

Commitment Process & Uplift Drivers



Joe Ciabattoni
Manager, Markets Coordination
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3-7 Days Prior

Reliability Engineer Studies 3-7 days

1 Day Prior

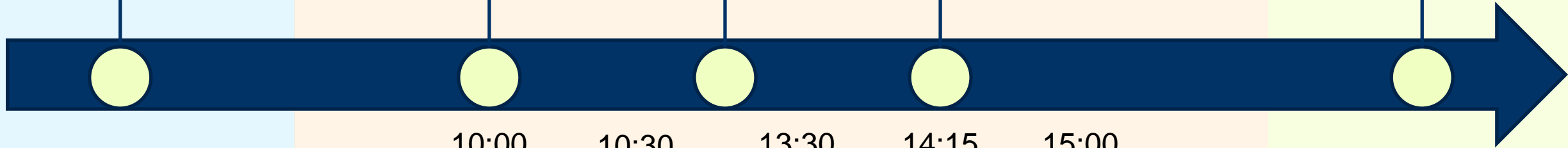
Reliability Engineer Studies Next Day

Day-Ahead Process Runs

Reliability Assessment Commitment (RAC)

Real-Time Commitments

Combustion Turbine Optimizer (CTO)
IT SCED
RT SCED



10:00

10:30

13:30

14:15

15:00

Day-Ahead Market Close

Re-bid Close

Day-Ahead Results Posted

RAC Commitments Communicated

- Power flow studies (full contingency list) are preformed for scheduled transmission outages
 - Thermal constraints
 - Reactive constraints (real time or post contingency voltage)
 - Units are identified based on distribution factors (dfax)
 - For voltage - proximity to the problem, thermal surrogate
 - Extreme weather Hot, Cold, Hurricane, etc.
- If required Long Lead units are called or run through
- Unit with >32 hours total time to start cannot be committed in the DA
- Before the Day-Ahead Market is run, next day commitments are given to the Day-Ahead Market operators

- **Objective** - minimize total production cost with bid-in generation and demand
- Balances generation and bid-in demand
 - Generation = generators and increment bids
 - Demand = fixed, price sensitive and decrement bids
- Up to Congestion transactions are also cleared
- Reliability units either picked up economically or committed manually

- **Objective** – utilize PJM forecast to schedule additional long lead units for reliability concerns at minimum cost
- Load is based on PJM forecast
- Interchange is based on PJM forecast
- Energy and Reserve co-optimization
- Focuses on Steam & Combined Cycle Commitments

- **Objective** – utilize updated forecasts and system conditions to schedule additional long lead Combustion Turbines (CT) at minimum total production cost
- Typically run 03:00-07:00 and throughout day if needed
- Same inputs as RAC but updated closer to the peak
 - Updated load forecast
 - Updated unit information
- Focus on CT commitment
- Used to commit > 2 hour time to start and long minimum run time units

- Objectives
 - Enforce security constraints
 - Minimize total production cost
 - Energy and reserve co-optimization
- Inputs – Current system conditions
 - Very Short Term Load Forecast
 - Topology
 - Generation
 - Load
 - Interchange
 - EMS constraints, operator selected

Intermediate Term SCED

- 2-hour look ahead
- Focus on CT commitment
 - Gives CT recommendations
 - Dispatchers have operational discretion
 - Enforces Reserve Requirements (synchronized and primary)

Real-Time SCED

- 15-minute look ahead
- Dispatches online units
 - Sends unit base points or dispatch signal
 - Respects the Reserve Requirements (synchronized and primary)
 - Dispatches economic Demand Side Response

- Day-Ahead Market
 - Minimize bid production cost
 - Does not guarantee the unit is economic for it's entire commitment
 - Some hours LMP above or below units cost/price
 - Cannot recoup start cost through LMP

- Long lead time units
 - Steam / Combined Cycle unit(s) needed for Monday's constraints
 - Release on Friday after peak...
 - Minimum Down Time + Start Time place unit out of time horizon unit is needed
 - Unit must be run through the weekend

- Resources committed for load and reserves
 - Unit Parameters
 - Minimum run
 - Starts per day
 - Economic minimum
 - Load under or over forecast
 - Interchange swings (20 minutes notice)
 - Self-scheduled units (20 minutes notice)
 - Emergency outages

- Reactive constraints
 - Energy Management System does not generate dfax for voltage constraints
 - May or may not be viable thermal surrogate
 - Bringing a unit on overwhelms voltage problem
 - Needed a portion of the unit
 - Flows are too low to model constraint