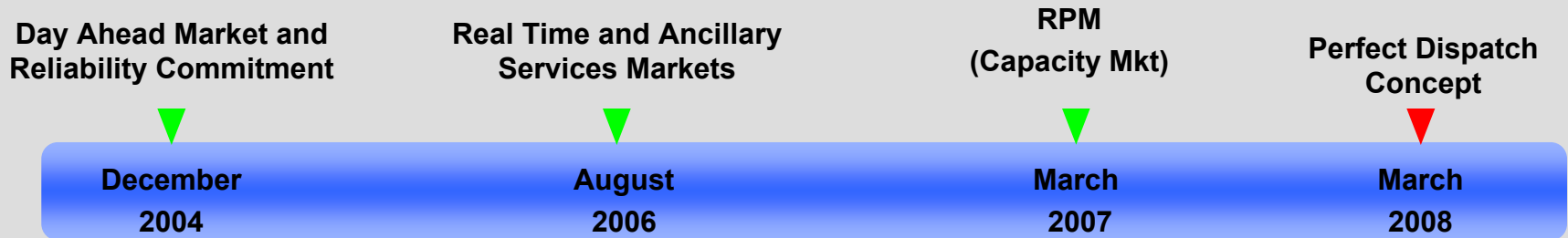# MIP-based Unit Commitment Implementation in PJM Markets

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PJM

Timeline of MIP Implementation in Production systems

| Day Ahead Market and Reliability Commitment	Real Time and Ancillary Services Markets	RPM (Capacity Mkt)	Perfect Dispatch Concept
December 2004	August 2006	March 2007	March 2008

1. Global optimality

2. More accurate solution

3. Improved modeling of security constraints

4. Enhanced resource modeling capability

   a) Generation

   b) Demand response

   c) Transmission Devices

5. More adaptable problem definition

Lower cost to maintain operational reliability

Lower uplift payments

PJM Day Ahead Market uplift Costs 2003-2007 ($/MWh Load)
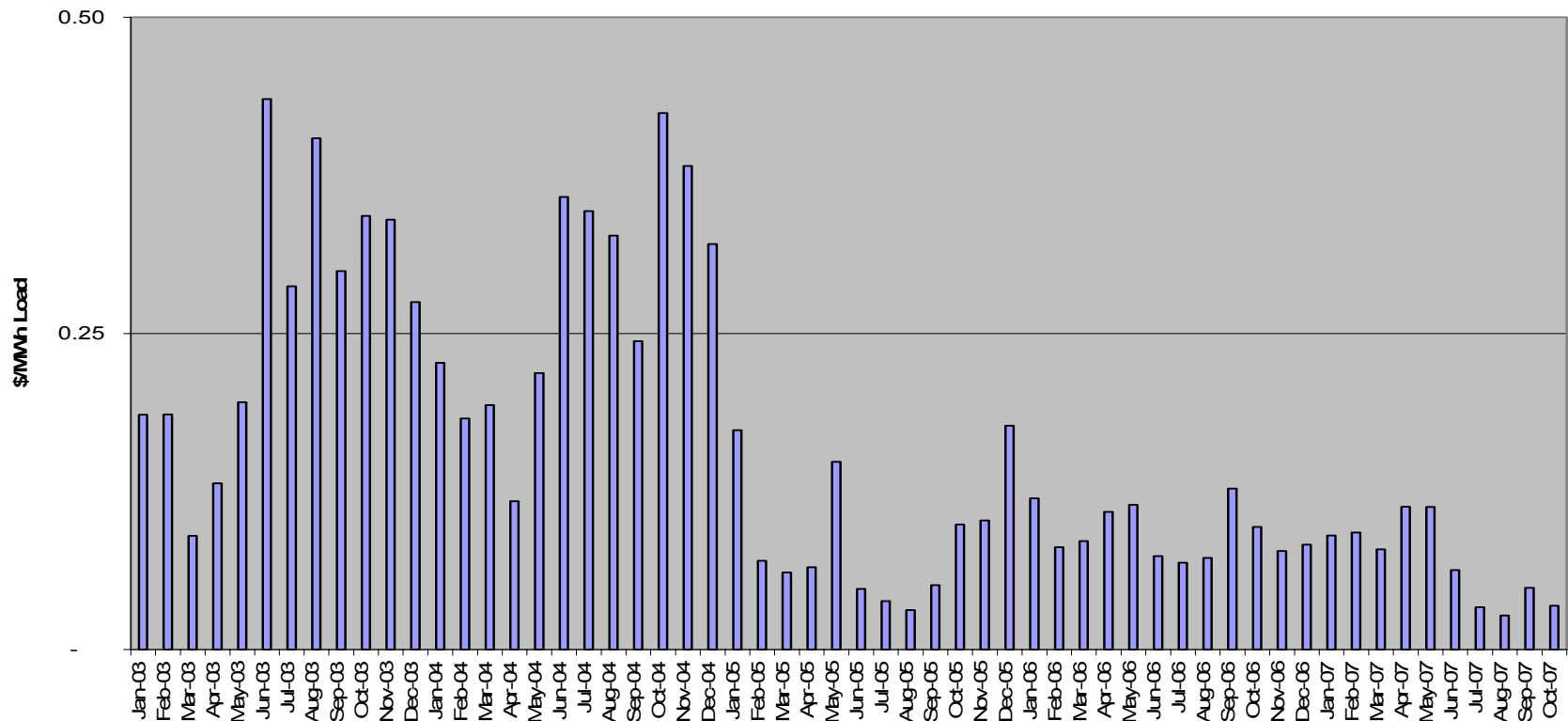
1. MIP tends to solve faster with more complete transmission model, LR had significant performance issues with transmission constraints

2. Conditional constraints initially created performance problems for MIP

3. Combined cycle model, Hydro unit commitment, etc. - very difficult to implement in LR. MIP handles relatively easily

4. MIP solution speed has improved dramatically

1. Distributed resources
2. Dispatchable demand response
3. Non-traditional regulating resources
4. Interregional coordination
5. Transmission device operation