File No. 23/16/2020-R&R
Government of India
Ministry of Power

Shram Shakti Bhawan, Rafi Marg
New Delhi, 24th March, 2021

To
1. Secretary, CERC, New Delhi
2. CMD, POSOCO, New Delhi.
3. CMD, IEX LTD New Delhi &MD/CEO, PXIL , Mumbai

Subject: Development of Integrated Day Ahead Market (DAM) in Power Exchange with separate price formation for RE Power and Conventional Power -Reg

Our nation has been witnessing a remarkable transformation towards sustainable energy economy with increasing share of clean and green energy in its energy mix. The introduction of Green Term Ahead Market (GTAM) on the Power Exchanges following the recent CERC order is a significant milestone which facilitates accomplishing green targets as well as support integration of green energy in a most efficient and transparent manner

2. Further, with the aim to have multiple options for market participants in renewable energy, which will be competing against each other, it has been decided to introduce integrated Day Ahead Market (DAM) in Power Exchange with separate price formation for RE power and Conventional power.

3. In this regard, a detailed Note on the subject "**Development of Integrated Day Ahead Market (DAM)** in Power Exchange with separate price formation for RE Power and Conventional Power " is enclosed for necessary action. This is to be launched at the earliest and preferably before 30.06.2021.

4. This issues with the approval of Hon'ble Minister of State (I/C) for Power, New & Renewable Energy.

Yours faithfully,

Encl:- As above

24/3/2021

(Ghanshyam Prasad)
Joint Secretary to the Govt. of India
Tel: 2371 0389

Copy to:-
1. Secretary, MNRE, New Delhi
2. Chairperson, Central Electricity Authority, New Delhi
3. Secretary(Power), JS(RR & OM) Ministry of Power

Development of Integrated Day Ahead Market (DAM) in Power Exchange with separate price formation for RE Power and Conventional Power

1. Background:

1.1. The installed generation capacity from Renewable energy sources is around 92.6 Giga Watt (GW) i.e. 24.5 % of the total installed generation capacity of around 377 GW. The growth in generation capacity addition from renewable energy sources has been more than 20% during last few years. The target is to achieve 175 GW by 2022 and go up to around 450 GW by 2030. The massive addition in this segment comes up with challenges like need for stronger electricity grid to meet the balancing requirements, steep ramp up and ramp down capability, accuracy of forecasting and scheduling of the availability of RE sources etc. The most important is to maintain the perfect balance of demand and supply in the grid and also meet the target reduction in carbon emission.

1.2. The regime of power purchase agreements for long term is being replaced by medium term, short term, day ahead, intraday and real time market. The day is divided into 96 time blocks of 15 minutes each and the requirement and supply is being planned and executed to this granular level. The effort is also on to further fine tune it to 5 minute time block. This is necessary as the accuracy of predictability is much higher in smaller time frame and also these mechanisms enable one to meet their last moment requirements from the grid keeping the grid safe.

1.3. Power Exchanges are presently operating Term Ahead Market (TAM), Green-TAM, Day Ahead Market (DAM), Intraday market and RTM in electricity segment. The electricity volume being traded in power exchanges is around 5.5 % of total energy consumption in the grid. The Power Exchanges have provided flexibility to participants by offering diversified products to trade in electricity starting real time market in intra-day, day-ahead and week-ahead contracts. In addition to electricity, exchanges also operate Renewable Energy Certificate (REC) and Energy Saving Certificates (ESCERTs) Markets. Through REC Markets, exchanges facilitate sale of RECs by renewable energy generators. This helps obligated entities in meeting Renewable Purchase Obligation (RPO).

2. Benefits of RE trade through Power Exchange:

2.1. **Investment signal for RE sector**: The tariff mechanism of renewables has transitioned from cost-plus (FIT) regime to competitive regime. Earlier, the tariffs were decided by the appropriate Electricity Regulatory Commission. The competitive regime has seen major fall in the price of renewable energy. It is believed that more efficient price discovery may be achieved by allowing larger competition over the power exchanges and such market mechanism will also provide signals for much needed investment in RE sector.

2.2. **Ensuring payment to the generator**: Nonpayment of dues by the Discoms is one of the biggest problems being faced by the RE developers. The RE sector is becoming unviable and the investment is drying up. Some measures have been taken to ensure

payment through payment security mechanisms. However, effort should be made to streamline the cash flow of the stakeholders. In power exchange, the payment is made by the buyer before trade is scheduled and seller receives the payment on completion of delivery. Hence it is a robust system of ensuring payment to the participating RE Generators on power exchanges and hence eliminates any possibility of non-payment of dues by the buyers to the RE developers.

2.3. **Unlocking untapped RE potential**: Renewable energy generators have an immense opportunity to consider commercial ways to sell energy through exchange at competitively delivered market prices, beyond the conventional PPA and REC framework. Opening new avenues for the renewable generators to sell their power has now become a glaring need for the generators. It is believed that by providing market support to RE generators, significant untapped RE potential can be unlocked and made available in the market on financially viable terms.

2.4. **Options to meet the RPO at any time from the market**: At present the RE is being mostly sold through power purchase agreement (PPA) regime. Thus, if a Discom or the obligated entity wants to meet the RPO, there is no option to buy RE power from the market for meeting RPO. As a result, the Discom buys REC or ends up paying penalty. But some of the Discoms have preference to buy actual renewable energy rather than REC, some are even facing questions from auditors as to why they have not been able to buy renewable energy itself in place of RECs. Thus, the Generation capacity not tied to PPA is required to be made available in the market (power exchanges) so that the obligated entities are able to buy RE power at competitive prices and meet their RPO.

2.5. **Reduction in curtailment of power:**RE has the benefit of must run. As the share of RE is increasing, on a number of occasions RE is getting curtailed due to some constraint or the other. Many a times it is difficult to establish whether the curtailment is actually due to technical constraint or not. It is being observed that few Discoms or State Load Dispatch Centres (SLDC) are not honoring the must run status of RE, thus, leading to conflict and also curtailment of RE. Such curtailment can be avoided by using the market platforms (power exchanges) or at least the burden of compensation to be paid by the Discoms can be reduced through the market based mechanisms. The RE generators should therefore be allowed to sell their curtailed power, if any, in the market, with mutual consent of the PPA holder.

Since RE variable cost is negligible, they can bid at a competitive rate or can also be a price taker in the power exchange. Thus, the power will not be curtailed and the RE generator will be able to recover their cost and also the Discoms will not be burdened to draw excess RE power and relieved of the liability of paying compensation even if the power is not drawn by them. It would also give an opportunity to other buyers to meet their RPO. With this mechanism, the liquidity of RE power would increase immediately in the power market.

2.6. **Mitigating the price risk of Discoms in purchasing through long term PPAs:** In the recent past, it has been observed that due to changes in the price of different bids at different time of the year, Discoms who have tied the renewable energy through

PPA at high tariff are finding it difficult to honour the PPA and draw such power. In case the next bid is at lower tariff, Discoms either donot go ahead with previous bids or tries to cancel the PPA or renegotiate the PPA. If the RE purchase is through power exchanges, all such concerns would get addressed as the price in power exchange would be discovered competitively for each time block and the tariff risk is only for a limited period with a choice of Discom to buy appropriately, at a competitively discovered price.

3. Option for RE Trade on Power Exchanges:

3.1. Existing Market:

3.1.1. Renewable Energy Certificate (REC) Mechanism:

In the REC Mechanism, the green power produced by RE Generators is unbundled in two components, grey power and green attributes. The RE Generators can sell grey power @ APPC (Average Pooled Power Cost) to incumbent Discom or to third party at mutually decided price or at Power Exchange. For green attribute, they are eligible for issuance of RECs. One REC is equivalent to green attributes from 1MWh of power generation. RECs are issued by National Load Despatch Centre (NLDC) against the green component of RE Generation. CERC have put in place complete regulations and procedure to ensure that genuine RE generators are accredited and registered with NLDC and once they generate, then based on certification by relevant SLDC, RECs are issued on monthly basis. These RECs can be sold in the exchanges in monthly trade sessions being held last Wednesday of the month. RECs are exclusively traded on the Exchanges. Obligated entities can fulfill their RPOs by purchasing RECs through Exchanges. These RECs once traded, are extinguishable. For trading purpose, CERC determines Floor and Forbearance price separate for Solar and Non-Solar category. At present there is no floor but the forbearance price is Rs 1000/REC for both Solar and Non-Solar. At present total capacity registered in this mechanism is 4537MW. Around 89 Lakh RECs were traded in FY 20 worth ~ Rs.1600 Cr. (At present there is stay by APTEL on trading of REC on the petition was filed wrt the floor and forbearance price.)

3.1.2. Electricity Markets on Power Exchanges:

RE Generator can also sell its power in the present Day Ahead Market or Term Ahead Markets and also G-TAM. In DAM, they can place its bids between market hours i.e. 10 am to 12 noon and the generator can claim number of RECs equivalent to cleared volume of renewable energy. Since it is a collective transaction, no revisions are allowed. 75 Million Units (MUs) RE Power has been sold in DAM in IEX in FY 2019-20.

RE Generators also have option to sell its power in the G-TAM Segment. The RE Generator may claim RECs against power sold in this market. No revisions are allowed.

3.2. Proposed Markets:

Proposed market structure should allow the buyer to get RPO credit by directly buying green power from the exchange at the same time there is a need to integrate Renewable and Grey power into the grid, and therefore it is preferable to keep both these segments together in the market as well. Some market participants aspire to buy renewable power rather than RECs, and therefore there is a need to identify the transactions which are purely between suppliers and buyers of renewable power. Therefore, while choosing a market structure, the twin objectives are to be met, to maintain a single market structure for renewable and conventional and also to clearly identify transactions on the yard stick of renewable and conventional. Further India has adopted multi (power) exchange model, and therefore above objectives need to be achieved within the constraint of multiple power exchange scenario. Suggestions to achieve these objectives are described hereunder.

3.2.1. Separate Green Day Ahead Market (G-DAM):

Green - Day Ahead Market to operate just before a current day ahead market along with separate products for type of renewable i.e. Solar, Non-Solar, Hydro, would not only separate the conventional day ahead market from renewable market but also fragment it into separate categories by type of renewable generation. This therefore is not suitable if we want to create an integrated market for electricity although there could be provision to allow bidders to participate in the subsequent day ahead market, however this transition would be a pain for the participants as well as for the agencies involved in the process i.e. Exchanges and System operators.

Further this option does not address the constraint of multi exchange scenario as there would be different price signals emerging from different exchanges and the volume of trade also get shared between the exchanges. As such integration would not happen in this sense as well.

Not recommended.

3.2.2. Integrated Day Ahead Market with separate price formation for Renewable and Conventional :

3.2.2.1. In the existing Day Ahead Market, participants of RE as well as conventional power can participate and submit their bids in two parts, that is quantity they would be willing to buy or sell, as renewable or conventional. Sellers who would be allowed to sell under renewable segment must be pre-certified through a process similar to certification process of the REC market. Participants should have option to choose if they would like to add unselected quantity under renewable segment to the quantity required under conventional. Bidders can be given option to have different prices for the renewable generation offered and different price when unselected part of the renewable bid is to be transferred to

the conventional segment. Thus, there would be clear identification of bids and offers under renewable and conventional segments.

3.2.2.2. To avoid multiple prices from different exchanges for renewable and conventional power, coupling of exchanges should be adopted. For this purpose, a new entity, Market Coupling Operator, need to be created, which should be an independent entity. This entity would receive bids from all exchanges and clear them together. This entity can be POSOCO which can function as market coupler. However, at present, we may go ahead without market coupling.

3.2.2.3. The entire set of bids can then be cleared one after another. First renewable bids would be matched with renewable offers, taking into consideration availability of transmission for the quantities selected. Once a final result for renewable segment is derived, this set of selected bids would be scheduled. All quantities transacted under this segment would be considered for meeting RPO compliance of the buyer.

3.2.2.4. Depending upon the choice of the bidders, unselected quantities from renewable segment, shall be transferred to the conventional segment. This segment would also be cleared considering availability of transmission, net of what has been allocated under first segment. To start with the counter flow in the transmission system, between conventional and renewables sets of transactions would not be netted off, however later on, once the process gets stabilized, netting of counter flow between these segments can also be considered.

3.2.2.5. The renewable generation not selected in the renewable segment but selected in the conventional segment shall be entitled for issuance of RECs. Please note the difference in allocating advantage of green component of energy, in first case it goes to the buyer (to account for this quantity towards RPO compliance of buyers), where as in second case it goes to the seller (in terms of issuance of REC) and therefore there should be a possibility to transfer unselected quantity in the renewable segment to conventional segment at a different price as per the bidders' choice.

3.2.2.6. Final schedules of both the segments can be settled (from payment perspective) together with two separate settlement statements for each participant, clearly identifying renewable and conventional part of quantities selected.

3.2.2.7. **Advantages of such system would be as under:**

- Participants can clearly identify that they have actually purchased renewable power from the exchange.
- Possibility to transfer unselected bids and offers from renewable segment to conventional segment would ensure that though two segments are not being cleared together, however because of this transfer of unselected bids these segments would get integrated.
- As all this can be achieved in a single process, allocating available transmission capacity first to the renewable segment and then to the conventional segment, the process can be managed in the existing timelines. At a later date, counter flows of the two segments can be netted off to achieve better outcomes.

- Participants would need to be trained to use both segments effectively while submitting their bids, other than this there would not be any change in the bidding, clearing and settlement process.
- As it is proposed to implement this process along with market coupling between exchanges, the Market Clearing Operator (entity responsible for common clearing) can get necessary algorithm built in. Existing exchanges need to change the bid structure and establish a communication channel to and from the Market Coupling Operator, POSOCO. (This may be kept on hold for the time being.)

3.3. Enablers required for proposed Green Market:

3.3.1. Variations management through RTM:

Since revisions are not allowed for participants in the day ahead market, to enable RE sellers to manage their variations, the RE Sellers also need to be allowed to buy from RTM.

3.3.2. Waiver of Inter-State Transmission Charge for G-DAM transactions as per GOI policy.

4. Scheme of implementation of Integrated Day Ahead Market (DAM) in Power Exchange with separate price formation for RE Power and Conventional Power

i. To have Integrated Market in Day Ahead Market (DAM) in Power Exchange with separate price formation for RE Power and Conventional Power as per para 3.2.2 above. Power Exchanges and POSOCO to take necessary action to modify the software etc.

ii. RPO obligation shall be proportionate RPO based on the proportion of the solar and non-solar bids of the seller's cleared bid volume in each time block.

iii. The implementation of integrated market for renewable and conventional and as described above wherein the price determination process could be a two-step process, other processes like bidding, settlement, scheduling may remain combined process for both however clear identification of type of transaction (renewable/ conventional) should not be lost sight of.

iv. For balancing purpose, RE Generators to be also allowed to buy from Real Time Market.

v. CERC, POSOCO and Power Exchanges are required to take necessary steps for its implementation by June 2021.

vi. A monitoring committee under Chairmanship of Secretary, Ministry of Power may be formed to monitor the implementation of RE market with members from CERC, CEA, POSOCO, MNRE and Power Exchanges.