

Pricing Behavior in the Balancing Market



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California ISO
Your Link to Power

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Report History

- 🌐 Technical root cause type of report
- 🌐 Focuses on legitimacy
- 🌐 Legitimacy is multi-faceted
 - A. Market Power
 - B. Software/Modeling/Implementation Issues
 - C. Business Practices
- 🌐 Report examines issues related to B and C
 - Assumes no market power and valid bidding
- 🌐 Links legitimacy to avoidability

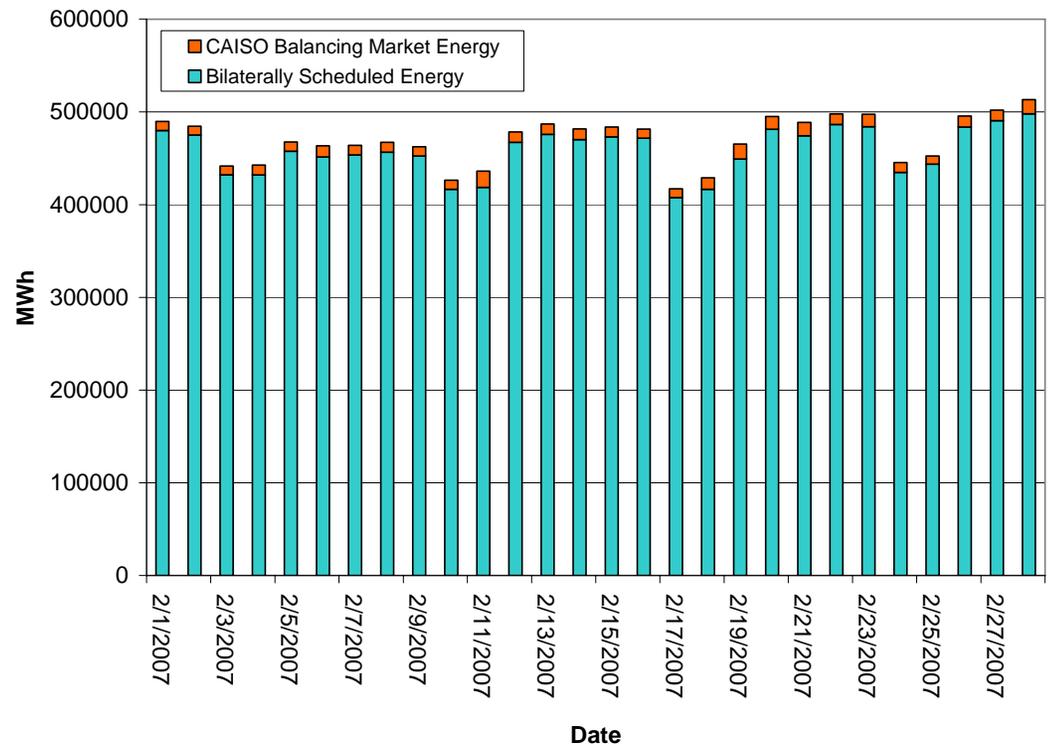
Nature of the Balancing Market

- 🌐 Balancing market provides near real time matching between generation and load
- 🌐 Balancing energy “fills the gap” between hourly scheduled energy and actual demand
- 🌐 Two types: hourly pre-dispatched energy (inter-ties) and 5-minute balancing energy
- 🌐 Inter-tie transactions do not set price
- 🌐 The most expensive balancing energy dispatched per 5-minute interval sets the market clearing price

Balancing Energy Volume

- 🌐 The vast majority of energy consumed in CAISO's balancing area is bilaterally contracted energy transacted outside of CAISO markets.
- 🌐 Real Time Balancing Energy typically constitutes less than 5% of total energy consumed
- 🌐 Balancing Energy costs are allocated to load deviation as a pro-rata charge to load deviations from hourly schedules

Balancing Energy Volume as a Percent of Total Consumption, Feb. 2007



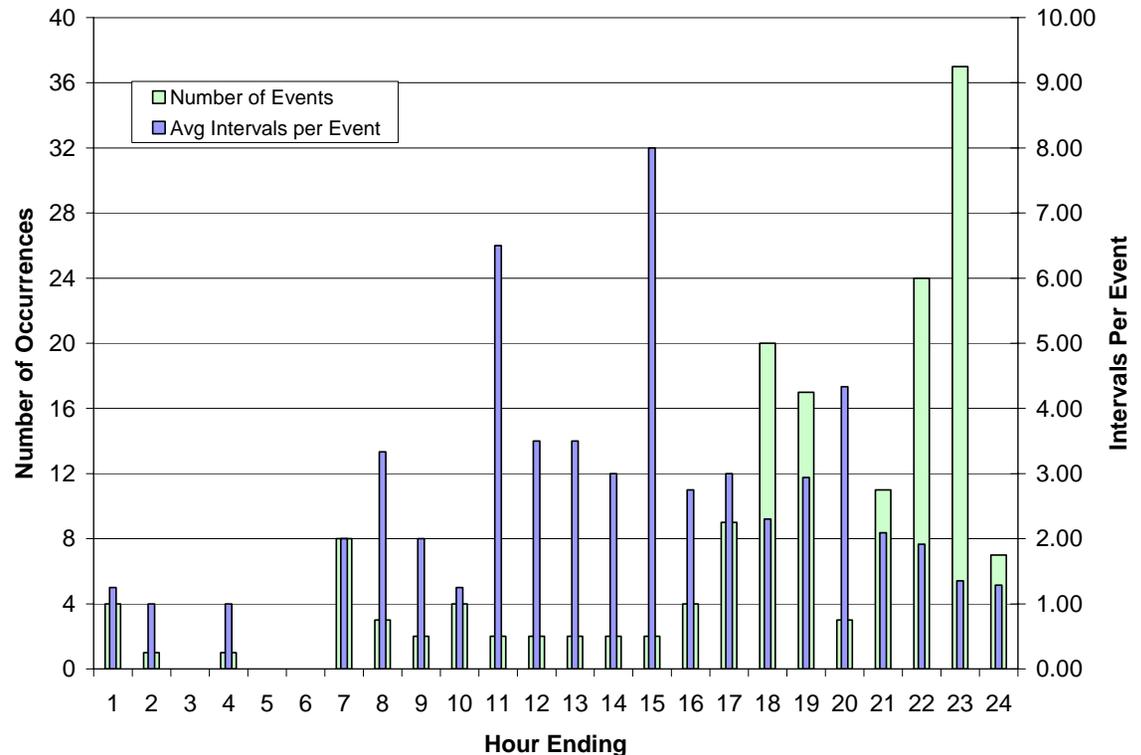
What is a “Good” Price for Balancing Energy?

- 🌐 Balancing Energy prices should accurately reflect the short-term value of energy in a five-minute time frame
- 🌐 Balancing Energy scarcity can arise for a number of reasons, including:
 - Outage of generation or transmission resources
 - Inherent difficulty in matching day-ahead load forecasts to actual demand
 - Inability of system resources to respond rapidly enough to changes in system requirements
- 🌐 High prices are an appropriate market response to scarcity of Balancing Energy

Characterizing Price Events

- Two types of price events: less frequent long duration spikes and more frequent short duration spikes
- Longer, less frequent price events reflect actual scarcity, tend to occur at peak load times
- Shorter duration spikes reflect inability of resources to rapidly respond to system conditions and tend to occur at evening ramp times

Spike Occurrences and Durations by Hour, Aug 2006 – Feb 2007

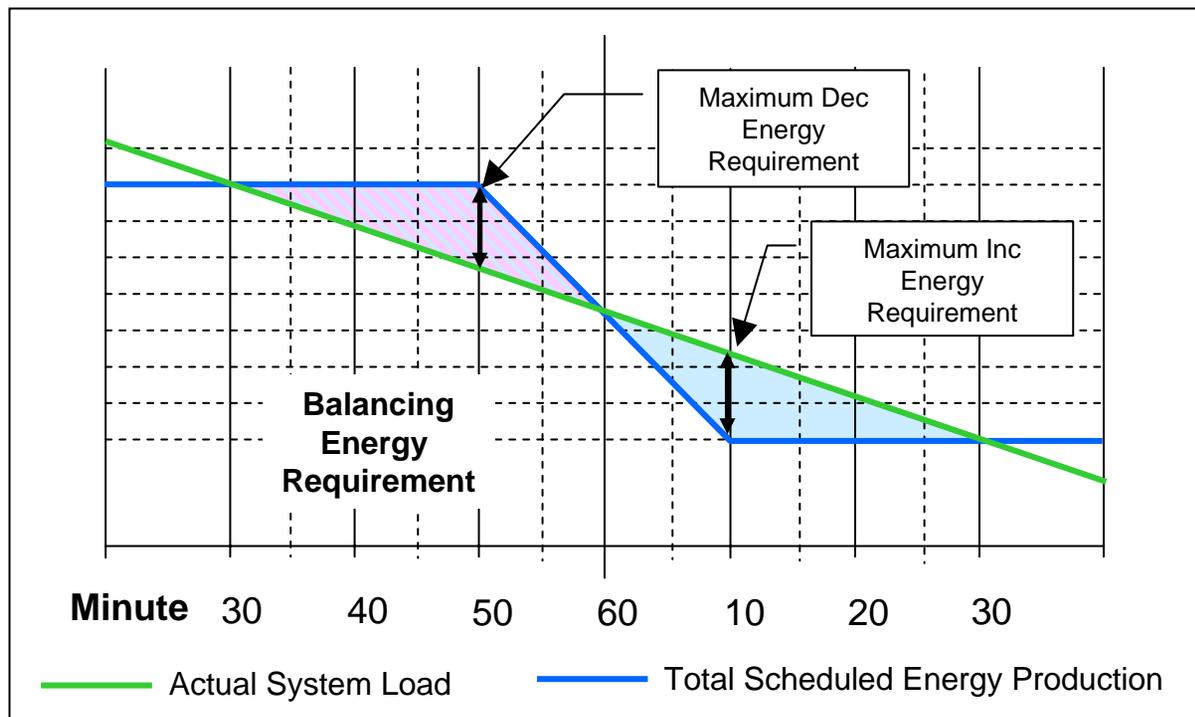


Legitimacy of Price Spikes

- 🌐 Longer duration spikes typically indicate an actual shortage due to unavoidable circumstances
 - Weather deviation from forecast
 - Outages
 - Under-scheduling
- 🌐 Price elevation is appropriate under these circumstances
- 🌐 Shorter Duration spikes indicate short term system scarcity
 - “Ramp Constraint” – system resources cannot change output instantaneously.
 - Some of these spikes are appropriate, but some could be mitigated through changes to software, regulatory or market structures

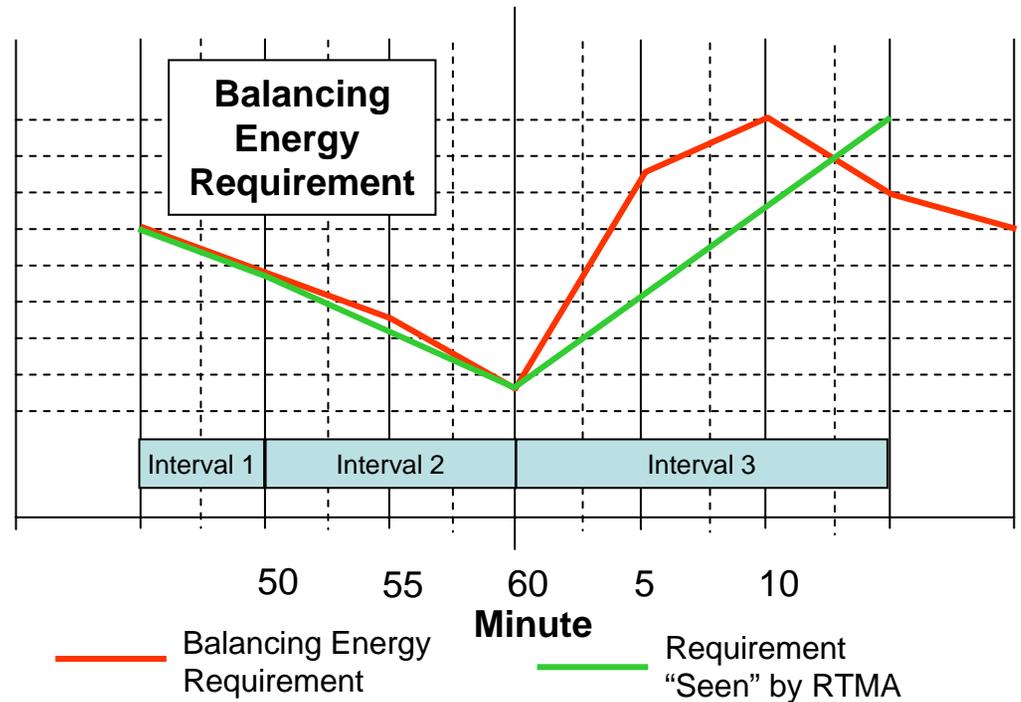
Conditions that Create Short Duration Spikes

- 20-minute ramping creates balancing energy swings
- Twenty minute ramp is a WECC standard for interchange transactions
- Internal generators use same standard
- Experience of Eastern ISOs



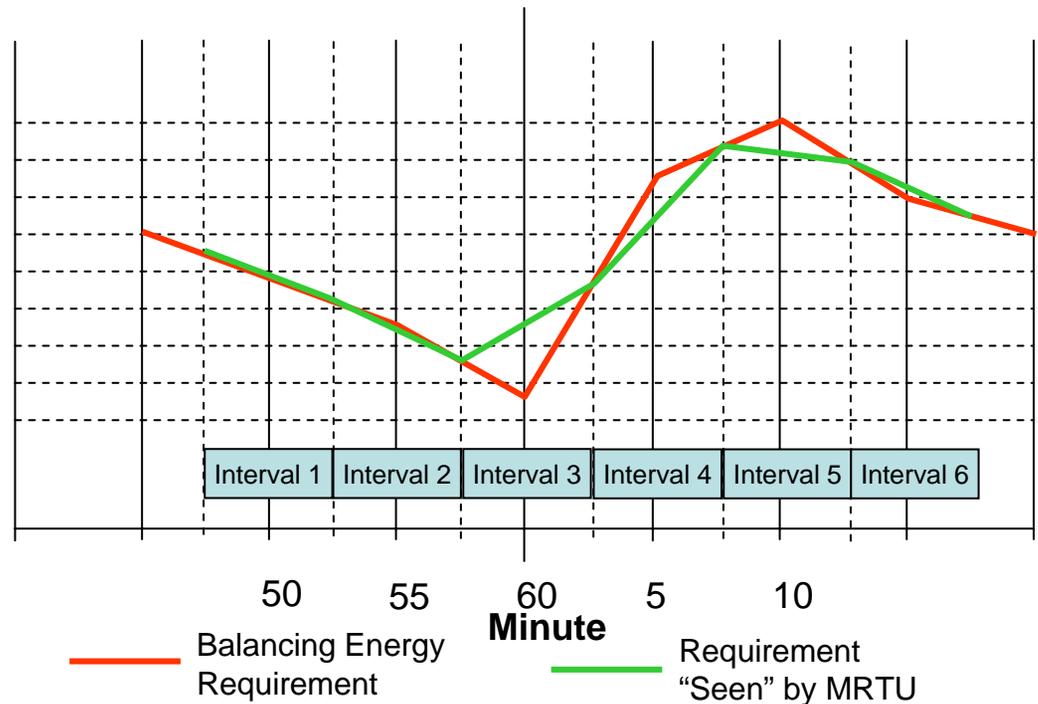
Ramp Underestimation

- Current system uses “Look Ahead” with intervals of varying duration
- System fails to account for rapid ramping during the 20-minute schedule change period, leading to price spikes after the change of hour
- This issue will be mitigated in MRTU



Mitigation of Ramp Underestimation in MRTU

- “Look Ahead” intervals all 5 minute duration
- MRTU dispatch system gets a more accurate picture of the Balancing Energy Requirement over the inter-hour ramp
- Dispatch system can optimize system response in advance to avoid undue price elevation



Predispatch Declines

- 🌐 RTMA models predispatches as binding commitments
- 🌐 Many SCs use them as free options
- 🌐 This mismatch degrades RTMA's dispatch optimization as the modeling does not correspond to the way predispatch bids are used
- 🌐 High levels of declines during stressed system conditions have contributed to price spikes

Conclusions

- 🌐 High Balancing Energy prices are appropriate if they reflect a true system scarcity
- 🌐 Balancing Energy costs represent a small fraction of the overall cost of energy in CAISO
- 🌐 Some price spikes are an appropriate reflection of scarcity, others could be mitigated by changes to systems, tariff, or conventions
- 🌐 MRTU will greatly improve the modeling of inertia ramps