

CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Real-Time Markets for Electricity

Explanatory Memorandum

1. Background

1.1. A discussion paper on ‘Re-Designing the Real-Time Electricity Markets in India’ was published in the CERC website on 25th July 2018 inviting comments/suggestions. Highlights of the discussion paper are as under:

- At present, real time ‘energy’ imbalances as well as inadvertent ‘system imbalance’ are primarily managed through Deviation Settlement Mechanism / Ancillary Services mechanism, and partly through rescheduling and intra-day market in the power exchanges. However, the practice of dependence on DSM for real time ‘energy’ poses a challenge to grid security.
- Accordingly, the discussion paper proposed a clear demarcation between ‘energy trade’ and ‘system imbalance’ management, by creating the framework of real time energy market. The intent was to provide the market players an organized platform for energy trade closer to real time.
- An hourly market based on double sided closed auction with uniform clearing price, was proposed for real time. This is in contrast to the existing practice of continuous trade in the intra-day market segment.
- Another important feature was the proposition for the introduction of gate closure. Gate closure implies the closure of the gate for trading in real-time market after which the bids submitted to the Power Exchange cannot be modified for a

specified delivery period. This was considered necessary to bring in the desired firmness in schedule and market transaction in real time.

1.2. In response to the paper, 21 stakeholders including POSOCO, Power Exchanges, Trading Licenses, IPPs, State Utilities, State LDCs, Generators and Consultancies submitted their comments. The list of stakeholders is provided in the **Annexure-I**.

1.3. From the comments received, it is observed that the stakeholders have in principle appreciated the concept of Real-Time Market to cater to real-time energy needs, as also to integrate the intermittent renewable energy into the grid. At the same time, however concerns have also been raised over implementation and procedural aspects of real time market vis-à-vis the existing regulatory framework.

1.4. The need for real-time market was also reiterated by the stakeholders in the context of 4th and 5th amendments to DSM Regulations, wherein it was argued that a market framework for energy trade close to real time should be brought in at the earliest.

1.5. In this backdrop, the Commission has decided to create the necessary regulatory framework for implementation of real-time market for electricity.

2. Proposed Real-Time Market (RTM) for Electricity

The Commission after due consideration of the proposal in the discussion paper and the comments received thereon proposes the Real-Time Market design as under:

- Real Time Market will be a half hourly market (as against the proposal in the discussion paper for an hourly market)

- Price discovery mechanism will be double sided closed auction with uniform price.
- The concept of gate closure is proposed to be introduced, with timeline in consonance with half hourly market.
- Buyers/sellers would have the option of placing buy/sell bids for each fifteen minute time block in the half hourly real time market. The generators having long-term contract and participating in this market will be required to share the net gains (after accounting for the energy charge) with the discoms in the ratio of 50:50 as per the stipulation of the Tariff Policy, 2016.
- RTM would be financially and physically binding. If the utilities fail to follow the dispatch instruction post RTM, it will attract charges under Deviation Settlement Mechanism.

3 Proposed amendments

To implement the Real Time Market as proposed above, the amendments to regulations such as Power Market regulations, Indian Electricity Grid Code (IEGC) Regulations, and Open Access in inter-state transmission regulations are proposed on the following lines:

3.1 Introduction of Gate Closure and Real time market

3.1.1 The Commission notes that the stakeholders have largely appreciated the need for introduction of gate-closure to ensure the firmness of the day-ahead schedules. Some stakeholders requested for clarification on applicability of Gate Closure in reference to various types of contracts viz. long term and medium Term (LTA/MTOA), short-term. Some others requested for clarity on the provision of right to revision of schedule upon the implementation of gate closure and the

timelines for the same. Some of them felt that the implementation of gate-closure for long-term contracted generators may be unfair to Discoms who are paying fixed costs to those generators but cannot rely upon their services in real time. Concerns have been raised that the load serving entity would be forced to procure the potentially expensive power from the Real-Time Market while their own contracted generation would not be available to them. Some of them requested that the interface between day-ahead schedules and gate closure is to be clearly brought out to avoid ambiguities and ensure that financial commitments under day-ahead schedules are adhered to while actualizing gate closure operations.

3.1.2 Some stakeholders have also suggested for longer time line for gate closure to ensure scheduling, dispatch and market settlement. Similarly, comments have been received requesting to keep the opportunity for revisions for generators in case of forced outages as per the existing regulations. On the contrary, a few stakeholders suggested that the timeline of the proposed gate closure be kept uniform across the participants even in the event of forced outage. Stakeholders have also argued for and against the continuance of the existing intra-day products such as intra-day bilateral contingency transactions in the power exchanges. Stakeholders feel that multiple intra-day products and markets shall lead to more confusion and they can be discontinued.

Commission's View

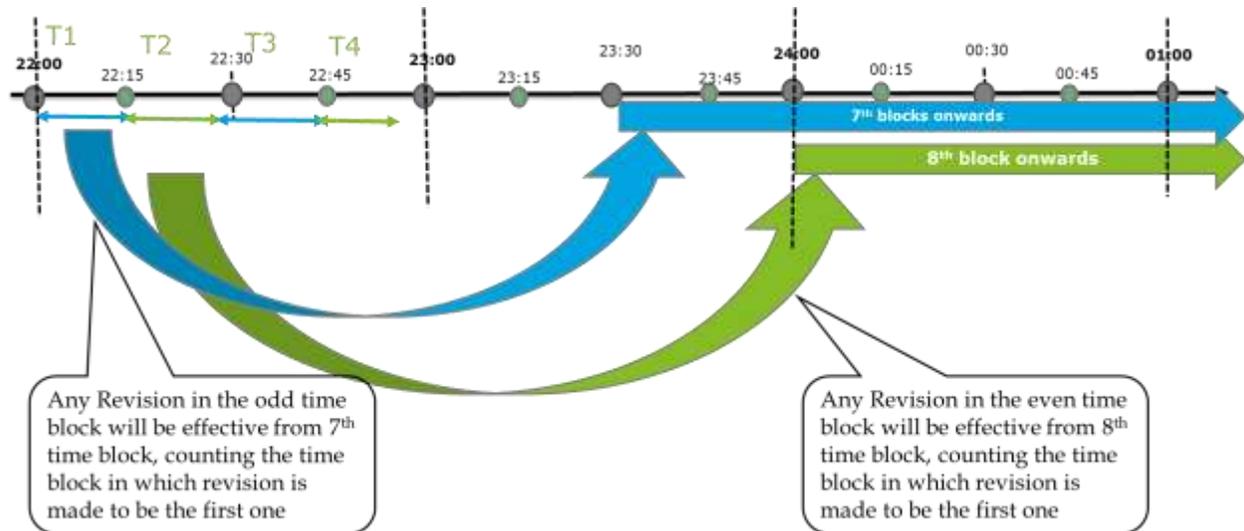
3.1.3 The Commission considered the comments and suggestions from different stakeholders with respect to timeline of gate closure both from the perspective of the utility and the system operator and market operator. The Commission after due consideration of the concerns raised in this context has decided to create the Real Time Market framework with 'half hourly' market as against the proposal in the

discussion paper for an hourly market. This will imply that right to revision of schedule will be available up to seven/eight time blocks before the actual delivery of power. The concept of gate closure is proposed to be introduced with timeline in consonance with half hourly market.

3.1.4 The proposed Real Time Market would not only provide discoms an alternate mechanism to access larger market at competitive price but would also allow the generators to participate in the RTM with their un-requisitioned capacity. 'Right to recall' is nothing but a product in the electricity market continuum. When the application window for one product expires, window for another product opens. The proposed timeline would also provide sufficient time to the system operator to carry out the entire process of scheduling and dispatch.

3.1.5 The provision of right to revision of schedule would still be available to the discom and the generator, and could be exercised by them until the real time market for specified half an hour commences. Any requirement of power after the end of right to revision of schedule should be met through the Real-Time Market at the real-time price. It is proposed that any revision in schedule made in odd time blocks shall become effective from 7th time block onwards, and any revision in schedule made in even time blocks shall become effective from 8th time block onwards, counting the time block in which the request for revision has been received to be the first one. In other words, once the real time market commences for any specific half-hour delivery period, the revision in schedule for that half-hour (two time blocks) shall not be permitted. However, the right to revision of schedule for the remaining time blocks of the day for which the RTM is yet to commence, would still be available with the discom and the generator.

3.1.6 A schematic representation of the proposed changes to the right to revision of schedule is given below:



3.1.7 As explained in the figure above, the revision in schedule made in any odd time block (T₁, i.e. from time block 2200 - 2215 Hrs.) shall be effective from 7th time block, i.e. 2330-2345 Hrs. onwards. Further, any revision in schedule made in the immediate next time block (even time block) i.e. T₂, shall be effective from 8th time block i.e. 2400-0015 Hrs. onwards.

3.1.8 With Real Time Market in place, the discoms would have a revolving reserve available in the form of half hourly trading opportunity. This would provide the discoms a multi-lateral platform to meet their real time energy needs vis-à-vis the one-to-one bilateral contract based price under the existing system of right to revision of schedule.

3.1.9 As regards the continuation of the existing intra-day market, the Commission is of the view that this market product may continue in its existing format, as participation in RTM is just another product and the market participants

should be left with their choice to traverse between different market products based on their requirement.

3.1.10 Existing intra-day segment of power exchange would continue to clear the continuous transactions except for the time blocks for which the real-time market operates.

3.1.11 All generators connected to the grid will be able to participate in the Real Time Market. In case of forced outages the generator can participate in the Real Time Market and buy power for the beneficiary to honor its commitment.

Proposed Amendments

3.1.12 In view of the above, the Commission proposes to amend clauses 6.5.4 (a), (b) & (c), 6.5.18, 6.5.18(A), 6.5.19, 6.5.19 (A) of the Indian Electricity Grid Code Regulations, 2010. Further, clauses 2(i)(o), 4(iii) of Power Market Regulations, 2010 and clause 2(i)(g-a) of Open Access in inter-state transmission, Regulations, 2008 are also proposed to be amended.

3.1.13 In addition, the Commission proposes to add new clauses: 2(i)(n-a), 2(i)(cc-a), 2(i)(cc-b), 2(i)(e-a), 2(i)(j-a) and 2(i)(e-b) to the Power Market Regulations, 2010. Similarly, clause 2(1) (m-a) is proposed to be added to the open Access Regulations, 2008.

3.2 Time line for Real-Time Market

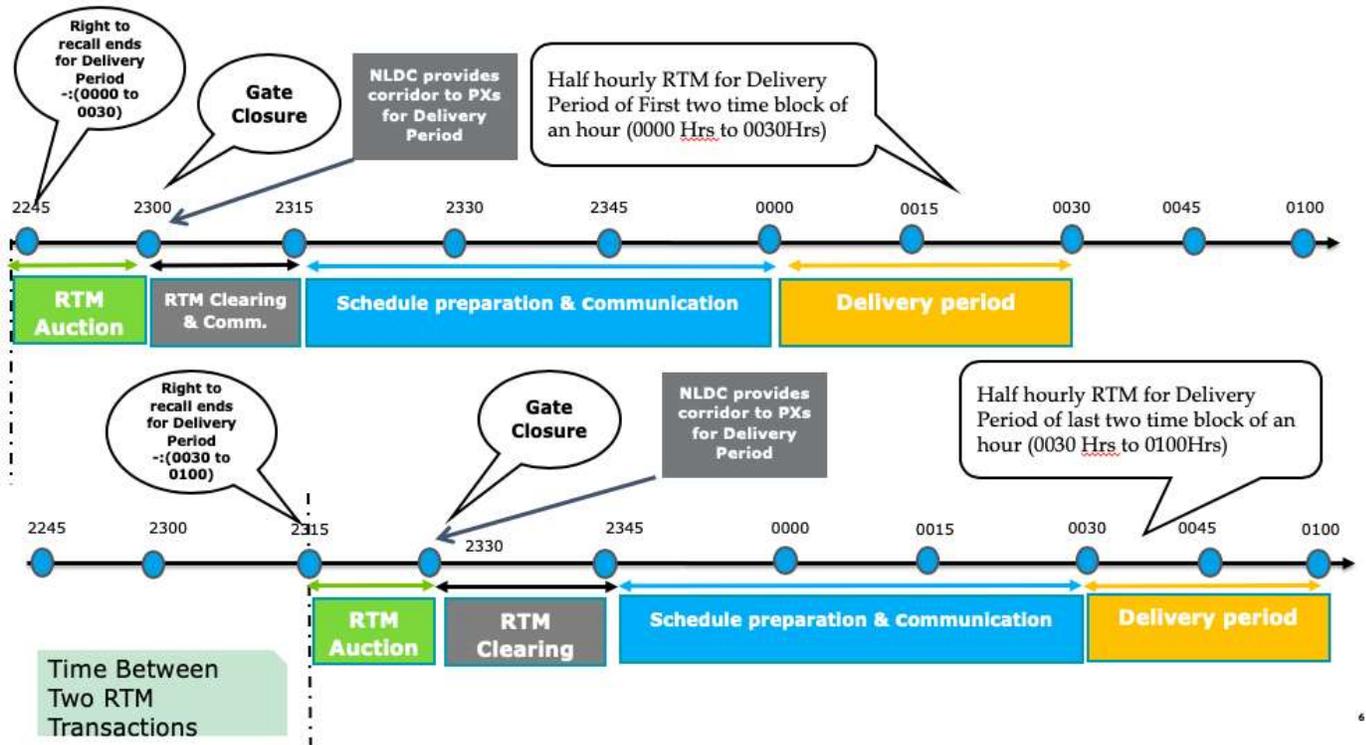
3.2.1 Several stakeholders have requested for more details on the procedure and some of them have requested more time for incorporating the revised schedules and preparation for dispatch. A few stakeholders argued that after the preparation of schedule in the RTM, there should be at least 30 minutes gap before the start of

the delivery of power. Suggestions have also been made to implement National Open Access Registry (NOAR).

Commission's View

3.2.2 The real time market shall be conducted every half an hour for the delivery of power for the duration of 30 minutes in two time blocks of 15 minutes each. NLDC has already evinced its capability to clear the scheduling and dispatch within 30 minutes while implementing the pilot on Security Constrained Economic Despatch (SCED). With the implementation of National Open Access Registry (NOAR) the process is expected to be further streamlined. The energy trade for the first half an hour (00.00 Hrs. to 00.30 Hrs.) of the day would start at 22.45 Hrs. of the previous day and would be repeated every half an hour thereafter.

3.2.3 The Real-Time Market commences with the end of the right to revision of schedule or declared capability and ends with gate closure. Gate Closure refers to the time after which bids submitted to the Power exchange cannot be modified. A schematic representation for the same is given below.



3.2.4 As depicted in the above figure, the Timeline in the RTM would be as follows:

- All the entities participating in the Real-Time Market i.e. after the right to revision of schedule or declared capability ends for a specified half an hour may place their bids and offers in the Power Exchanges for purchase and sale of power.
- The window for trade in Real-Time Market for day (D_0) shall open from 2245 hrs to 2300 hrs of ($D-1$) for the delivery of power for the first two time blocks of (D_0) i.e. 0000 hrs to 0030 hrs, and will be repeated every half an hour thereafter.

- The NLDC shall assess and communicate the margin in each transmission corridor before the trading for RTM closes for a specified duration that will be available for delivery period in RTM transactions (say by end of 2300 hrs for delivery of power between 0000 hrs to 0030hrs). The allocation of transmission corridor between the power exchanges for real time transactions could be in the ratio of their shares in the cleared volumes in the day ahead market subject to a minimum of 10% of the available capacity to the power exchange having smaller share; or based on such methodology to be decided by the Commission by way of an Order.
- Once the auction has ended, the power exchange shall run the optimization/engine and clear the market considering the available transmission margins (say by 23:15 Hrs.).
- The power exchange shall immediately communicate to the NLDC the cleared transaction/volume. The NLDC, using this information will communicate the schedule to the RLDCs/SLDCs to incorporate in the schedule. These schedules will be communicated to the respective RLDCs and SLDCs. The LDCs shall in turn incorporate the schedules and inform the respective generators and discoms.
- The bids cleared will be financially and physically binding for the delivery period.

3.2.5 The complete timeline for scheduling of transaction in Real Time Market would be as follows:

RTM Auction Start Time	RTM Auction End Time	RTM Clearing Interval	Communication of Schedule to NLDC/RLDCs / SLDCs	Final Schedule Preparation	Preparation time for despatch	Delivery Period (Delivery on the Same Day, MCP and MCV will be discovered for each 15-minute block)
22:45 Hrs (of the previous day)	23:00 Hrs (of the previous day)	23:00 Hrs – 23:15 Hrs (of the previous day)	23:15 Hrs – 23:30 Hrs (of the previous day)	23:30 Hrs – 23:45 Hrs	23:45 Hrs – 24:00 Hrs	00:00:00 – 00:30:00
23:15 Hrs (of the previous day)	23:30 Hrs (of the previous day)	23:30 Hrs – 23:45 Hrs of the previous day	23:45 Hrs – 00:00 Hrs (of the previous day)	00:00 Hrs – 00:15 Hrs	00:15 Hrs – 00:30 Hrs	00:30:00 – 01:00:00
...						
07:45 Hrs	08:00 Hrs	08:00 Hrs – 08:015 Hrs)	08:15 Hrs – 08:30 Hrs	08:30 Hrs – 08:45 Hrs	08:45 Hrs – 09:00 Hrs	08:30:00 – 09:00:00
...						
20:45Hrs	21:00Hrs	21:00 Hrs – 21:15 Hrs	21:15 Hrs – 21:30 Hrs	21:30 Hrs – 21:45 Hrs	21:45 Hrs – 22:00 Hrs	22:00:00 – 22:30:00

3.2.6 The NLDC would prepare detailed procedures for collective transactions under RTM in line with the outline specified in the Regulations. The charges applicable for the participants would be specified in relevant byelaws and rules of the power exchanges accordingly.

Proposed Amendments

3.2.7 Accordingly, amendments have been proposed to clause 6.5.5 of Indian Electricity grid Code Regulations, 2010. Further new clauses 13(B) to the Open

Access in inter-state Regulations, 2008 and 6.5.5(a) to the Indian Electricity Grid Code Regulations, 2010 have been proposed to be added to the existing regulations.

3.3 Sharing and Settlement in Real time market

3.3.1 Some stakeholders have suggested that the sharing of additional revenue by the generator must be on pro-rata basis in case the generator has more than one beneficiary. Some stakeholders have also suggested linking the DSM price vector to the real-time prices discovered in the exchange. Stakeholders have suggested creating liquidity in the real-time market only through surplus merchant capacity and not with long-term contracted capacity. Some stakeholders have also sought clarification regarding treatment of Deviation in RTM and participation of Renewable Energy Generators.

Commission's View

3.3.2 RTM is an energy only market and as such the participation in this market is around the variable or marginal cost. In the event of a generator having long-term PPA with a discom and earning revenue over and above the regulated variable cost, the gain shall be shared in the ratio of 50: 50 with the beneficiary as per the stipulation in the Tariff Policy, 2016.

3.3.3 Regarding the suggestion to link the DSM prices with the RTM prices, the Commission has already indicated in the 4th Amendment to DSM Regulations to link the DSM prices with the RTM prices as and when it comes into effect. Further, the Commission is of the view that the real time market shall not be restricted to only merchant or renewable generators instead all the unrequisioned

capacity available in the country should be brought to the RTM platform to ensure that the real-time energy needs are met at least cost.

3.3.4 As regards the treatment of deviation, the Commission proposes to treat conventional and non-conventional sources of power participating in the RTM as per the existing DSM Regulations.

Proposed amendments

3.3.5 Accordingly, the Commission proposes to amend clause 11, 11(A) (ii) of the Power Market Regulations, 2010 and clause 6.5(A)(c) of Indian Electricity Grid Code Regulations, 2010. Further, amendment to clause 20(1) of Open Access in inter-state transmission Regulations, 2008 has been proposed. Similarly, new clause 6.5.7(iii) is proposed to be added to the Indian Electricity Grid Code Regulations, 2010.

3.4 To summarize, the Commission has proposed amendments to the following regulations to implement the real time market framework and solicits comments of stakeholders:-

- Power Market regulations, 2010
- Indian Electricity Grid Code (IEGC), Regulations, 2010 and
- Open Access in inter-state transmission Regulations, 2008