Energy Storage Enhancements – Issue Paper discussion

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General Session

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Multi-Interval optimization (MIO) and spread bidding

- Today, the market dispatches all resources based on future expectations of market conditions
  - The multi-interval optimization is effective at positioning system and increasing overall market efficiency reducing uplift payments
  - The optimization can issue startup, shutdown and dispatch instructions for future conditions

- The market minimizes costs during binding and advisory periods
  - Dispatch instructions for storage may be 'inconsistent' with bids in the binding interval

- If a storage resource has a self schedule or exceptional dispatch to discharge, the resource will be charged to meet that schedule

Opportunity costs and bid cost recovery

- The real-time market considers future intervals between 65 minutes and two hours
    - These horizons cannot 'save' state of charge for use later in the day when selling opportunities may be greater
- Bid cost recovery provides compensation for net revenue shortfalls across the entire day
    - Storage resources only represent energy costs and do not have start costs, minimum load costs, or transition costs
- Bid cost recovery principles will feed into the replacement tool for the minimum state of charge and potential adjustments to exceptional dispatch for storage

The real-time market only observes a fraction of the period when storage is critical

Load(8/14) RTD

18:00 RTD Window
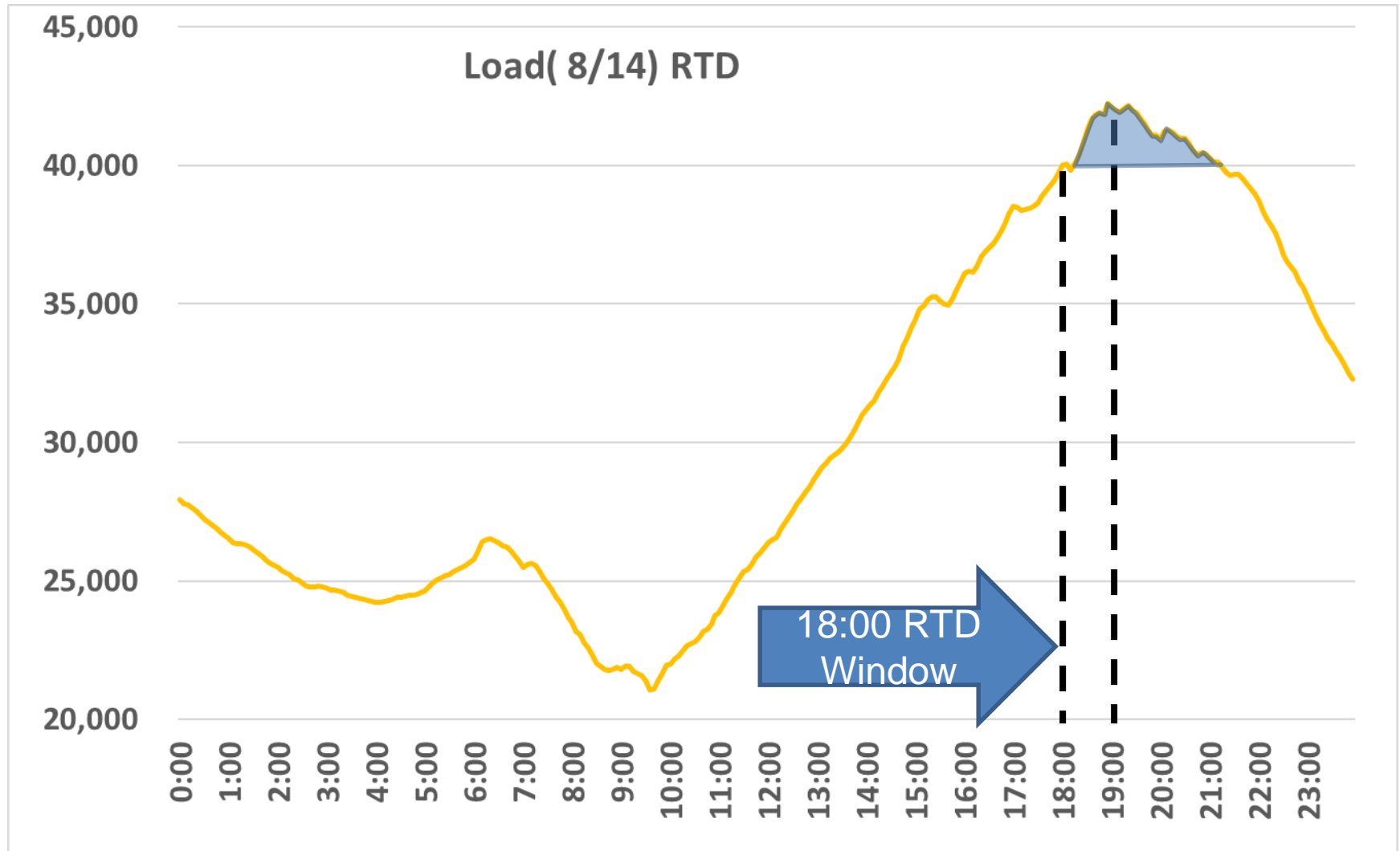
Three potential solutions for ensuring sufficient state of charge across the storage fleet

➤ Apply prices to existing minimum state of charge tool
  – Prices may be difficult to compute, and may require inaccurate ex-post calculations

➤ Energy shift product
  – Product would specify energy that would be bought (at a certain time) and sold (at a certain time) in a single transaction
  – Day-ahead results may not be updated in the real-time market

➤ Biddable state of charge product

Variable charging rates and exceptional dispatch

- Charging rates degrade as storage approaches full state of charge
  - Some storage resources are 'oversized' to avoid this problem
  - Current modeling only includes one Pmin (max charge rate)

- Exceptional dispatch is an instruction to a resource to provide a target MW value
  - Compensation is at the higher of bid or market prices

- Operators may want to have a specific amount of state of charge to set up grid for later in the day
  - Charging instructions may have appropriate compensation, but issuing instructions to hold energy receive no (little) compensation