

Study Committee C5 ELECTRICITY MARKETS AND REGULATION

Paper ID_10494

Reforms in Indian Electricity Market through Pan India Implementation of Real Time Market for Electricity

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National Load Despatch Centre, Power System Operation Corporation (POSOCO)
India

Motivation

Vital Flexibility to manage real time balance

Balancing avenue mitigating variability

Better portfolio management

Optimal Utilization of available resource

Access to larger generator reserves pool

Fast market and defined processes (Gate Closure)

Innovation

WBES Synchronization

Half Hourly Market

Clearing Time: 15 min
Delivery Period: 30 min
48 Sessions Everyday

Gate Closure

Revision of schedules not allowed after Gate Closure

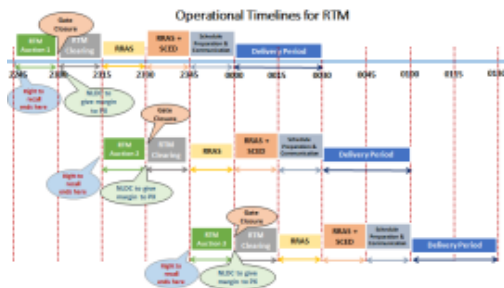
RTM Core Engine

In-House Development

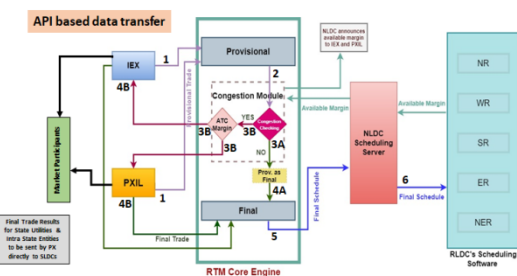
Regulatory Framework



Implementation of Real Time Market



Software architecture and design



Salient Features

• Half hourly market
• 15-minutes bidding window
• 15-minutes clearing window
• 48 times bidding and clearing every day.

Duration 30 min

• 30 minutes (two time-blocks of 15 minutes each)
• Financially and physically binding

Delivery

• Double sided closed auction
• Uniform pricing
• Price and Volume discovered for every 15 minutes

Price Discovery

• End of the right to revision of schedule or declared capability for specific half hour
• RTM window closes
• 1 hour time between gate closure and delivery

Gate Closure

• National Load Despatch Centre (NLDSC), POSOCO
• Ensure grid security and reliability through ATC/TTC declaration.

Nodal Agency

• Cleared volume communicated 45 minutes prior to delivery
• Incorporation in the schedules by RLDCs and SLDCs
• Information to respective generators and discoms.

Communication

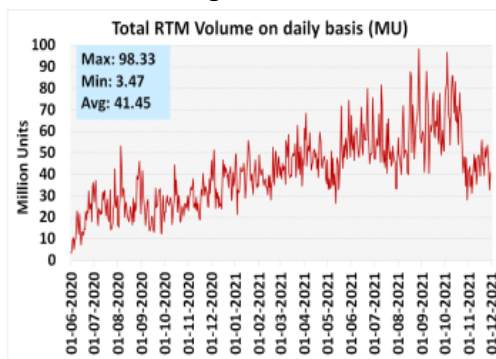
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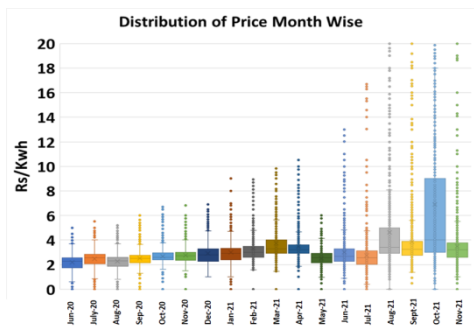
Opportunities

Better management of load and generation	Reduction of overall power purchase cost	Conservation of hydro resources by buy in RTM
Reduction in curtailment of renewable generation	Cost optimization by backing down thermal generation	Managing the sudden variation in renewable generation
Managing sudden variation of load	Managing sudden tripping of generating units	Strategic use of Pumped Storage Hydro plants

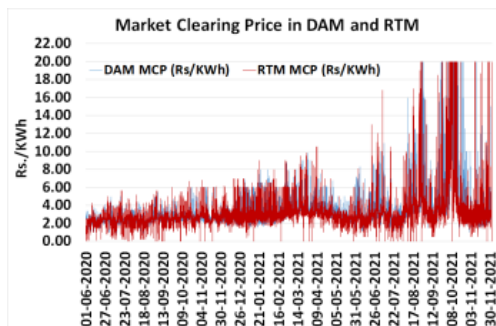
Market Clearing Volume in RTM



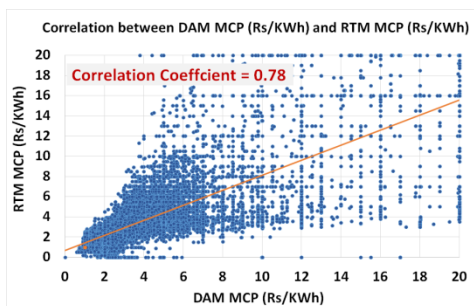
Market Clearing Prices in RTM



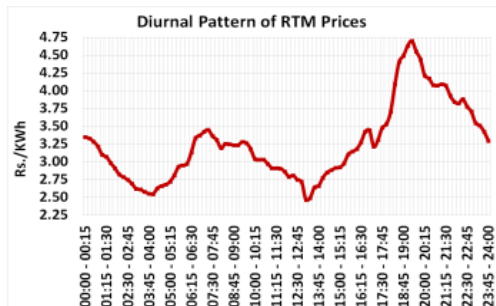
Market Clearing Prices in DAM & RTM



Correlation between MCP in DAM & RTM



Diurnal Pattern of MCP in RTM



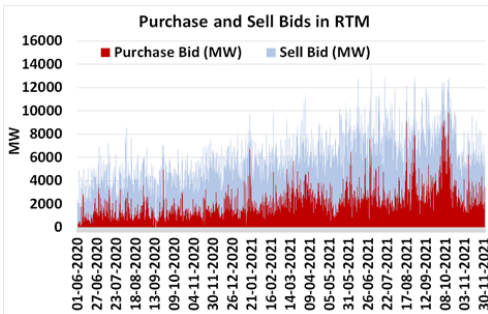
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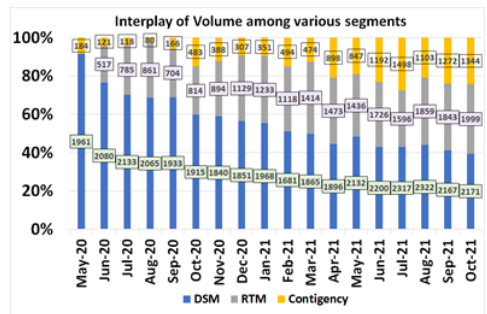
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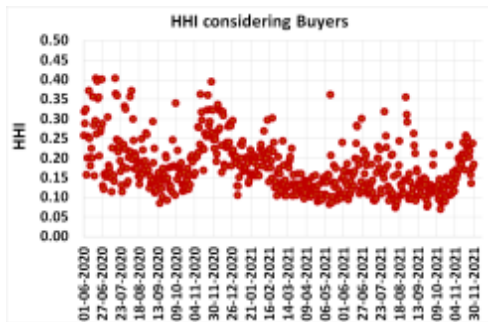
Liquidity in RTM



Imbalance management through RTM



Market Concentration in RTM



Conclusion

Flexibility and competition

Focus on better forecasting

Purchase by Generators

Additional revenue Opportunity

Imbalance Management

RE Integration

The conclusion graphic features several icons and text boxes. It includes a central icon of a hand holding a green arrow pointing up, labeled 'FORECAST'. Other icons include a gear with a dollar sign, a lightbulb, and a 3D surface plot. The text boxes highlight key findings and opportunities related to the RTM implementation.

Real Time Market

- A crowning achievement for Indian Electricity Market