent submission of similar Minimum Income Conditions from different units, even if running on the same fuel, could be an indication of strategic bidding"*.

The authors note low value of participation with Minimum Income Bid orders as opposed to single bid orders in most cases. They also highlight consistent similar Minimum Income Conditions by generators whose fixed costs are different in 25% of the cases in FY15. As this strategy is not to recover fixed costs, the authors surmise that such a bidding strategy could be for other purposes which can impact price formation. Thus the risks seem to outweigh the benefits from the introduction of this order.

The welfare implications as compared to the risks in selection based on the Minimum Income Condition are also discussed in the 2016 paper by Madani and Vyve[7].Koltsaklis and Dagoumas also highlight that there could be significant risk borne by generators with the minimum income condition bid is used by most generators as it could lead to unrealistic outcomes, eliminate flexibility, increase curtailment and potentially increase the burden on the ancillary markets.These issues are also mentioned as potential challenges in Sliecz et al.,(2015)[8].

[5] In the paper titled "Policy Implications of Power Exchanges on Operational Scheduling: Evaluating EUPHEMIA's Market Products in Case of Greece" published in Energies in October 2018. For more details, please see: https://www.mdpi.com/1996-1073/11/10/2715/pdf-vor

[6] In the paper titled ""Improving gradient constraint of complex energy orders on power exchanges," presented at the 14th International Conference on the European Energy Market (EEM), Dresden. For more details: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7981975&isnumber=7981843

[7] In the paper titled, *"Revisiting minimum profit conditions in uniform price day-ahead electricity auctions"* by M. Madani, M. Van Vyve published in the European Journal of Operational Research (2017). For more details, please see: https://www.sciencedirect.com/science/article/abs/pii/S0377221717309372

[8] In the paper titled *"Challenges in the formulation of complex orders on European power exchanges," presented at the 12th International Conference on the European Energy Market (EEM)*, Lisbon For more details, please see: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7216673&isnumber=7216596

6 Lack of clarity on specific issues

There is also lack of clarity on the design and implementation of specific bid orders which we would like to highlight. Notwithstanding any of the issues detailed above, these specific issues are listed in Table 2.

Table 2: Lack of clarity with specific aspects of proposed bid orders

Type of Bid Order	Areas with Lack of clarity
Minimum Quantity Bids	This type of bid order seems very similar to existing parent child bids. Therefore, market participants can use parent child bids itself to limit paradoxical rejection. Thus, the advantage of introducing a new bid order is not clear.
Minimum Income Condition Bid	Clarity is needed on whether the fixed term is part of the bids used for market clearing. If not, in order to enable simple filing of bids, the generator can account for the fixed costs, while specifying the minimum income. This minimum income is nothing but the minimum income term to be specified by the generator, net of the fixed term.
Scheduled Stop Condition	Market clearing with Minimum Income Condition along with Scheduled Stop Conditions would require an iterative process.[9] It is not clear if the current software for bid matching has the computational capability to execute this.
	The Scheduled Stop Condition, in essence accepts the bid of an unsuccessful seller which could impact the clearing price, especially with multiple generators opting for this. It is not clear how the impact on prices will be minimised.
	The number of blocks over which unsuccessful sellers can schedule capacity till it stops is not clear. The number of blocks should be limited by the Power Exchange.
	It is not clear if scheduled stop condition is necessary to aid generators who are at the risk of coming to a full stop in case of rejection. Generators can have multiple strategies to avoid this eventuality by using load gradient bids (as shut down ramp rate can be specified) and also using parent child bids. If it is not necessary, then the utility of introducing a new complex bid order is unclear
Load Gradient Bid	It is not clear if the load gradient condition is the band within which generators have to specify their load gradient bids or ramp rates. If so, it is not clear who these conditions will be specified by and how the standard will be determined. Sellers can simulate ramp rates using a profile block bid as well. It is not clear if there is an additional function which load gradient bids will allow to sellers.

[9] As average price needs to be computed, then compared with conditional simple matching to eliminate bids except where scheduled shutdown condition applies. The algorithm would then have to repeat the process on remaining bids to ensure compliance with the minimum income condition.

It is requested that the Commission and the power exchanges clarifies their position with respect to these matters.

7 Need for simulation studies to assess potential impacts

Many of the stakeholders are of the opinion that the introduction of these new bid orders could influence price discovery significantly. Literature from international experience also points to this possibility. These concerns need to be addressed with sufficient evidence before the regulations are amended to introduce these bid orders.

CERC should commission a study to assess the impact of these new bid orders on:

- Clearing prices based on buy and sell bids in the system over the last three year period. The variation in price between various scenarios (like when the system treats all bids as single bids and when the system clearing is conditional to specifications in the bid orders) can be compared. Extreme cases (where all generators and all bidders opt for one type of bid order) can also be explored in scenarios to ascertain the impact of the following on prices and variations in cleared quantum. The impact on prices when the bid orders are applied during periods of stress should also be covered.
- The quantum of electricity cleared in all these scenarios should be discussed. The study should focus on instances of potential non-clearing of significant capacity which would increase the risk of shortages and the stress on real-time settlement mechanisms.
- The computational capability of existing clearing mechanisms and the time taken to ensure iterative calculations towards market clearing should be assessed.
- The study can also explore potential bidding strategies by generators and buyers which could result in sub-optimal outcomes.
- Outcomes in the system with new bid orders will be subject to the parameterization of specific factors by IEX which would regulate the bidding options. This is necessary for optimal functioning of the system. The study could also test the sensitivity and impacts due to various parameterized factors and limits introduced by the exchanges to arrive at the optimal cut-offs.

Based on the analysis, the study can also recommend measures to address key issues and ensure smooth implementation and introduction of the new bid orders. This study, once finalised should be available for public consultation as part of the current proceedings.

8 Way Forward

The introduction of new bid orders will provide flexibility to generators and increase options to buyers. However, its implementation should take place in a calibrated manner after rigorous

assessment of potential benefits and risks. This is especially important with the growing reliance on the exchanges by various stakeholders.

It is suggested that all new bid orders are not introduced together but in a phase-wise, incremental manner. This will also give market participants enough time to learn about these bids and evolve bidding strategies which lead to optimal system outcomes. Options like flexi-bids seem simple to implement and could go a long way in incentivising utilisation of storage options and participation of captive industries. This can be introduced early on.

However, load gradient bids can be introduced after introducing profile block bids, especially as generators can also use profile block bids to simulate ramp rates. Other options like minimum income condition bids with schedule stops condition should be introduced after assessing potential risks and the progress with simpler bid orders.

Many stakeholders have suggested hybrid bids combining some of the existing bid orders for implementation. It is suggested that these are not considered now but can be deliberated at a later stage after the proposed bid orders are introduced. In addition, to ensure smooth implementation, many of the stakeholder comments with respect to making bid filing easier should be addressed.

With the emerging trends, the electricity sector is at the cusp of a revolution led by new technologies, cheaper supply options and increasing variability. Flexible, broad and robust markets are a crucial part of any reform in the sector. Our comments and suggestions are intended to ensure that these new bid orders are introduced and implemented in such a way that the benefits are maximized and the risks are minimised.

We hope our comments will be considered and we request the commission for the opportunity to present our submissions during the public hearing, which should be part of these proceedings.

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