



California ISO

Briefing on day-ahead market enhancements

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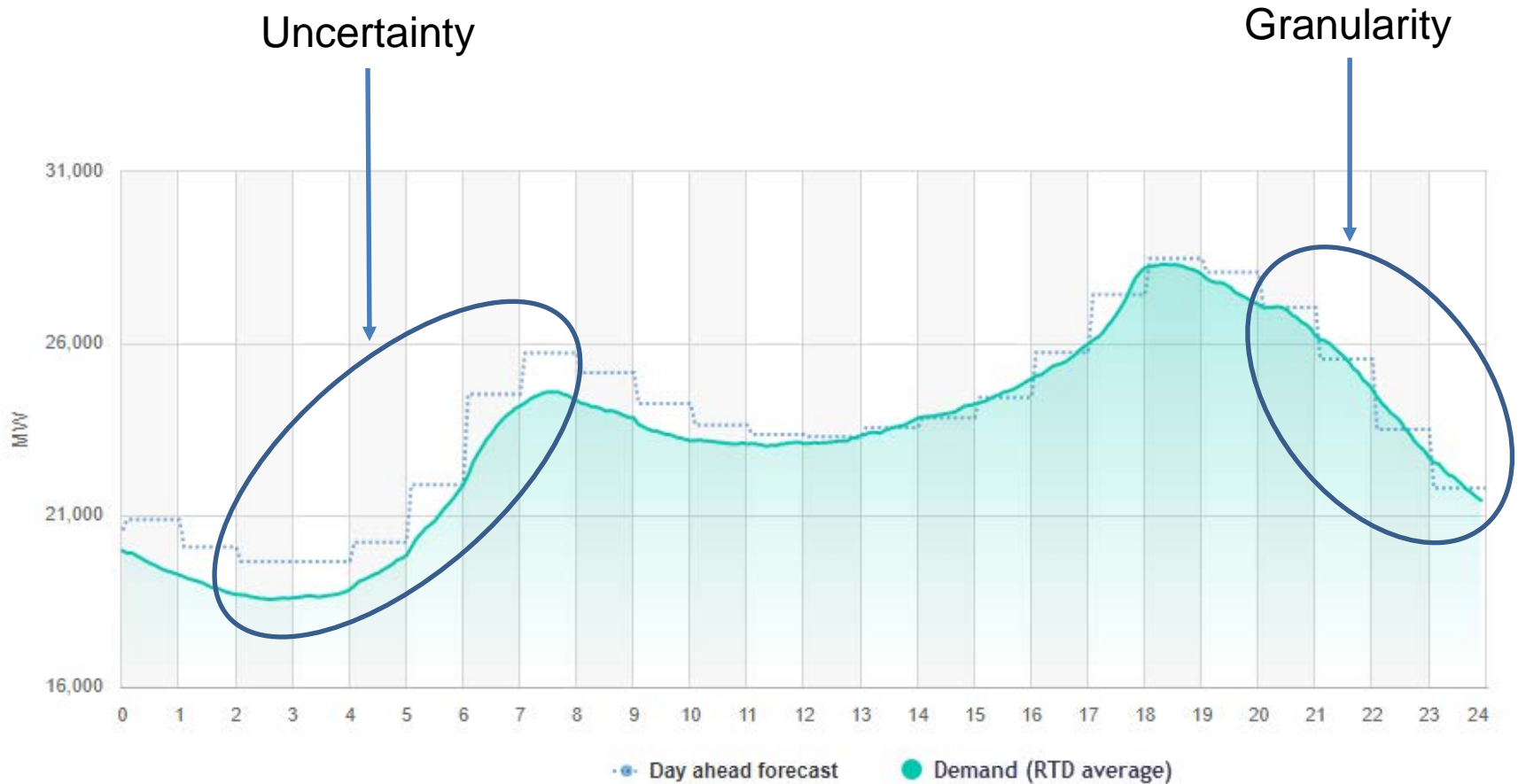
Executive Director, Technology

Board of Governors Meeting

General Session

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Day-ahead market enhancements position the fleet to better respond to real-time imbalances.



In response to stakeholder comments, the day-ahead market enhancement initiative was split into two phases.

- Phase 1: 15-Minute Granularity
 - 15-minute scheduling
 - 15-minute bidding
 - Implementation Fall 2020
- Phase 2: Day-Ahead Flexible Ramping Product (FRP)
 - Market formulation of FRP consistent between day-ahead and real-time market
 - Improve deliverability of FRP and ancillary services
 - Consider re-optimization of ancillary services in real-time 15-minute market
 - Implementation Fall 2021

EIM decisional classification for day-ahead market enhancements

- 15-minute granularity: Hybrid non-EIM driven
 - 15-minute scheduling/bidding: Advisory
 - 15-minute base scheduling: Primary
 - Changes to resource sufficiency evaluation: Primary

- Day-ahead flexible ramping product: Advisory

15-minute scheduling in the day-ahead market positions the fleet to better respond to real-time imbalances (Phase 1).

- Operational benefits
 - Pacific Northwest hydro resources can provide 15-minute schedules in day-ahead, but not real-time
 - Improves variable energy resource scheduling in day-ahead
 - Day-ahead flexible ramping product only needs to cover uncertainty
 - Commits resources to more closely match steep net-load ramps and sharp changes in ramp within the hour
- Technical challenges
 - Market optimization to solve for 96 intervals vs. 24
 - Solving market within current market timelines
 - Settlement updates to nearly all charge codes

Design elements to change from hourly to 15-minute scheduling granularity.

- 15-minute bidding for day-ahead and real-time market
- 15-minute residual unit commitment process
- Inter-SC trades submitted for each 15-minute interval
- Hourly load meters can be shaped into 15-minute values
- Clarification to ancillary services rules
- Bid submission deadline moved to 9:00 AM from 10:00 AM

In general, all hourly rules move to 15-minute granularity

Corresponding design changes to the energy imbalance market

- Base schedules will now be submitted with 15-minute granularity
- Resource sufficiency evaluation balance test performed for each 15-minute interval
 - Under/Over scheduling penalties by 15-minute interval
- Resource sufficiency evaluation capacity test performed for each 15-minute interval
 - Failure results in EIM transfers limited for 15-minute interval

Aligns ISO day-ahead schedule & EIM base schedule

Stakeholders support the move to a 15-minute day-ahead market.

- Broad support for phasing the initiative
- Broad support for 15-minute scheduling and bidding
- EIM entities support changes to the resource sufficiency evaluation
- Proposal to move bid submission deadline to 9:00am is not opposed; but stakeholders recognize this will require changes to their business practices
 - Stakeholders requested ISO to confirm market timeline change is needed and sufficient

Schedule for phase 1 and phase 2 of the day-ahead market enhancement initiative

- **Phase 1: 15-Minute Granularity**
 - EIM Governing Body: Q1 2019
 - ISO Board of Governors: Q1 2019
 - Implementation: Fall 2020

- **Phase 2: Day-Ahead Flexible Ramping Product**
 - EIM Governing Body: May 2019
 - ISO Board of Governors: May 2019
 - Implementation: Fall 2021

In summary, 15-minute scheduling provides significant operational benefits to integrate more renewables.

- Pacific Northwest hydro resources can provide 15-minute schedules in day-ahead, but not real-time
- Improves variable energy resource scheduling in day-ahead
- Day-ahead flexible ramping product only needs to cover uncertainty
- Commits resources to more closely match steep net-load ramps and sharp changes in ramp within the hour

Potential approaches to meet solution time goals

1. Direct 15' granularity modeling approach ... *In progress*
 - Encouraging results but twice as long as current timelines without CME
 - Carefully revisiting model formulation and tuning MIP algorithm
2. All 15' granularity except hourly commitment for resources with start-up, min-up, or min-down constraints more than 1 hour, everything else is 15' commitment.
3. Hourly commitment as today but with new intra-hour special ramping constraints then
 - a) Fix commitment of resources with start-up, min-up, or min-down more than 1 hour and
 - b) Run 15' optimization with everything else flexible including commitment of resources not restricted by 3a.
4. Hourly commitment as today but with new intra-hour special ramping constraints then
 - a) Fix commitment of all resources and run 15' dynamic dispatch run