

Implementation of Market Coupling in India: Recommendations to the Central Electricity Regulatory Commission (CERC)

The Indian power sector is undergoing a transformative shift from a predominantly fossil-based system to an increasingly renewable-centric one, calling for a change in the design of electrical systems, markets, and regulations. Recognising this need, especially to achieve the target of 500 GW of renewable capacity by 2030, a series of regulations have been introduced by the CERC. One of the focal areas has been an emphasis on a market-based mechanism to facilitate entry of renewables that includes *inter alia* 'Power Market Coupling' to enhance liquidity in the wholesale spot market since the Ministry of Power (MoP) directed CERC to initiate the market coupling process across multiple electricity exchanges. Coupling presents a unique opportunity to form a bigger connected liquid and efficient marketplace to overcome many of the limitations of a fragmented market that currently has only 7% liquidity, multiple segments, very low-price cap, and aggressive bidding by the supply side in the face of unfulfilled demand.

Implementing market coupling in India involves addressing several important questions and challenges around institutional and structural design, pricing mechanisms to ensure availability and affordability, and more. The webinar "Powering India's Future: Navigating Market Coupling Essentials", was co-organised by the Institute for Energy Economics and Financial Analysis (IEEFA) and CarbonCopy to bring together power sector experts from different geographies to share insights on the CERC Staff Paper on market coupling. The experts brainstormed on various aspects of market coupling and suggested focused recommendations on four broad themes:

1. Administration and implementation processes of market coupling:

- a. *Broader Market Design and System Perspective:* Adopt a holistic approach to electricity market design, encompassing long-term capacity markets, day-ahead markets, real-time markets, and ancillary services markets. Adapt market designs to create a more liquid and efficient market with robust price signals by integrating multiple market segments, whether it's different power exchanges or coupling power exchanges with the incumbent security-constrained economic dispatch (SCED).
- b. *Institutional Structure and Operator Selection:* Address the key considerations regarding the institutional structure for market coupling. Select a non-profit Market Coupling Operator (MCO) with well-defined roles, responsibilities for a fair and secure outcome for the market and the power system, technical capacity, and regulatory oversight for transparent and accountable market operations.
- c. *Market Coupling Phases:* Tailor market coupling solutions to suit India's complex two-tier market structure across Inter-State. Generating Station (ISGS), state owned generators and private generators. Implement in phases, commencing with pilot projects involving power exchanges and ISGS/SCED, and gradually expanding to cover a larger market share. This phased approach allows for testing, adjustments, and smoother integration.
- d. *Market Rules and Guidelines:* Adapt market rules and guidelines to support implementation of the coupled market operated by the MCO with a focus on fairness and efficiency. Maintain robust market regulation and oversight to ensure fair competition between regulated and unregulated entities.
- e. *Value Preservation:* Ensure that market coupling implementation safeguards the innovation and independence of existing power exchanges.

- f. *Monitoring and Surveillance:* Establish necessary procedures, systems, committees, departments and more to keep a close watch on market operation, efficiency, effectiveness, and reporting.

2. Regulatory and technical considerations:

- a. *Regulatory Flexibility:* Design the institutional structure for market coupling with adaptable regulations capable of accommodating different market segments and evolving needs. The process may start cautiously with a pilot that allows for limited transfer between power exchanges (PX) and/or with the SCED, including one-way transfer from SCED→PX Real Time Market (RTM) to preserve liquidity, monitor the gain in social welfare and expand over time to allow for full (two-way) transfer. The MCO functionality over time may include Day Ahead Market, and eventually ancillary services market.
- b. *Promote Greater Participation from both Demand and Supply Side:* Recognise the increasing influence of demand-side resources (e.g., demand response, energy storage) in shaping the market and the role other market segments like ISGS, state and other private generators that are currently not participating in the PX may play to meet higher demand. Develop frameworks for their active participation.
- c. *Market Signal Accuracy:* Enhance the accuracy of market signals to better represent real supply-demand conditions, ensuring reliable and informative pricing. There have been issues with market signals not accurately reflecting the actual supply-demand dynamics, even when the demand was successfully met. The market's ceiling rate has been consistently hitting the maximum limit, such as Rs.10 per kilowatt-hour. This situation has raised questions about the market's efficacy and price signals to attract sufficient entry to meet a rapidly growing peak demand.
- d. *Algorithm Development:* Design and implement sophisticated algorithms for market clearing, congestion management, and price determination. These algorithms should consider factors such as transmission constraints, complex generator and demand-side bids, unit commitment decisions, technical constraints on ramping, minimum up/down time and ancillary services.
- e. *Addressing Information Asymmetry:* Address challenges related to information asymmetry among market stakeholders, including buyers and sellers. Improve data transparency and sharing within the market to reduce information asymmetry and enhance market efficiency.

3. Renewable energy, grid integration, co-optimisation of the ancillary and the energy market:

- a. *Renewables Integration:* Encourage regulatory frameworks that promote renewable energy grid integration by recognising and valuing renewables' contributions to grid stability and the extent to which MCO may be able to address this through co-optimization of ancillary services in due course.
- b. *Regulatory Interventions:* Explore regulatory interventions to prevent panic buying situations leading to ceiling rate hits while maintaining market competitiveness and transparency.