

Comments and Suggestions on CERC Staff Paper on: Market Based Economic Dispatch of Electricity (MBED): Re-designing of Day-Ahead Market (DAM) in India'

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*Comments and Suggestions by Prayas (Energy Group) in response to CERC staff paper published on CERC web-site for public consultation on 31st December 2018. The paper is available here:
http://www.cercind.gov.in/2018/draft_reg/DP31.pdf*

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CERC staff published a discussion paper 'Market Based Economic Dispatch of Electricity (MBED): Re-designing of Day-Ahead Market (DAM) in India' on the 31st of December for public comments. Given the extent of under-utilised contracted capacity, fragmented electricity markets in India, and the lack of mechanisms to ensure efficient price discovery, the paper proposes a way to ensure economic dispatch of power.

The proposal by the CERC staff, as detailed in the paper provides a broad outline for commercial and economic arrangements for optimal procurement at the national level. A proposal which calls for such a dramatic shift (a year from its implementation) in India's power procurement practice needs to be deliberated and discussed extensively based on multiple studies and considering various perspectives. Further, to ensure robust markets in the future and to move towards capacity markets, there is a need to consider a phase-wise, calibrated approach which focuses on building institutions, ensuring monitoring and tracking to reduce technical and commercial risks as well as gaming possibilities in the market. There are many progressive changes which can be implemented in the current framework with less resistance from power sector utilities.

In this context, Prayas (Energy Group)'s comments and suggestions are given below:

1 Estimation of savings from the proposed arrangement

The objective of ensuring a nation-wide merit-order dispatch which lead to optimization of costs is desirable. The CERC staff has estimated the savings of moving away from self-scheduling to the Market Based Economic Dispatch (MBED) framework proposed by CERC staff to be around 11% for five states for FY17. From the staff paper, it is unclear if certain variables have been accounted for. Uncertainty in this context could imply that the savings could be much lesser than what is estimated. Some examples include:

1.1 Transmission constraints

It is not clear if the modelling simulations account for transmission constraints in the system. Annexure 1 details that the model accounts for transmission congestion charges which it considers to be the same as that in the day-ahead market. However, transmission constraints are managed by self-scheduling DISCOMs and the impact may not fully be accounted for in the DAM congestion charges. If transmission constraints are not adequately accounted for, the actual unrequisitioned capacity as well as the savings could be less.

1.2 Transmission charges and losses

While the model accounts for PoC charges in the procurement cost, it does not account for intra-state transmission charges and losses. Across states, there is a wide variation in the intra-state transmission charges and losses as shown in Table 1.

Table 1: Average Intra-state Transmission losses and charges approved for FY19

Approved for FY19	Rajasthan	Punjab	Maharashtra	Gujarat	Haryana	Andhra Pradesh
Average Transmission charges (Rs/kWh)	0.31	0.22	0.33	0.36	0.36	0.20
Intra-state Transmission losses (%)	3.35%	2.93%	3.30%	3.87%	2.46%	3.95%

Not accounting for the intra-state transmission loss and charges could impact the savings significantly. If the generator is connected to the CTU network, the total transmission costs incurred by the DISCOM will be similar to self-scheduling. However, if the generator is located in the inter-state transmission network of State A and the supply is to a DISCOM in State B, the transmission costs could be much higher due to the transmission losses and charges incurred in State A. These costs can be substantial and thus reduce the estimated savings.

1.3 Comparison with similar simulation studies

National level optimization of cost, based on principles of merit order or economic dispatch has been proposed by POSOCO and MoP during various deliberations. It would also be useful to compare and contrast the parameters and assumptions considered and the estimates arrived at by various agencies as well.

The discussion paper suggests major changes which make sense only if the benefits from such an exercise outweigh the costs and the potential risks. Given the lack of clarity in quantifying benefits, it is difficult to ascertain if such a massive shift in a short span of time is the best way to address issue of optimal scheduling of unutilized capacity. This is especially relevant when the potential risks and the lack of clarity on scheme specific are considered.

Some of these risks are detailed below:

2 Risks to DISCOMs

Such a mechanism will only function if there is buy-in from all DISCOMs and generators to ensure:

- Discovery of cost-optimal outcomes
- Efficient use of existing resources through transparent market-based allocation
- Operationalisation of congestion management and market splitting for large volumes

However, DISCOMs might be reluctant to participant in MBED as this mechanism requires advance payment and settlement of bills unlike their current, more flexible arrangements.

Moreover, the potential risks and ways to manage them need to be articulated clearly and discussed with DISCOMs while deliberating a way forward. Some such risks are detailed below:

2.1 Risk of non-optimal outcome to due transmission cost considerations

In the MBED framework, bids do not include transmission charges. As the bids are simultaneous for a time block and the clearing is at the national level, the source and destination of power flows are not known. Thus, incorporating transmission costs is not an option. These charges are considered separately.

However, not accounting for transmission costs may result in sub-optimal trades for DISCOMs in some instances. This is illustrated in Table 2.

Table 2: Possibility of sub-optimal outcome when transmission charges are not included

Costs (Rs/kWh)	Intra-state Generator 1 (PPA)	Inter-state Generator 2 (MBED-DAM)
Variable cost	3.25	3.0
Market Clearing Price	3.0	3.0
Inter-state transmission charge	N/A	0.4
Intra-state transmission charge	0.3	0.3
Total cost payable at T<>D periphery¹	3.55	3.7

Let us consider a DISCOM A which typically gets its power supply from an intra-state generator, Generator 1 for Rs. 3.25/kWh. However, under the MBED mechanism, when the market clearing price is Rs. 3/kWh, Generator 1 is not scheduled and power is supplied by Generator 2 whose variable cost is less. However, Generator 2 happens to be located out of state and thus the total transmission charges applicable are Rs.0.7/ kWh. The transmission charges payable by the more expensive Generator 1, located in the same state as DISCOM A was only Rs.0.3/kWh. Thus the difference in the transmission cost alone makes the cheaper generator discovered under MBED more expensive for the DISCOM at the T<>D periphery than the contracted Generator 1, which remains unscheduled. The possibility of such outcomes increases the risk of high costs being borne under the mechanism by DISCOMs. The framework should clarify options to address these possibilities and mitigate such risks which would be borne by cash-strapped DISCOMs.

2.2 Risks due to fuel shortages

For MBED to be operational, it is of utmost importance that there are no fuel shortages and there are functional fuel markets. In its absence, DISCOMs will face uncertainty about supply as well as price.

In the face of coal shortages, DISCOMs currently have de facto practices to ensure generation, especially from state generating companies that are based on considerations of optimum use. This optimization may not be considered if the generator's decision making is independent of a specific DISCOM's requirements as in the case of MBED.

¹ This estimation does not include impact of transmission losses and thus is an under-estimate.

Thermal Power Plants declare availability based on fuel availability and the fuel stock they have. When fuel stock is at a critical level (say, to meet 2 days requirement), the generator will continue to report high availability. However, the DISCOM with the view of ensuring fuel availability for a later date with significant demand, (say a festival day) may schedule less in those two days even if the variable cost of the generator is less. Using this flexibility with its contracted generator, DISCOMs are able to use fuel stock optimally in times of high demand. Under the proposed scheme, such decision making is not possible as generators will declare normative availability to ensure fixed cost recovery and generate if they are scheduled. This increases the risk of not getting supply during crucial time-periods for DISCOMs.

2.3 Lack of clarity on treatment of hydro

From the staff paper, it is not clear if hydro-power is included in the MBED mechanism. If included, it not clear how the seasonal/ peaking value of hydro-power will be captured. If hydro-power generators are to incorporate seasonal value of such power in their bidding strategies (by not bidding or bidding very high rates), then DISCOMs which have contracted this low-cost power to meet their seasonal or peaking requirements may be at risk of paying much higher rates or may face the prospect of load shedding. Thus, DISCOMs which have contracted hydro-power or have significant hydro-power allocation may be more hesitant to opt for such a mechanism, increase their exposure to risk and forgo access to capacity reserve to meet peak demand.

Further, it is not clear if the per unit cost of generation will be considered for hydro or only the energy charge computed based on ERC regulations will be considered. If the latter is the case, contracting DISCOMs will have to pay charges even if the hydro-power is not scheduled to cater to their demand. This clarification needs to be made.

2.4 Lack of clarity on risk due to various bidding strategies of generators

The MBED framework assumes that generators will bid based on their marginal, variable cost or their energy charge as per the PPA. In case the market clearing price (MCP) is above the variable charge as per PPA, the generator is scheduled and the difference between the MCP and the variable charge is compensated such that the DISCOMs continues to pay the contracted

variable charge. This scenario is illustrated in Table 3 for Generator 1 and is also discussed in great detail in the staff paper.

The assumption that the generator will always bid close to its energy charge may not hold true and DISCOMs could be subject to risk due to various gaming possibilities. Some are discussed below:

Strategy 1: Generator bids below variable cost and below market clearing price

As shown in Table 3 for Generator 2, if the generator bids below the variable cost and below the market clearing price, the generator will be scheduled but the market clearing price will not be sufficient to recover the variable cost as per the terms of the PPA with the DISCOM. In such a case, it is not clear if the DISCOM will have to compensate the generator in a similar fashion as the previous case to meet the variable cost. Ideally, the cost needs to be borne by the generator which undertook the bidding strategy and not the DISCOM and this should be clarified for both Section 62 and Section 63 to prevent unnecessary litigation.

The clarification on who bears the risk for such bidding strategies needs to be made upfront as it is not impossible for the generator to bid less than the regulated variable charge. In fact, this case could be quite likely for competitively bid projects where the actual variable cost incurred maybe different from the energy or variable charge as per the PPA and contractually, the DISCOM is bound to pay them the variable cost if power is generated.

Strategy 2: Generator bids above variable cost but DISCOM bids at variable cost

As in the example with Generator 3 in Table 3, if the generator bids above the variable charge and the market clearing price, it will not be scheduled. In the same example, if the DISCOM, going with the assumption that generators will bid close to its marginal cost, bids at the variable charge of its contracted capacity, it is likely that its bid will be much lower than the market clearing price. In such a case DISCOM's bid will not clear and it will have to face shortages even through it has contracted capacity with Generator 3 at a variable cost of Rs.3/unit, much lower than the market clearing price. While it's true that the generator will not get scheduled, it is also a fact that the Generator 3 will continue to recover fixed charges. So this would be an ideal strategy to avoid generation for generators whose actual fuel costs are above the PPA variable/

energy charge. This could also be strategy by generators to claim full availability during fuel shortage as described in Section 2.2

The cases and strategies discussed are summarised in Table 3

Table 3: Illustrative example to demonstrate generator bidding strategies

Parameters (Rs./kWh)	Generator 1	Generator 2	Generator 3
Generator bid	3.5	3.5	5
Market clearing price (MCP)	4	3.5	4
Variable charge	3.5	4	2.8
DISCOM bid	3.5	4	3
Result	Generator is scheduled		Generator is not scheduled
	DISCOM buys power at MCP		DISCOM may not get power from market
	DISCOM is compensated with Rs.0.5/kWh under the Bilateral Contract Settlement (BCS) mechanisms.	Not clear if the generator is compensated Rs.0.5/kWh by DISCOM to meet variable charge.	High risk of no supply for DISCOM. Generator continues to get paid fixed costs as per PPA.

Depending on the specific cases, it is likely that Generators can use various bidding strategies to game the system. From the CERC staff paper, it is yet unclear how market monitoring will prevent such gaming possibilities. The proposal should also account for such bidding strategies and suggest mechanisms to address this.

2.5 Lack of clarity on cases where there is post-facto computation of variable charge

In the proposed mechanism, it is not clear how instances of post-facto changes in variable charges will be addressed. This is especially true for dispensation of the various change in law related costs for competitively bid projects. It is not clear if these costs will be borne by the contracted DISCOM or the final buyer of the power. Further, it is not clear how these costs will be considered while implementing the BCS mechanism, i.e. whether they will be factored in the bid quoted by the generators or settled post-facto. This will have significant bearing on market clearing price and scheduling. Additionally, there could be higher risks if some parties consider these costs as part of the bidding strategy while others do not. In order to ensure national cost-optimization of generation scheduling, such ambiguities need to be clarified upfront by

specifying the regulatory framework for dealing with the same. Further, it needs to be also clarified whether the MBED itself will be considered a change in law event or not and what would be the implications of the same.

Risk of increase in purchase cost or load shedding unless DISCOMs are good traders

With the implementation of such a mechanism, DISCOMs which have relied on trading licensees to optimize even short-term procurement for marginal requirements, will have to become good traders themselves to avoid the risk of high costs or load shedding. In the medium-term, this is quite unlikely. The potential risks which DISCOMs have to bear could be substantial and will be exacerbated by poor trading decisions. All these potential risks will most likely be passed onto consumers via cost-plus tariff determination and will not be shared with generators.

3 Participation of open access consumers unclear

It is not clear if DISCOMs are the only buyers on MBED. Open access has been growing in the recent years and is comparable to 20% of HT sales of DISCOMs in many states². Their participation in MBED will make a difference to the market clearing price and their exclusion will be a step towards market fragmentation in India. The details and modalities to ensure their participation also need to be spelled out in the proposed mechanism which includes treatment of open access contracts, scheduling and deviation settlement for embedded open access consumers etc.

4 Comprehensive treatment of legal, regulatory changes required and utility capacity building needs

The commercial design of MBED has been detailed well in the staff paper. However, the amendments required in PPAs, the legal ramifications and the state-level regulatory changes are discussed only briefly. As there is every possibility of increased litigation as well as regulatory risk, the extent of these changes should also be detailed in a more comprehensive manner to aid discussion.

² For more details, please see: <http://www.prayaspune.org/peg/publications/item/377>

In addition, more discussion on the required IT related and commercial capability of the DISCOMs, LDCs, Exchanges, transmission companies and other stakeholders for the MBED would also require further deliberation.

5 Importance of Market Monitoring

The paper has emphasised the need for market monitoring via market surveillance to prevent gaming and market performance assessment to study trends and improve market functioning. CERC should also outline mechanisms which could be instituted to prevent collusion, concentration of market power and gaming. This is especially important as the fuel sector markets are non-functional and the transmission and distribution sector revenue recovery is on a cost-plus basis.

In addition CERC should also constitute a market performance assessment committee consisting of representatives from regulatory commissions, power exchanges, DISCOMs, generators, transmission utilities, power sector experts, academics and load dispatch centres to:

- assess key market-related parameters;
- highlight issues faced by various participants and;
- suggest measures to improve market functioning.

With the size of the electricity market expanding, even without the adoption of MBED, efforts to create institutions for effective market monitoring is a growing necessity and steps need to be taken in this direction.

6 Way forward

While the MBED mechanism requires more analysis, legal and regulatory clarity as well as discussion and deliberation before implementation, some steps can be implemented in the coming years to ensure some optimization and towards building of robust markets.

6.1 More studies to assess potential benefits of optimisation efforts like MBED

As the CERC staff paper highlighted, there is a growing need to ensure optimal use of generation resources at the national level. In the recent years many progressive approaches

have been proposed to address this issue. Some of these include the introduction of Reserves Regulation Ancillary Services, the pilot for Security Constrained Economic Dispatch, the proposal for Real Time Markets and ancillary services etc.

It is still not clear how these multiple efforts, along with MBED will work together. Before adopting a particular mechanism such as MBED to address this issue, there is a need to assess the benefits from such an exercise.

Since the proposed mechanism involves fundamental restructuring which can have long term implications, it is desirable that the benefits estimated by CERC staff are vetted via multiple, independent analyses. To ensure this, the data which is used for the simulation exercise for five states by CERC should be available in the public domain. Further CERC should allow various stakeholders to run independent simulations and assess various possibilities for optimisation. To this end, CERC can also provide relevant information for the next year (FY18) to aid the simulation exercise.

Based on various studies, if the benefits are much lower than estimated by CERC, then the scheme needs to be reconsidered in the face of legal, regulatory changes needed, price/supply risk for DISCOMs and the capacity of current institutions. Given the need for optimization, other alternatives can also be explored.

6.2 Ensure implementation of gate closure

The proposal to introduce gate closure in the Indian power system is important to ensure broadening and deepening of markets, utilise unrequisioned capacity, encourage better forecasting and scheduling practices and ensure functioning of real time markets. To operationalise this, the following steps need to be taken:

- Gate closure should be part of the Indian Electricity Grid Code and the State Grid Codes
- DISCOMs should be encouraged to provide NoCs and forgo their right to recall (guaranteed in PPAs) at least 3 to 1.5 hours before delivery of power, enabling generators to sell unrequisioned power.

6.3 Automatic sale of unrequisioned power on exchanges

With the implementation of gate closure, measures to ensure automatic sale of unrequisioned power can also be tried out. If adequate measures are not taken by generators or the DISCOMs to sell unrequisioned power, steps can be taken to ensure such unrequisioned power is automatically bid on power exchanges after gate closure.

To implement this across DISCOMs, a trader, say PTC, can be appointed as the nodal agency or SPV which acts as an aggregator for unrequisioned capacity. This will enable the agency to ensure effective participation in the market. To facilitate this, DISCOMs which want to participate in the arrangement can sign a standard contract with PTC or the nodal agency allowing it to purchase, sell, bid and schedule unrequisioned capacity after gate closure.

The contracting DISCOMs will continue to pay the fixed costs in such a case. However, revenue from sale of unrequisioned power can be shared between the DISCOM and the generator. The nodal agency can charge a regulated trading margin for its services. To ensure transparency, all trades by the aggregator nodal agency should take place on the power exchanges.

Such a mechanism would go a long way in deepening markets and provide for options to aid flexible power procurement.

6.4 Steps to broaden and deepen trades on DEEP

The Discovery of Efficient Electricity Price (*DEEP*) e-bidding platform to facilitate short-term procurement has been useful for trade of unrequisioned capacity. This platform also allows for longer duration contracts than exchanges, which provides more certainty to DISCOMs and generators. Further, bidding takes place in a transparent manner. Several gains relating to optimising generation scheduling can be realised if DEEP is broadened and deepened. Some easily implementable measures in this respect include:

- Allowing open access and captive consumers to participate in DEEP. The Ministry of Power has already proposed participation of open access consumers via e-bidding

through DEEP in the short-term bidding guidelines.³ It is hoped that this will also be applicable for medium-term bidding in the future.

- Disallowing all bilateral trades other than those facilitated in a transparent manner via power exchanges or DEEP.

It is hoped that along with MBED implementation some of these proposals are also discussed, deliberated and possibly adopted to deepen electricity markets in India.

7 Conclusion

The proposal outlined in the CERC staff paper for Market Based Economic Dispatch needs further analysis especially to ensure:

- a) Estimation of potential savings based on multiple studies
- b) Assessment of potential risks to DISCOMs, Generators and grid users
- c) Detailing of mechanisms to address potential risks
- d) Analysis of legal and institutional changes needed to operationalise mechanism and implications of the same, particularly in the context of:
 - i. Power procurement contracts under Section 62 and Section 63,
 - ii. Role and powers of market monitoring institutions
 - iii. Role of load dispatch centers
 - iv. Capacity which needs to be built within DISCOMs, ERCs, LDCs, transmission companies and state owned generators to ensure effective market functioning

The changes proposed in the paper are fundamental changes with significant ramifications on sector operations. Thus, they need to be implemented cautiously and would require time for implementation.

However, in the meanwhile, there are several steps that can be implemented which require limited legal and institutional changes but could be effective in addressing some of the issues highlighted in the paper. Some of these steps include:

³ As per the Draft Guidelines for short-term sale of power by power generating company and distribution licensees through tariff-based bidding process published for comments on 6th March, 2019. For more details, please see: https://powermin.nic.in/sites/default/files/webform/notices/Draft_guidelines_for_short_term_Sale_of_Power_by_Power_Generating_company.pdf

- Implementing gate closure
- Instituting mechanisms to ensure automatic sale of unrequisioned power in the existing Day-Ahead and Term-Ahead Markets in the Power Exchanges
- Creating a nodal trading agency for the sale of unrequisioned power
- Broadening and deepening the scope of transparent, bilateral, short-term and medium-term trades of DEEP.

Implementing these steps would enable a concrete move towards broadening and deepening of markets and would be a major step towards realising efficiency gains by more optimum scheduling. These steps would also prepare sector institutions and actors including ERCs, DISCOMs, Generators, Power Exchanges and even consumers for further market-based reforms.

Using these steps in the intervening period while the MBED approach is being deliberated would also avoid loss of many crucial years in moving towards market based operations and improving efficiency. Thus, urgent action on the issues listed above is imperative.

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