CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Petition No. 8/SM/2025

Coram:
Shri Jishnu Barua, Chairperson
Shri Ramesh Babu V., Member
Shri Harish Dudani, Member
Shri Ravinder Singh Dhillon, Member

Date of Order: 23.7.2025

IN THE MATTER OF:

Directions by the Commission for Implementing Market Coupling in terms of the provisions of the Central Electricity Regulatory Commission (Power Market) Regulations, 2021.

ORDER

The Commission, vide Order dated 6.2.2024 in Petition No. 1/SM/2024 (Suo-Motu), had decided to implement a Shadow Pilot on Power System and Cost Optimization through Market Coupling. The Commission, *inter-alia*, directed the Grid Controller of India (Grid-India) to implement the following on a shadow pilot basis: (a) coupling of the RTM of the three power exchanges; (b) separately coupling of the RTM at the three power exchanges along with SCED; and (c) coupling of DAM of the three power exchanges. The relevant extracts of the said Order are as under:

"25. In light of the above, and with due consideration of the objectives of Market Coupling as specified in Regulation 37 of the PMR 2021 and with a view to exploring the scope of optimization of schedule and dispatch of electricity as enshrined in sections 26 and 28 of the Electricity Act, 2003 and in the Preamble to the IEGC, the Commission directs Grid-India as under:

(i) Develop, within two months from the date of this Order, the necessary software as required for running the shadow pilot for coupling of RTM of the three power exchanges as well as coupling of RTM & SCED, and for coupling of DAM of the three power exchanges. The software so developed should be scalable for running

the shadow pilot for coupling of DAM and SCUC, as and when decided by the Commission.

(ii) Implement the shadow pilot of coupling (a) RTM of the three power exchanges (b) RTM and SCED and (c) DAM of the three power exchanges, for a period of four months after the development of the necessary software, based on the directions contained in paragraph 23 of this Order.

(iii) Share the operational experience of running a shadow pilot in the form of a monthly report during the period of four months and a feedback report at the end of the four-month period.

(iv) Suggest the feasibility of coupling of the DAM and SCUC within two months from the date of this Order.

26. Based on the insights gained while running the shadow pilot, the Commission shall further decide upon the need for creating the necessary regulatory framework for market coupling.

27. The Commission also directs all the power exchanges to share the necessary data and other information required by Grid-India for running the shadow pilot, as detailed in this Order."

2. Subsequently, Grid-India, vide its letter dated 13 February 2024, raised some concerns on the strict timelines provided for implementing the shadow pilot of market coupling and also requested for constituting a Committee for harmonization of bid structure and other related issues. The Commission, after duly considering the concerns raised by Grid-India and the practical difficulties in adhering to the timelines, had decided to grant extension to Grid-India to develop and deploy the necessary software as required for running the shadow pilot, and also decided to constitute a Committee to deliberate on various aspects relating to the shadow pilot of market coupling. The Commission, vide its office order dated 19 April 2024, constituted a Committee under the chairmanship of Member, CERC, to oversee the implementation of the shadow pilot of Market Coupling. The Committee held five meetings and deliberated on various aspects to ensure smooth implementation of shadow pilot of market coupling, including the timely development of in-house coupling engine by Grid-India and its validation, running of the coupled engine for RTM and DAM on D+1 basis, formulation of

coupling of RTM with SCED, submission of data by the power exchanges through API, etc. Grid-India submitted a report on 16 January 2025 and also made submissions before the Commission regarding the progress made in the implementation of the shadow pilot of market coupling, including the experience gained by it in developing and validation of the coupling engine using historical data of about 29 months, results of the shadow pilot run based on historical data, challenges in the formulation of RTM-SCED coupling. Grid-India highlighted the need for bringing uniformity in clearing algorithms and bid structures across exchanges for rolling out market coupling, and also suggested that *full-fledged roll-out of market coupling may be considered with the three power exchanges acting as the Market Coupling Operator (MCO) in a round-robin manner*.

3. The Commission noted that the above submissions of Grid-India were based on the historical data, whereas the Commission in its Order dated 6.2.2024 in Petition No. 1/SM/2024, had directed Grid-India to "s*hare the operational experience of running a shadow pilot in the form of a monthly report during the period of four months and a feedback report at the end of the four-month period".* Accordingly, in pursuance of the directions of the Commission in the Order dated 6.2.2024, Grid-India on 30 June 2025, submitted the "*Feedback Report on D+1 run of Shadow Pilot on Power System & Cost Optimization through Market Coupling for the four-month period from 1 December 2024 to 31 March 2025*". Summary of the results of D+1 run of Shadow Pilot for different market segments for the four-month period from 1 December 2024 to 31 March 2025 is as under:

(i) In case of DAM coupling, the overall welfare increases by ₹38 Cr (0.3%), overall volume cleared increases by 52 MU (0.2%), negligible impact on price due to skewed liquidity and welfare increases in every session in line with the objective of coupling.

(ii) In case of RTM coupling, the overall welfare increases by ₹72 lakh (0.01%), overall volume cleared increases by 1.54 MU (0.01%), negligible impact on price due to skewed liquidity and welfare increases in every session in line with the objective of coupling.

(iii) In case of RTM-SCED coupling, the overall net savings improve by ₹1.4 crore/day in the coupled scenario; despite the reduction in aggregate costs, the average cost increases by ₹ 1/MWh in the coupled scenario due to reduced demand catered; and ACP volatility reduces in the coupled scenario.

4. The Commission discussed and deliberated on the Feedback Report submitted by Grid-India in compliance with the Commission's directions in the Order dated 6.2.2024 in Petition No.1/SM/2024. The Commission noted the results of the D+1 run of shadow pilot on the coupling of DAM segment of the power exchanges, coupling of RTM segment of the power exchanges, and separately, the results of coupling of RTM with SCED for the four months from 1 December 2024 to 31 March 2025. The Commission also noted the issues and challenges to be addressed in implementing market coupling in different market segments.

5. Regulations 37 to 39 of the Central Electricity Regulatory Commission (Power Market) Regulations, 2021 (PMR 2021), regarding 'Market Coupling' provides as under:

"37. Objectives of Market Coupling

(1) Discovery of uniform market clearing price for the Day Ahead Market or Real time Market or any other market as notified by the Commission;

(2) Optimal use of transmission infrastructure;

(3) Maximisation of economic surplus, after taking into account all bid types and thereby creating simultaneous buyer-seller surplus.

38. Designation of Market Coupling Operator

Subject to provisions of these regulations, the Commission shall designate a Market Coupling Operator who shall be responsible for operation and management of Market Coupling.

39. The provisions with regard to market coupling and Market Coupling Operator in these regulations shall come into effect as and when decided by the Commission in accordance with the regulations to be specified separately."

6. Based on the submissions made by Grid-India and various consultations held and as per the provisions of Market Coupling specified in Regulations 37 to 39 of the PMR 2021, the Commission has decided to initiate the process for implementing market coupling in a phased manner as under:

i. Implementation of the coupling of Day-Ahead Market (DAM) of the power exchanges in a round-robin mode by January 2026. Under the round-robin mode, the power exchanges may act as the Market Coupling Operator (MCO) on a rotational basis, with Grid-India being the fourth MCO for backup and audit purposes. This arrangement would facilitate an efficient functioning of the power exchanges and also help instill faith of the market participants in the power exchange operations.

ii. Given the shorter time for bid submission and running the market clearing engine, the decision to implement the coupling of Real-Time Market (RTM) of the power exchanges shall be considered at a later stage after gaining operational experience from the coupling of DAM.

iii. There is a need to further examine the approach and methodology of the shadow-pilot run of coupling of RTM with SCED adopted by Grid-India. The Commission is of the view that some of the complexities involved in RTM-SCED coupling, as highlighted by Grid-India, could be addressed through suitable regulatory interventions and after stakeholder consultation.

iv. The feasibility of coupling of the Term-Ahead Market (including Contingency Contracts) of the power exchanges also needs to be examined by running a shadow pilot.

7. In view of the above, the Commission directs the staff of the Commission to initiate the consultative process with Grid-India and power exchanges on various operational and procedural aspects for implementing the coupling of DAM, and also propose the regulatory amendments with respect to the implementation of market coupling.

8. The Commission directs Grid-India to develop the necessary software for running the shadow pilot for coupling TAM (including Contingency Contracts) of the power exchanges. Post development of necessary software, Grid-India shall implement the shadow pilot for coupling TAM (including Contingency Contracts) of the power exchanges for three months and share the operational experience of running the shadow pilot thereafter in the form of a feedback report to the Commission.

9. The Commission hereby directs all the power exchanges to share the necessary data and other information as required by the staff of the Commission and Grid-India to analyze various operational and procedural aspects for implementing the coupling of DAM.

10. The Commission shall issue further necessary orders at appropriate time based on the assessment of the progress made in the implementation of the above directions.

Sd/-	Sd/-	Sd/-	Sd/-
(Ravinder Singh Dhillon)	**(Harish Dudani)**	**(Ramesh Babu V.)**	**(Jishnu Barua)**
Member	**Member**	**Member**	**Chairperson**