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Review of Draft Straw Proposal: Post-Release 1 MRTU Functionality for Demand Response

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Plan for Today

- **Thank you for comments on Sept. 25 Draft Straw Proposal**
  - Discussion will address response to comments
- **Review of Working Group 2 Goals**
- **Overview of Working Group 2 Activity and Schedule**
- **Comparison of Non-Participating Load and Participating Load**
- **Bid structure for Participating Load**
- **Additional Participating Load options in response to comments**
- **Technical requirements for Participating Loads: options from simple participation to advanced capability**
- **Next steps**

Role of Working Group 2

- **Working Group 2 is one of five working groups**
  - Objective: "Determine how demand resources will be modeled and fully integrated into the wholesale electricity markets and CAISO grid operations. This could involve changes to the MRTU software and tariff."
- **Working Group 2 is <u>not</u> the other working groups**
  - Working Group 1: Demand Response Participation in MRTU Release 1
  - Working Group 3: Demand Resource Product Specification
  - Working Group 4: Infrastructure for Demand Resources
  - Working Group 5: Vision for Demand Resources

Working Group 2's Role in Overall CAISO Vision for Demand Resources

- **Revised Draft Straw Proposal will contain more discussion of context**
- **CAISO has discussed its overall vision in other presentations, e.g.:**
  - "CAISO Demand Response Vision and Role" in January 25, 2007, Market Issues Forum on Demand Response (http://www.caiso.com/1b70/1b70cfb32a50.pdf)
  - "Update on Demand Response" in June 6, 2007, Market Surveillance Committee Meeting and Stakeholder Meeting (http://www.caiso.com/1bef/1befe83d18d10.pdf)
- **Release 1A functionality describes only part of the overall demand resource program**

Release 1A Features Do Not Replace Release 1 Features

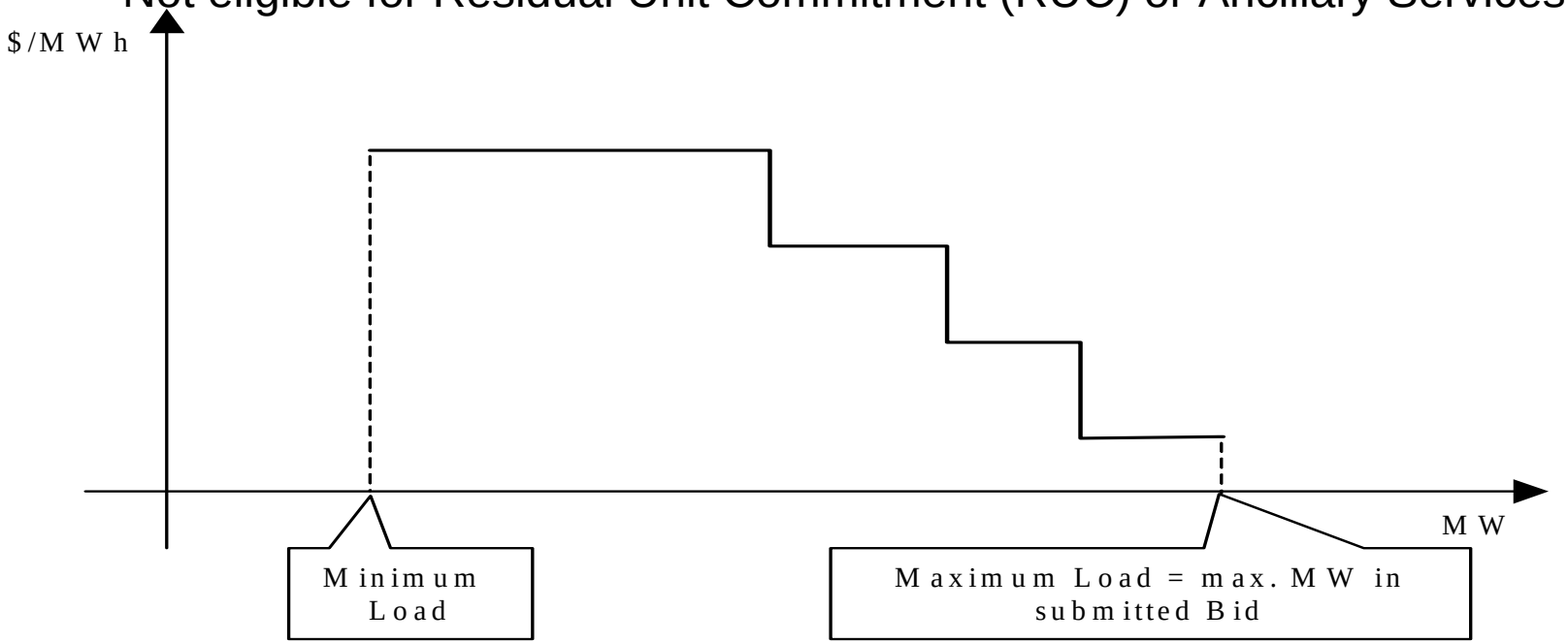
- **Working Group 1's User Guide continues to apply to demand resource programs that use Non-Participating Load**
- **Advisory prices in Real-Time Market remain available (can be a tool in Auto-DR programs)**
  - See "MRTU Release 1 Availability of Advisory Real-Time LMPs for Potential Use in Demand Response Programs" at http://www.caiso.com/1c27/1c27755a43710.pdf
- **No uninstructed deviation penalty applies to Load**
- **Release 1A (Convergence Bidding) eliminates requirement for Day-Ahead scheduling of Load**

Phases of Working Group 2 and CAISO Activity

- **Formulate Market Release 1A software functionality**
  - CAISO Draft Straw Proposal 9/25/07, Revised Draft 10/23
  - CAISO Straw Proposal to stakeholders 11/6/07, followed by stakeholder meeting/conference call
- **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 input on Business Practice Manual and User Guide begins: December 2007**

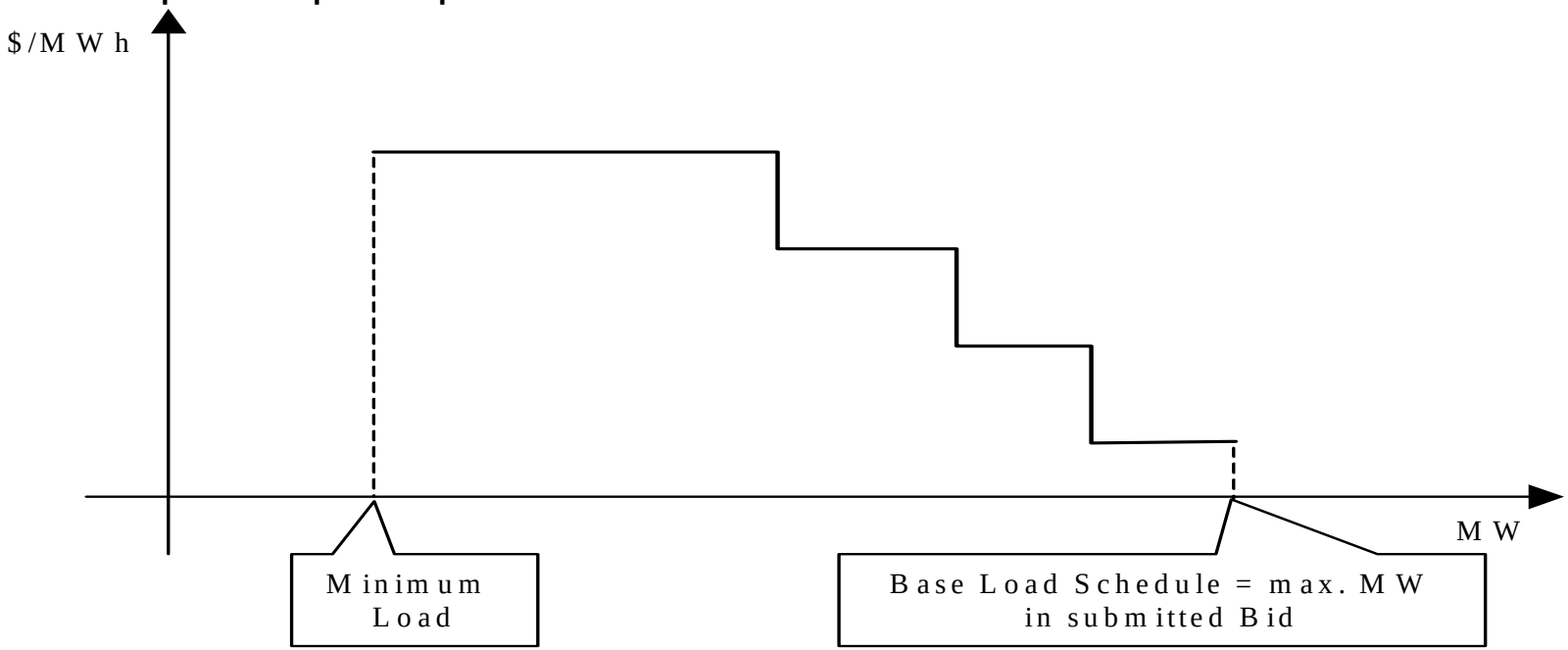
Response to Question: Comparison to Non-Participating Load

- **Bidding structure for Non-Participating Load: Day-Ahead Energy Bid**
  - Load aggregation is large Load Aggregation Point (LAP)
  - Up to 10 segments
  - No participation in Real-Time Market
  - Not eligible for Residual Unit Commitment (RUC) or Ancillary Services



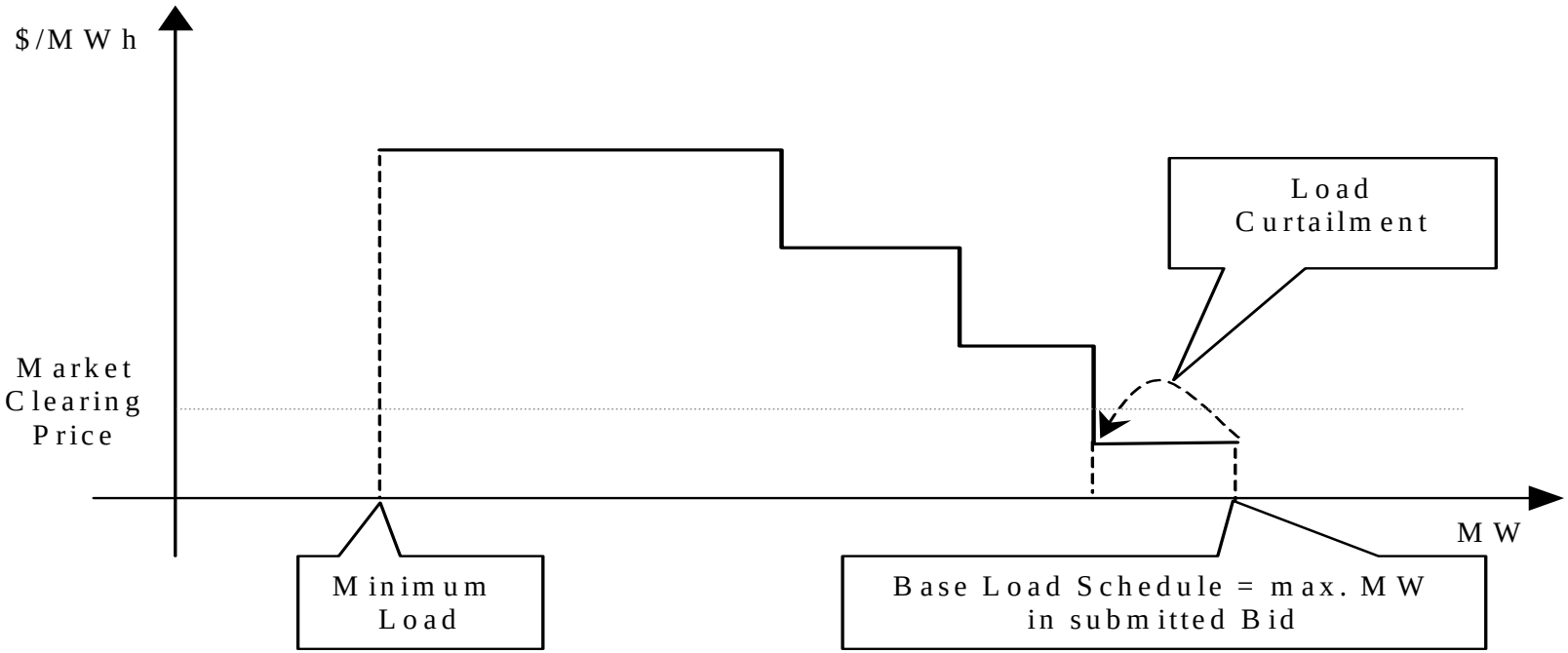
Response to Question: Comparison to Non-Participating Load (2)

- **Minimum bidding structure for Participating Load: Day-Ahead and/or Real-Time Energy Bid**
  - Load aggregation is nodal or Custom Load Aggregation
  - Up to 10 segments
  - Optional participation in Real-Time Market



A full Dispatchable Demand Resources model provides flexibility:

- **Optional bid components recognize operational constraints of Participating Loads. Within a simple Energy Bid:**
  - Ramp rate prevents abrupt changes of dispatched Load Curtailment
  - RUC Availability and Ancillary Service Bids allow recognition as capacity resources

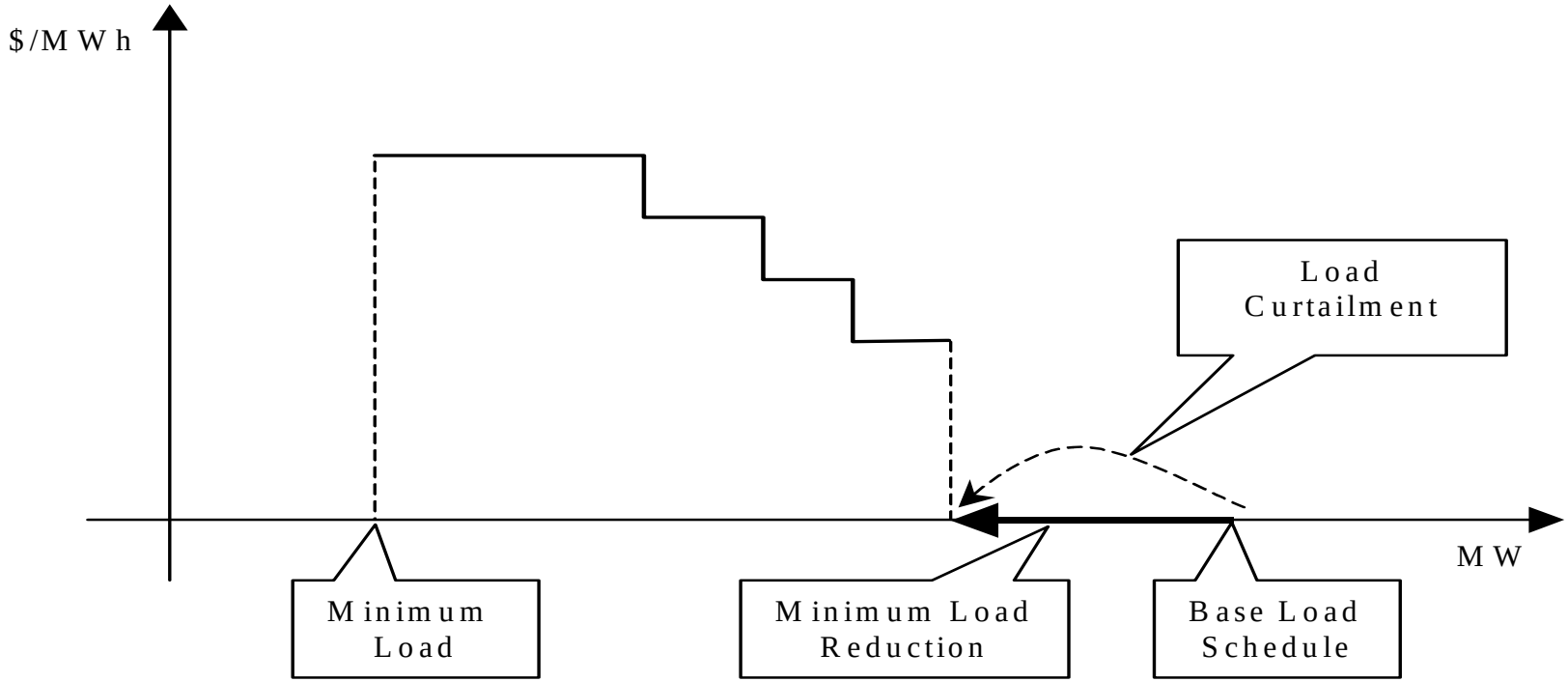


Participating Load Model Includes Optional Non-Spinning Reserve & RUC Participation

- **Eligibility for Non-Spinning Reserve capacity: load reduction within 10 minutes**
  - Requires certification, per technical standards
- **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.

Participating Load Bid with Minimum Load Reduction Constraints

- **Additional optional bid components recognize operating constraints:**
  - "Minimum Load Reduction" recognizes minimum curtailment costs
  - Minimum and maximum energy limits and time limits
  - CAISO is reviewing interaction with bid cost recovery



Comparability to Generation: Additional, Optional Bid Components

Dispatchable Demand 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 Load Reduction Time	Minimum up time
Maximum Load Reduction Time	Maximum daily energy limit
Minimum & Maximum Daily Energy Limit	Maximum daily energy limit
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

Base Load Schedule, Minimum Load Reduction, Load Reduction Initiation Time, Minimum & Maximum Load Reduction Time, Minimum & Maximum Daily Energy Limit, Load Reduction Initiation Cost, and Minimum Load Reduction Cost become meaningful when Minimum Load Reduction > 0

Response to Comments (1): Additional Optional Bid Components

- **The CAISO's original Draft Straw Proposal limited the optional Bid components to the vendor's previous design, but CAISO has also discussed other options:**
  - Minimum Base Load Time (minimum time after load restoration, before the next Load reduction)
  - Maximum number of daily load curtailments
- **Comments on Draft Straw Proposal supported adding these options, and explained their need**
- **CAISO is including these options in discussions with the vendor**

Response to Comments (2): Additional Option for Hourly RT Dispatch

- **Comments identified that a number of retail customers are limited to hourly metering intervals**
- **Option for Hourly Real-Time Dispatch can be accommodated by inclusion in Hour-Ahead Scheduling Process (HASP)**
- **Provisions for scheduling Participating Load in HASP would be similar to hourly intertie resources:**
  - Day-Ahead bids can include Minimum Load Reduction (MW and costs), daily energy limits, time limits, etc.
  - Real-Time scheduling is hour-to-hour: no energy limits, time limits, etc.

Response to Comments (3): Separate Function for DR Aggregator

- **Comments on Draft Straw Proposal suggested allowing demand response to be bid separately from scheduling of demand**
- **Ability to do this depends on broader policy issues, including CPUC regulations**
  - Implementation will depend on resolution of those policy issues
  - All CAISO market transactions go through Scheduling Coordinators (SC), but SCs do not all perform the same functions
- **CAISO will instruct its vendor to not assume that Demand Response Aggregator and Load Serving Entity use the same SC**

Response to Comments (4): Eligibility for Spinning Reserve and Regulation

- **Comments on Draft Straw Proposal supported adding these options, and explained their need**
- **CAISO would develop technical requirements for Participating Load to provide Spinning Reserve and Regulation**
  - Include these services in market software requirements
  - Include technical requirements in Participating Load Technical Standard (http://www.caiso.com/docs/2001/01/22/20010122115324207 3.pdf)
- **Technical requirements for all services need to conform to reliability requirements**
  - Highlights of requirements are in the following slides

Technical Requirements (1): Energy

- **In order to be settled financially for the energy price of a specific time interval, a Participating Load must provide meter data for that interval**
  - For hourly intervals, CAISO will accept hourly metering
  - For sub-hourly intervals, CAISO accepts data that are based on 15-minute metering intervals (submitted as 5-minute intervals)
- **No telemetry is required for providing Day-Ahead or Real-Time Energy**
  - Telemetry is useful for CAISO operations, for large loads

Technical Requirements (2): Load Aggregation

- **Scheduling at Custom Load Aggregation is consistent with current Participating Load Technical Standard, section 8.2:**
  - *"… The location of the Load must be included in the bids submitted to the CAISO. Loads posing potential Intra-Zonal Congestion problems will be identified and will not be allowed to participate. Preference will be given to Loads within areas where potential Congestion problems could be mitigated by Demand curtailment … The ISO reserves the right to determine whether a group of Loads … spans or interferes with an intra-zonal path."*
- **Release 1A does not exclude loads that have different intra-zonal congestion impacts from participation**
  - Congestion defines the boundaries of Sub-LAPs, i.e., Custom Load Aggregations.
  - Sub-LAP boundaries to be discussed before Release 1A implementation.

Same Load Aggregation in DA and RT

- **Participating Load model did not proceed in MRTU Release 1 due to an identified gaming opportunity**
  - Release 1 tried to adapt to scheduling all Load at large LAP while dispatching Participating Load (PL) at local level
    - Assume PL has maximum load of 100 MW, but averages 70 MW. Assume LAP LMP = $50 and Local LMP = $100 when PL's demand response bid for 10 MW is dispatched.
    - Intended result: PL schedules 70 MW at LAP, then is dispatched to 60 MW. PL settlement = 70 MW * $50 – 10 MW * $100 = $3500 - $1000 = $2500. PL gets average price of $41.67 in exchange for demand response.
  - Problem: Lack of enforcement for accurate scheduling
    - Assume Local LMP = $75 when no demand response is needed, PL schedules a Base Load at 100 MW, and offers $0 curtailment to actual Load of 70 MW. Although no demand response is needed, PL settlement = 100 MW * $50 – 30 * $75 = $5000 - $2250 = $2750. PL gets average price of $39.29 for no real demand response.

Technical Requirements (3): Non-Spinning Reserve

- **In addition to interval metering for energy, Non-Spinning Reserve requires telemetry**
  - *WSCC Operating Reserve White Paper (http://www.wecc.biz/documents/library/PWG/wsc6oprs.pdf): "The WSCC [Minimum Operating Reliability Criteria] requires that system operators must know, at all times, the amount of Operating Reserve available which can be fully activated within the next 10-minutes. That means this information must be periodically calculated and displayed."*
- **CAISO Energy Management System (EMS) requires 4-second reporting intervals in SC's Data Processing Gateway (DPG), but allows 1-minute updates from end-use meters to SC's system**
- **Participating Load Technical Standard limits load monitored by a single DPG to 1100 MW, of which 400 MW can provide AS. This does not limit total Participating Load eligibility for Non-Spin.**

Technical Requirements (4): Spinning Reserve

- **In addition to requirements for Non-Spinning Reserve, CAISO Tariff Appendix K (Ancillary Service Requirements Protocol) requirements for Spinning Reserve include:**
  - *The resource must provide an automatic frequency response governor with minimum performance:*
    a) *5% droop,*
    b) *Governor deadband must be ± 0.036 Hz,*
    c) *Power output must change within one second for any frequency deviation outside the governor deadband.*
  - *Ability to "increase real power output" within one minute after instructions to dispatch Spinning Reserve*
- **Requirements may change when WECC adopts separate Frequency Response Reserve**

Technical Requirements (5): Regulation

- **In addition to requirements for Spinning Reserve, WECC Minimum Operating Reliability Criteria (MORC) requires Regulating reserve:**
  - *"Sufficient spinning reserve, immediately responsive to automatic generation control (AGC) to provide sufficient regulating margin to allow the control area to meet NERC's Control Performance Criteria."*
- **CAISO Tariff definition of Regulation:**
  - *"The service … capable of responding to the CAISO's direct digital control signals … in an upward and downward direction to match, on a real-time basis, Demand and resources, consistent with established NERC and WECC operating criteria. …"*

Next Steps

- **CAISO issues Revised Draft Straw Proposal on Release 1A software functionality: 10/23/07**
- **Working Group comments requested by: 10/30/07**
- **CAISO issues Straw Proposal to stakeholders: 11/6/07**
- **Stakeholder meeting/conference call: Late November**
- **Working Group input on Business Practice Manual and User Guide begins: December 2007**
  - Identify data needs, data flow and associated timelines
  - Develop business rules and outline business process
  - Also develop necessary tariff modifications
- **Complete BPM and User Guide: July 2008**
- **Integration testing: Sept. to Dec. 2008**
- **Market simulation testing: Jan. to March 2009**