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GS Paper II: Current Affairs

1. Draft Regulations Propose GRID INDIA as Sole Market Coupling Operator

The Central Electricity Regulatory Commission (CERC) has released the draft *Power Market (Second Amendment) Regulations, 2026*, proposing the introduction of market coupling in India's electricity trading system.

Under the proposal, the Grid Controller of India Limited (Grid India) would function as the sole Market Coupling Operator (MCO) responsible for discovering a uniform market-clearing price across all power exchanges. The reform seeks to move India toward the vision of "One Grid, One Price", thereby creating a more integrated and efficient electricity market.

The proposal represents one of the most significant structural reforms in India's power market architecture since the enactment of the Electricity Act, 2003.

The development must also be viewed in the context of India's broader transition toward a competitive, technology-driven and renewable-oriented energy economy.

a. Background and Context

India's electricity sector has historically evolved from a highly centralised, state-dominated system into a progressively market-oriented structure. Prior to economic reforms, electricity generation and distribution were largely controlled by State Electricity Boards, with limited competition and administratively determined pricing.

The Electricity Act, 2003 transformed this framework by introducing competition, open access, private participation and power trading mechanisms. This marked the beginning of India's transition toward a modern electricity market.

Electricity falls under Entry 38 of the Concurrent List, enabling both the Union and State Governments to legislate on the subject. Consequently, electricity reforms involve coordination between the Centre, state regulators, distribution companies and market institutions.

The issue is linked with multiple dimensions of governance and development:

- Infrastructure and energy reforms
- Regulatory institutions and governance
- Sustainable Development Goal 7 relating to affordable and clean energy
- India's renewable energy transition and decarbonisation strategy

As electricity markets became increasingly competitive, the need emerged for a more integrated and harmonised pricing mechanism across exchanges.

b. Evolution of Electricity Trading in India

Traditionally, electricity transactions in India occurred primarily through long-term Power Purchase Agreements (PPAs) between generating companies and distribution utilities. These contracts generally extended for periods ranging from twenty to twenty-five years and ensured predictable supply and revenue stability.

Over time, India introduced market-based electricity trading mechanisms through power exchanges and spot markets. This enabled:

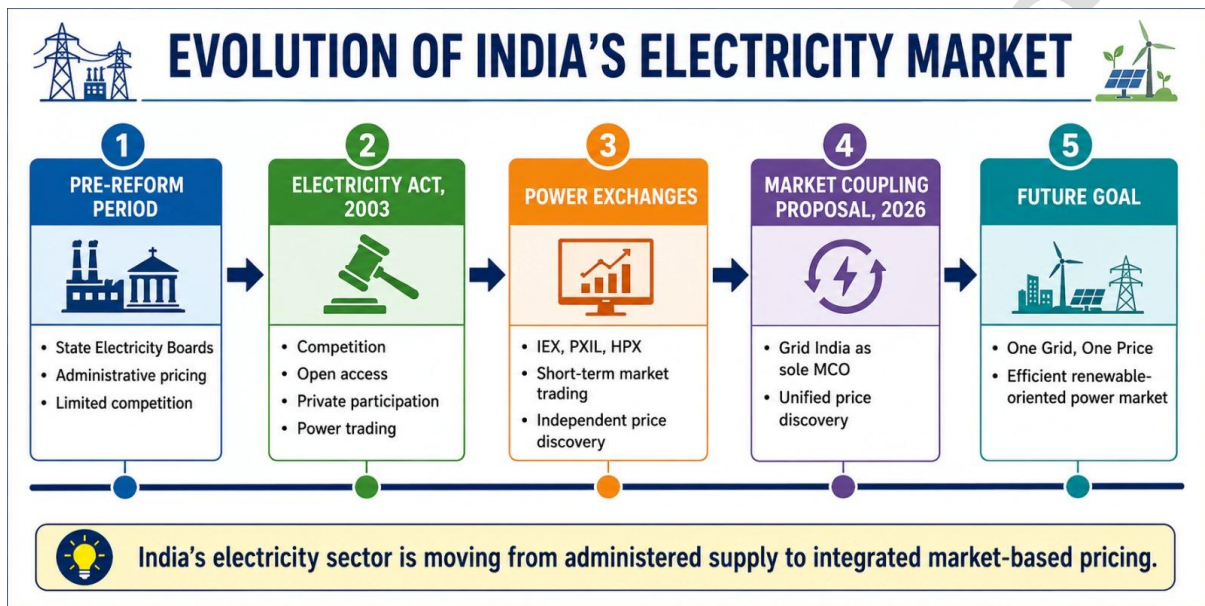
- Competitive price discovery
- Efficient balancing of supply and demand

- Better utilisation of generation capacity
- Greater renewable energy integration

The emergence of short-term electricity markets has significantly altered the structure of power trading in India.

Short-term electricity transactions have grown at a Compound Annual Growth Rate (CAGR) of approximately 8.9 percent, compared to overall electricity generation growth of about 5.8 percent. The share of short-term transactions in total electricity trade increased from 9.6 percent in 2009–10 to over 13 percent in 2024–25. This demonstrates the growing importance of market-based electricity procurement.

The rise of short-term markets eventually led to the emergence of multiple power exchanges operating simultaneously across India.



c. Existing Power Exchanges in India

India currently operates through multiple power exchanges that independently conduct electricity trading and price discovery.

Power Exchange	Description
Indian Energy Exchange (IEX)	Largest electricity exchange in India
Power Exchange India Limited (PXIL)	Alternative exchange platform
Hindustan Power Exchange (HPX)	Relatively newer exchange

At present, each exchange independently determines electricity prices based on bids received from buyers and sellers. Consequently, different exchanges may discover different prices for the same delivery period, leading to market fragmentation and inefficiency.

These inefficiencies have strengthened the policy push toward a unified electricity pricing mechanism.

d. Understanding Market Coupling

Market coupling refers to a mechanism through which buy bids and sell bids from all electricity exchanges are aggregated into a common pool in order to discover a single market-clearing price.

Instead of multiple exchanges independently determining prices, a central entity would compute a unified equilibrium price based on nationwide demand and supply conditions.

i. Objectives of Market Coupling

Elimination of Fragmented Pricing

- Reduces price divergence across exchanges
- Creates greater national market integration
- Promotes transparent electricity pricing

Improvement in Market Efficiency

- Enhances liquidity and competition
- Improves matching of supply and demand
- Reduces distortions arising from isolated exchanges

Optimisation of Economic Surplus

- Maximises welfare gains for buyers and sellers
- Promotes economically efficient electricity dispatch
- Encourages competitive equilibrium pricing

Better Utilisation of Transmission Infrastructure

- Enables efficient electricity flow across regions
- Reduces underutilisation of grid capacity
- Improves balancing capability of the national grid

Deeper Renewable Energy Integration

- Facilitates balancing of intermittent renewable sources
- Enhances nationwide green energy utilisation
- Supports India's decarbonisation objectives

Thus, market coupling seeks to create a nationally integrated electricity market similar to those operating in advanced economies.

The reform framework proposed by CERC operationalises these objectives through specific institutional and procedural mechanisms.

e. Key Features of the Draft Regulations

Aspect	Details
Regulator	Central Electricity Regulatory Commission
Reform Proposal	Introduction of market coupling
Central Operator	Grid Controller of India Limited
Assigned Role	Market Coupling Operator
Objective	Uniform market-clearing price
Applicable Segments	Day-Ahead Market, Real-Time Market and other segments in phases
Procedure Timeline	Within six months of notification
Stakeholder Consultation Deadline	May 16

The draft regulations envisage a phased implementation strategy rather than an immediate nationwide rollout.

A central role in this proposed framework has been assigned to Grid India.

f. Role of Grid India Under the Proposed Framework

The draft regulations designate Grid India as the sole Market Coupling Operator.

Market-Clearing and Price Discovery

Grid India would aggregate bids received from all exchanges and determine the national market-clearing price through a centralised algorithmic process.

Establishment of a Market Coupling Cell

A dedicated institutional mechanism would be established for:

- Bid aggregation
- Market operations
- Algorithmic optimisation
- Price discovery management

Development of the Power Market Coupling Procedure (PMCP)

Within six months, Grid India would formulate the Power Market Coupling Procedure (PMCP).

This procedure would specify:

Component	Purpose
Bid submission standards	Uniformity across exchanges
Operational timelines	Synchronised market functioning
Secure data transmission systems	Reliability and cybersecurity
Price discovery algorithm	Uniform market-clearing mechanism
Institutional responsibilities	Administrative clarity

The institutional design of Grid India will ultimately determine how efficiently the proposed market coupling mechanism functions in practice.

g. How Electricity Price Discovery Would Function

Under the proposed framework, the process would operate in the following manner:

- Power exchanges collect bids from buyers and sellers.
- All bids are transmitted securely to Grid India.
- Grid India aggregates bids from every exchange.
- A single market-clearing price is determined for the relevant market segment.

The mechanism seeks to maximise economic surplus, which represents the combined welfare gains of buyers and sellers.

i. Economic Significance of Unified Price Discovery

Efficient Allocation of Electricity

- Electricity flows toward regions with highest economic value
- Generation resources are utilised optimally
- Supply-demand mismatches are reduced

Competitive Equilibrium Pricing

- Prevents artificial regional price distortions
- Strengthens market transparency
- Encourages efficient bidding behaviour

Welfare Optimisation

- Reduces procurement costs for buyers
- Improves revenue realisation for efficient generators
- Enhances overall consumer welfare

The functioning of price discovery also depends upon the structure of various electricity market segments operating in India.

h. Types of Electricity Markets in India

India's electricity trading ecosystem consists of multiple market segments catering to different time horizons and operational requirements.

Market Type	Characteristics
Day-Ahead Market	Auction-based trading for next-day delivery
Real-Time Market	Near-immediate electricity procurement
Intra-Day Market	Same-day electricity transactions
Term-Ahead Market	Trading ranging from three hours to eleven days ahead
Renewable Energy Certificate Market	Trading of renewable energy obligations

Among these, the Day-Ahead Market and Real-Time Market are expected to be the first segments covered under market coupling.

The increasing role of renewable energy within these markets further enhances the importance of coordinated market mechanisms.

i. Renewable Energy Certificates and Green Transition

Renewable Energy Certificates (RECs) form an important component of India's electricity market reforms.

Each REC represents one megawatt-hour of renewable electricity generation. These certificates enable states or utilities lacking renewable energy capacity to meet their Renewable Purchase Obligations (RPOs) by purchasing certificates from renewable-rich regions.

i. Importance of the REC Mechanism

Encouragement of Renewable Investment

- Provides additional revenue streams for renewable producers
- Improves financial viability of green projects
- Encourages private investment in renewable energy

Interstate Green Energy Balancing

- Enables transfer of renewable benefits across states
- Reduces regional imbalance in renewable availability
- Supports national clean energy integration

Support for Climate Commitments

- Helps India meet Paris Agreement commitments
- Promotes low-carbon electricity generation
- Strengthens sustainable development objectives

Cost-Effective Renewable Compliance

- Enables states to meet RPO targets flexibly
- Reduces compliance costs
- Improves efficiency of renewable procurement

Market coupling could further strengthen renewable integration by improving balancing and dispatch efficiency.

However, achieving uniform electricity pricing also requires addressing structural transmission constraints.

j. Transmission Congestion and Market Splitting

Although the reform aims to create a uniform national electricity price, physical transmission limitations may sometimes prevent complete price uniformity.

India continues to face transmission bottlenecks and regional congestion in several corridors. In such circumstances, the regulations provide for a market splitting mechanism.

i. Features of Market Splitting

Regional Price Differentiation

- Different regions may temporarily experience different prices
- Price divergence reflects actual transmission constraints
- Congestion signals become economically visible

Efficient Congestion Management

- Helps optimise electricity dispatch under constrained conditions
- Prevents grid instability
- Improves operational reliability

Infrastructure Signalling Function

- Identifies regions requiring transmission expansion
- Encourages infrastructure investment
- Supports long-term grid planning

Thus, while the broader objective remains “One Nation, One Price,” practical limitations of grid infrastructure may occasionally necessitate regional differentiation.

These operational realities shape both the opportunities and challenges associated with the reform.

k. Significance of the Reform

i. Toward a Unified National Electricity Market

Improved Transparency

- Uniform pricing enhances clarity for all stakeholders
- Reduces informational asymmetry
- Improves market credibility

Greater Predictability

- Stabilises electricity procurement expectations
- Assists long-term planning
- Enhances financial certainty

Increased Investor Confidence

- Strengthens trust in market institutions
- Encourages private participation
- Improves investment climate in the energy sector

Enhanced National Market Efficiency

- Improves resource allocation
- Reduces fragmentation
- Promotes nationwide electricity optimisation

ii. Improved Market Efficiency

Greater Market Liquidity

- Aggregated bids deepen the market
- Improves transaction efficiency
- Reduces volatility

Better Resource Utilisation

- Enhances generation efficiency
- Minimises idle capacity
- Promotes efficient dispatch decisions

Reduction in Arbitrage Opportunities

- Limits exploitative price differentials
- Improves fairness across exchanges
- Enhances market discipline

iii. Better Renewable Energy Integration

Improved Balancing of Intermittent Sources

- Facilitates nationwide balancing of solar and wind generation
- Reduces renewable curtailment
- Enhances grid flexibility

Support for India's Energy Transition

- Assists achievement of 500 GW non-fossil fuel target by 2030
- Accelerates decarbonisation
- Promotes green growth

iv. Economic Optimisation

Lower System Costs

- Encourages economically efficient generation dispatch
- Reduces unnecessary procurement costs
- Improves overall system efficiency

Consumer Welfare Gains

- Potentially lowers electricity costs
- Enhances affordability
- Improves reliability of supply

v. Enhanced Energy Security

Improved National Balancing Capability

- Enables better management of regional shortages
- Improves resilience during demand spikes
- Strengthens grid reliability

Better Crisis Response Capacity

- Facilitates coordinated nationwide electricity management
- Reduces vulnerability to supply disruptions
- Enhances systemic resilience

Despite these potential benefits, the reform also raises important concerns and implementation challenges.

1. Concerns and Challenges

i. Monopoly and Centralisation Concerns

Reduced Competition

- Sole authority vested in Grid India may centralise market power
- Exchanges fear erosion of competitive dynamics
- Concerns regarding institutional concentration may increase

Weakening of Innovation Incentives

- Exchanges may lose incentives for independent innovation
- Product differentiation could decline
- Market dynamism may reduce over time

Thus, institutional safeguards and transparent governance mechanisms will become crucial.

ii. Technological and Operational Complexity

Efficient market coupling requires sophisticated technological infrastructure, including:

- Advanced optimisation algorithms
- Real-time coordination systems
- High-speed communication networks
- Strong cybersecurity architecture

Any technical failure could affect nationwide electricity transactions.

iii. Transmission Infrastructure Limitations

Persistent Grid Bottlenecks

- Congestion may prevent uniform pricing
- Regional disparities could continue
- Transmission constraints may weaken market efficiency

Need for Infrastructure Expansion

- Interstate transmission corridors require strengthening
- Grid modernisation remains essential
- Investment requirements will be substantial

iv. Regulatory Coordination Challenges

The reform requires close coordination among:

- Central Electricity Regulatory Commission
- Grid India
- State Electricity Regulatory Commissions
- Distribution companies
- Power exchanges

Differences in regulatory priorities and operational practices could complicate implementation.

v. Impact on Existing Exchanges

- Exchanges may lose independent price discovery functions
- Greater emphasis may shift toward value-added services
- Innovation and product diversification may become key differentiators

The concerns surrounding implementation can be better understood by examining experiences of other electricity markets globally.

m. Comparative Perspective

Several advanced electricity markets already operate through coupled market mechanisms.

Region	Market Model
European Union	Integrated cross-border electricity market
Nord Pool	Unified Nordic electricity trading platform
India	Transitioning toward centralised price discovery

The Indian proposal resembles European-style integrated electricity markets, where coupled systems optimise electricity flows and pricing across large geographic areas.

These international experiences provide important lessons for India's future policy direction.

n. Way Forward

i. Strengthening Transmission Infrastructure

Expansion of Interstate Corridors

- Improve nationwide electricity transfer capability
- Reduce congestion-related inefficiencies
- Enhance grid integration

Grid Modernisation

- Adoption of smart grid technologies
- Strengthening real-time monitoring systems
- Improvement in operational reliability

ii. Ensuring Transparent Governance

Algorithmic Transparency

- Periodic audits of price discovery mechanisms
- Public disclosure of operational standards
- Independent regulatory oversight

Stakeholder Trust Building

- Continuous consultation with exchanges and utilities
- Institutional accountability mechanisms
- Transparent grievance redressal systems

iii. Gradual and Phased Implementation

Initial Rollout in Selected Segments

- Begin with Day-Ahead and Real-Time Markets
- Reduce operational disruption risks
- Facilitate institutional learning

Continuous Review Mechanism

- Evaluate implementation outcomes periodically
- Modify procedures based on operational experience
- Improve institutional adaptability

iv. Improving Renewable Integration Capacity

Investment in Storage and Smart Systems

- Battery storage infrastructure
- Smart grids and forecasting systems
- Flexible generation capacity

Enhanced Renewable Balancing

- Reduction in renewable curtailment
- Improved integration of intermittent power
- Better nationwide balancing capability

v. Maintaining Competitive Neutrality

Preserving Exchange Innovation

- Encourage product diversification
- Promote service quality improvements
- Maintain healthy competitive dynamics

Balanced Regulatory Design

- Avoid excessive centralisation
- Protect market efficiency and innovation
- Ensure institutional neutrality

The long-term success of the reform will ultimately depend upon balancing central coordination with market flexibility.

Conclusion

The proposed market coupling framework represents a transformative reform in India's electricity sector. By introducing a unified price discovery mechanism, the reform seeks to enhance efficiency, transparency, grid integration and renewable energy balancing. At the same time, the success of the initiative will depend upon robust transmission infrastructure, technological readiness, regulatory coordination and balanced institutional governance.

If implemented effectively, market coupling could become a foundational pillar in India's transition toward a modern, competitive and sustainable electricity market while advancing the broader vision of "One Grid, One Price."

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While every effort has been made to balance depth with brevity, please keep the following in mind:

1. Orientation & Purpose

This compilation is curated primarily from the UPSC Mains perspective — with emphasis on conceptual clarity, analytical depth, and interlinkages across GS papers.

However, the PrepAlpine team is simultaneously developing a dedicated Prelims-focused Current Affairs Series, designed for:

- factual coverage
- data recall
- Prelims-style MCQs
- objective pattern analysis

This Prelims Edition will be released separately as a standalone publication.

2. Content Length

Some sections may feel shorter or longer depending on topic relevance and news density. To fit your personal preference, you may freely resize or summarize sections using any LLM tool (ChatGPT, Gemini, Claude, etc.) at your convenience.

3. Format Flexibility

The formatting combines:

- paragraphs
- lists
- tables
- visual cues

—all optimised for retention.

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