Demand Response Functionality in Market Release 1A

Jim Price
Lead Engineering Specialist, Market & Product Development

California ISO
Your Link to Power

Market Surveillance Committee
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Plan for Today

- Overview of Working Group and stakeholder activity
- Ensure understanding of proposed functionality
  - Comparison of Non-Participating Load and Participating Load
  - Bid structure for Participating Load
    - Participating Load options include response to stakeholder comments
  - Initial discussion of Settlement examples
  - Technical requirements for Participating Loads: options from simple participation to advanced capability
- Next steps

Previous Development of Enhanced Participating Load Model

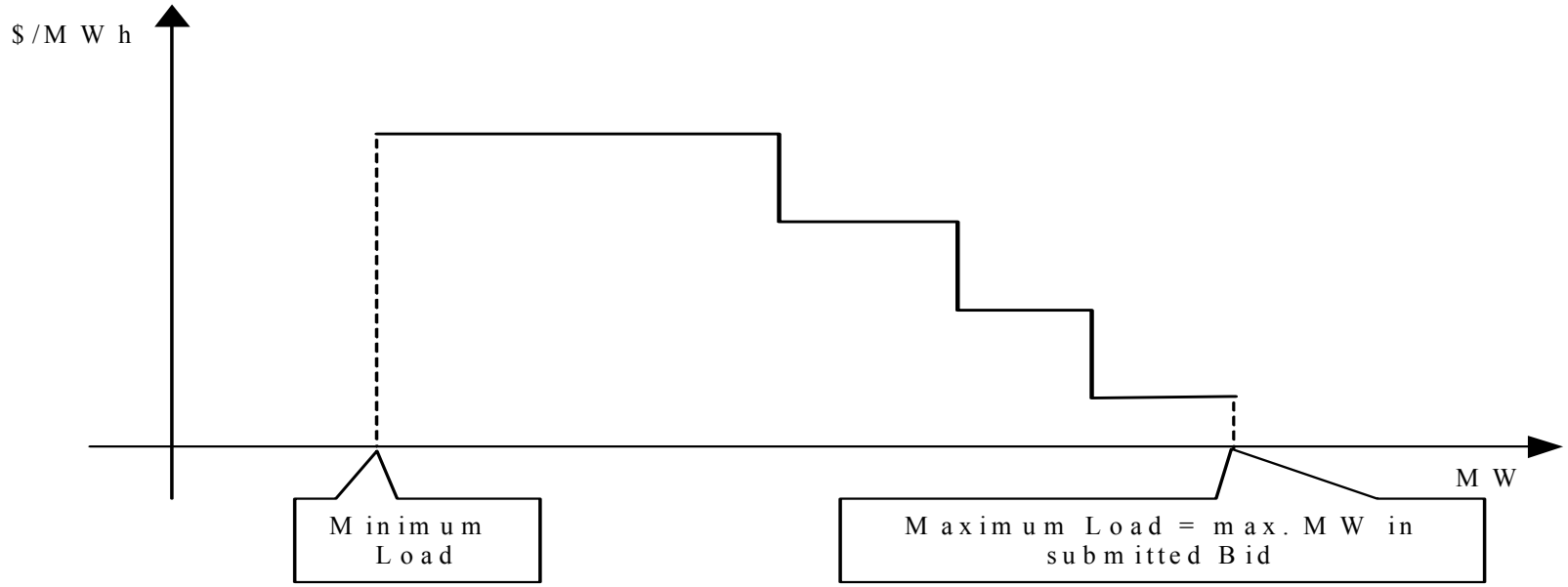
- Original MD02 conceptual design included comprehensive Participating Load model
  - Voluntary 3-part bids similar to generators' start-up/ minimum-load cost/ multi-segment energy bid, RUC participation, load aggregation, multiple markets (DA & RT), non-spin eligibility, run-time constraints, etc.
  - Original design included option for scheduling at local or aggregated levels, but overall MRTU design changed to scheduling Load at highly aggregated level.
    - Dispatch is needed at physical location.
  - Participating Load model could not be adapted in time for Release 1. Release 1 includes a limited model to serve existing Participating Load.
- Enhanced Participating Load model was partially developed, and will be implemented as a market enhancement in Release 1A

Phases of Working Group 2 and CAISO Activity

- Formulate Market Release 1A software functionality
  - Working Group 2 activity: CAISO Draft Straw Proposal 9/25/07, Revised Draft 10/25, refined through working group discussion
  - Stakeholder activity: CAISO Issue Paper 6/26/07, Market Notice 9/26/07, Straw Proposal 11/9/07, Stakeholder Meeting 12/4/07
- Implementation of Market Release 1A software
  - Software requirements go to vendor, vendor prepares detailed design: 1st Quarter 2008
  - Vendor implementation, followed by several testing phases
  - CAISO integration and market simulation after Summer '08
- Working Group and Stakeholder input on Business Practice Manual and User Guide: ongoing through Summer 2008
- Integration and market simulation testing: Fall 2008 to Spring 2009 (pending overall Release 1A schedule)

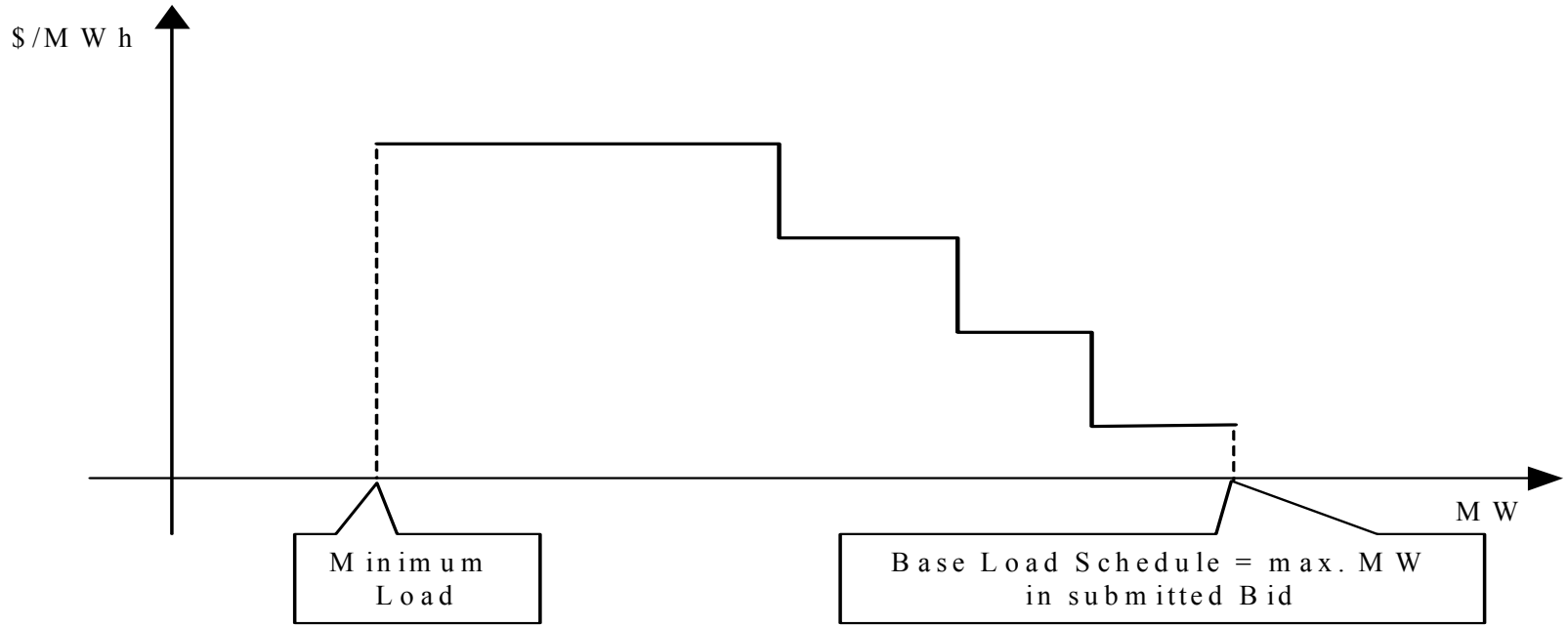
Release 1 Support for Price-Responsive "Non-Participating Load" Continues in Release 1A

- Bidding structure for Non-Participating Load: Day-Ahead Energy Bid
  - Up to 10 segments, submitted for large Default LAP
  - No participation in RT Market, but no penalty for RT load reduction
  - No RUC or AS capacity payments, but CAISO adjusts RUC target based on data from Load Serving Entities
  - Real-Time Market provides advisory prices 45 minutes before Operating Hour (can be a tool in Auto-DR programs)



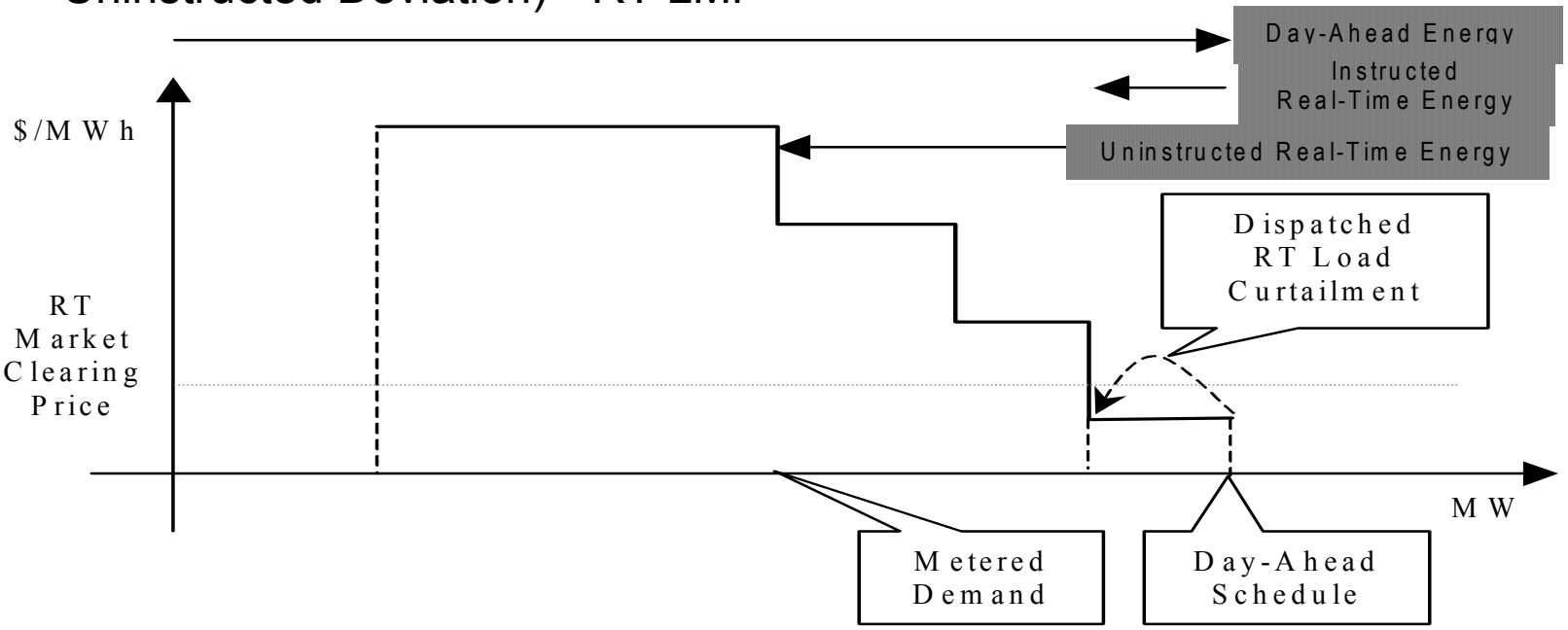
Minimum Participation by Participating Load is Similar to Non-Participating Load

- Minimum bidding structure for Participating Load: Day-Ahead and/or Real-Time Energy Bid
  - Up to 10 segments, like Non-Participating Load
- Load aggregation is nodal or Custom Load Aggregation
- Optional participation in Real-Time Market
- Optional RUC Availability and Ancillary Service Bids allow recognition as capacity resources



A full Dispatchable Demand Resources model provides flexibility

- Optional bid components recognize operational constraints in CAISO Dispatch:
  - Ramp rate prevents abrupt changes of dispatched Load Curtailment
  - Minimum Load Reduction recognizes minimum curtailment costs
  - Minimum and maximum energy limits and time limits
- Energy Settlement includes Day-Ahead and Real-Time Energy:
  - If no AS or RUC payment, RT Settlement applies to all RT Energy
  - Final Energy Charge = DA Schedule * DA LMP + (RT Dispatch + Uninstructed Deviation) * RT LMP



Technical Requirements: Energy

- Energy Settlement for a specific time interval requires interval meter data for a Participating Load
  - For hourly intervals, CAISO will accept hourly metering
  - For sub-hourly intervals, CAISO accepts 15-minute metering intervals (submitted as 5-minute intervals)
- No telemetry required for providing DA or RT Energy
  - Telemetry is useful for CAISO operations, for large loads
- Scheduling at Custom Load Aggregation is consistent with current Participating Load Technical Standard
  - Congestion defines the boundaries of Sub-LAPs, i.e., Custom Load Aggregations.
- Participating Load minimum aggregation size = 0.1 MW.

Participating Load Model Includes Optional Ancillary Service & RUC Participation

- Technical requirements for all Ancillary Services need to conform to reliability requirements. Requires certification.
  - Eligibility for Non-Spinning Reserve capacity: load reduction within 10 minutes, and available telemetry.
  - Eligibility for Spinning Reserve capacity: requirements for Non-Spin + begin load reduction within 1 minute, and provide frequency response.
  - Eligibility for Regulation capacity: requirements for Spin + immediate response to CAISO's automatic generation control.
- Ancillary Services can be simultaneously self-provided for part of the resource's capacity, and bid for remaining capacity.
- RUC Availability Bid indicates quantity and price of capacity to meet CAISO's RUC Requirement
  - RUC Award does not alter Day-Ahead Schedule, but obligates bidder to offer the RUC capacity for Real-Time Dispatch.

Comparability to Generation: Additional, Optional Bid Components

Participating Load Resource	Generator Resource
Base Load Schedule	Base Load
Minimum Load Reduction	Minimum generator output
Minimum Load	Maximum generator output
Load Reduction Initiation Time	Start-up time
Minimum Base Load Time	Minimum time between curtailments
Minimum Load Reduction Time	Minimum up time
Maximum Load Reduction Time	Maximum daily energy limit
Minimum & Maximum Daily Energy Limit	Maximum daily energy limit
Maximum Daily Curtailments	Maximum number of curtailments
Load Drop Rate	Ramp up rate
Load Pickup Rate	Ramp down rate
Load Reduction Initiation Cost	Start-up cost
Minimum Load Reduction Cost	Minimum load cost

Hourly RT Dispatch option provides limitations on availability for dispatch in RT Market, and on availability and minimum duration of dispatch in DA Market