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System Operator Corporation

Summer 2006
Operational and Market Issues

Eric Hildebrandt, Ph.D.
Department of Market Monitoring

Market Surveillance Committee Meeting
San Francisco, CA
August 8, 2006

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Overview

- **Day Ahead Scheduling vs. Loads/Forecasts**
- **Must Offer/Resource Adequacy**
  - Self commitment vs. Must Offer Waiver Denials
  - RA and non-RA
  - Reasons (System, Zonal and Local)
- **Super Peak Load Day Example (July 24)**
  - Why high prices in bilateral markets and Stage 2 contingency, but low real time prices?

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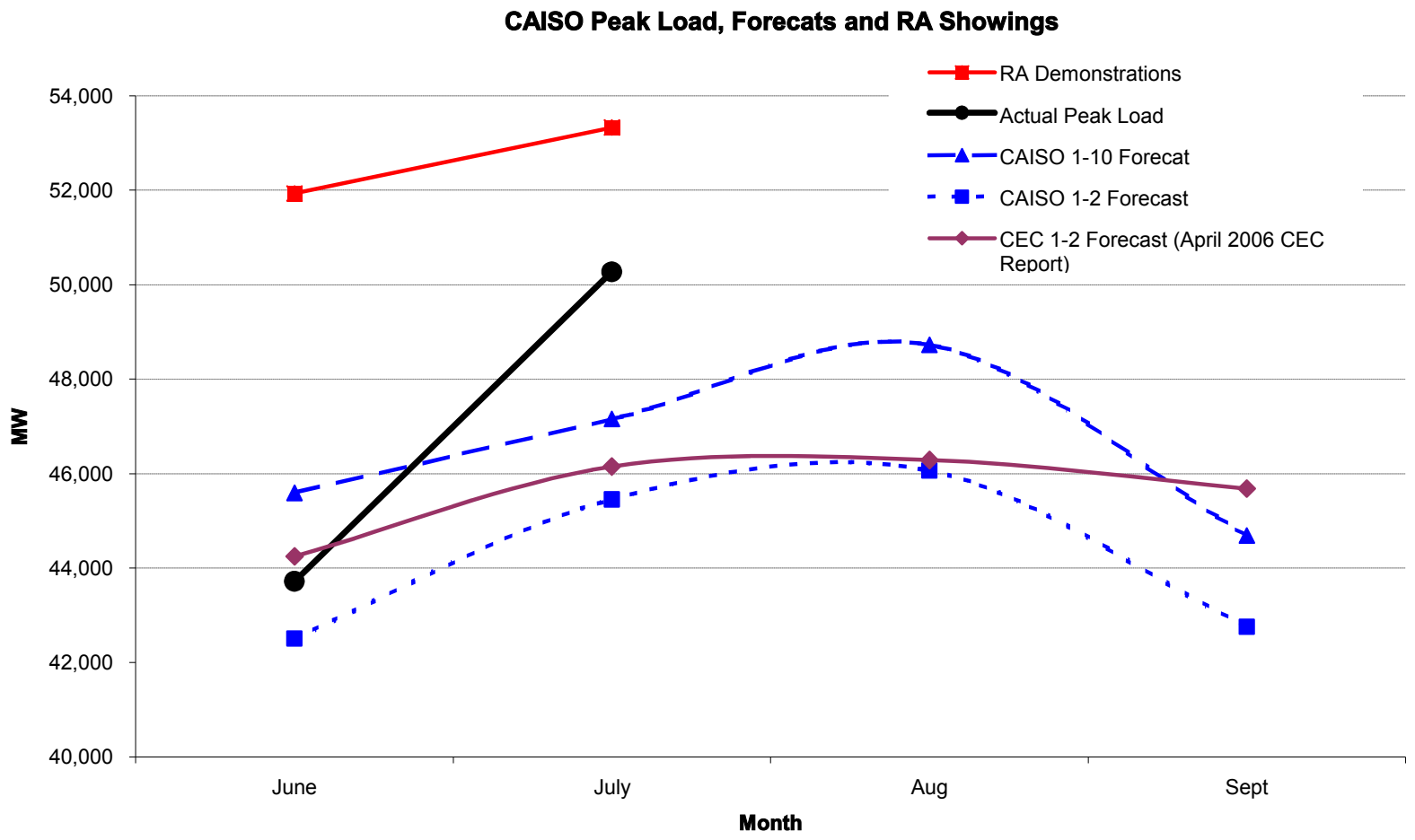
Peak Load, Forecasts and RA Showings



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Day Ahead Schedules and Forecasts

- **Day Ahead schedules for peak hours typically >97% to 103% of actual load and DA forecast of SCs**
- **Aggregate DA forecasts submitted by SCs pursuant to Amendment 72 highly accurate**
  - Slight tendency for sum of SC forecasts to be less than reported CAISO load expected due to transmission losses, method used to estimate CAISO load, etc.
- **CAISO forecast tends to overestimate peak load**

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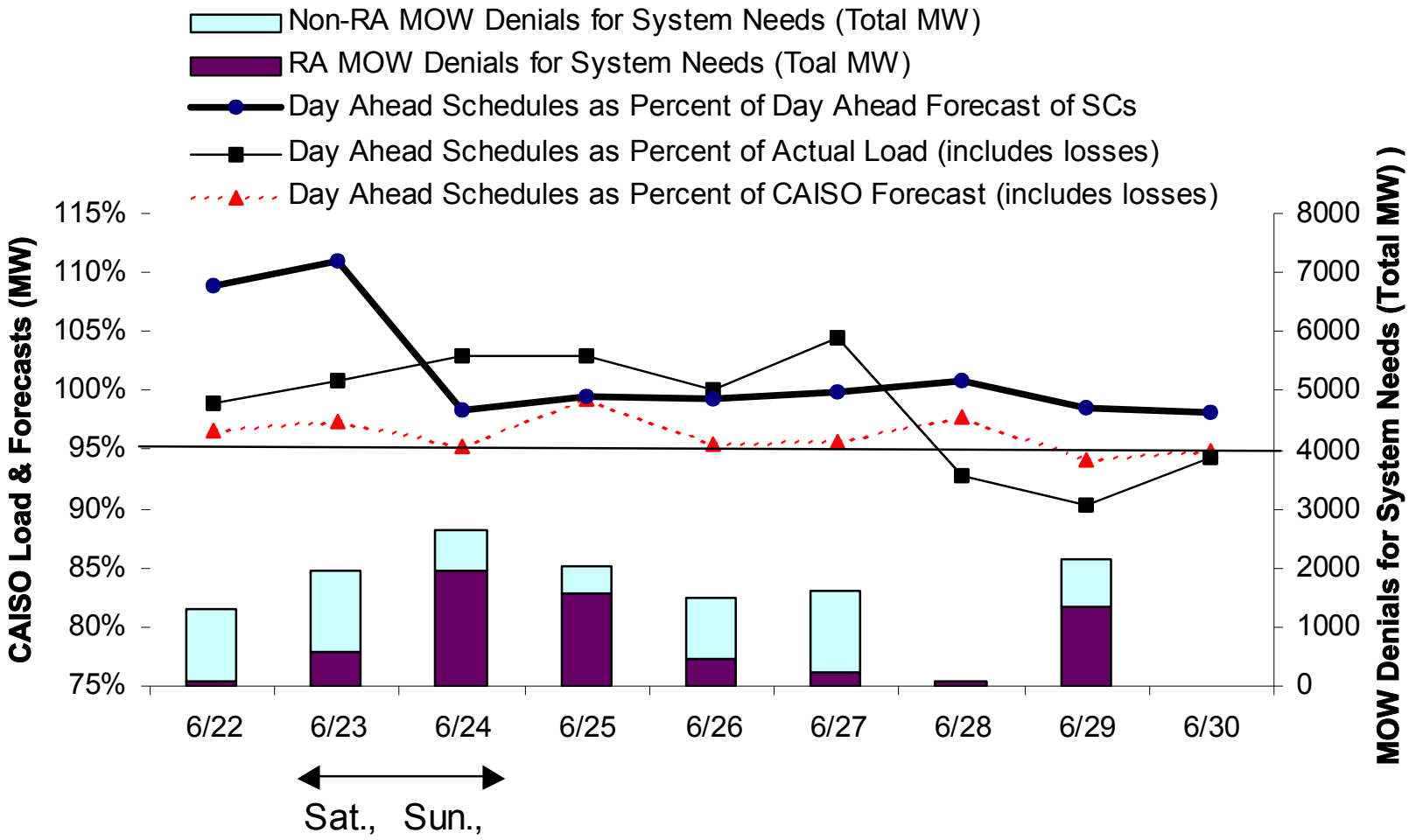
Aggregate Compliance with 95% Day Ahead Scheduling Requirements (Hour 16, June 22-30)



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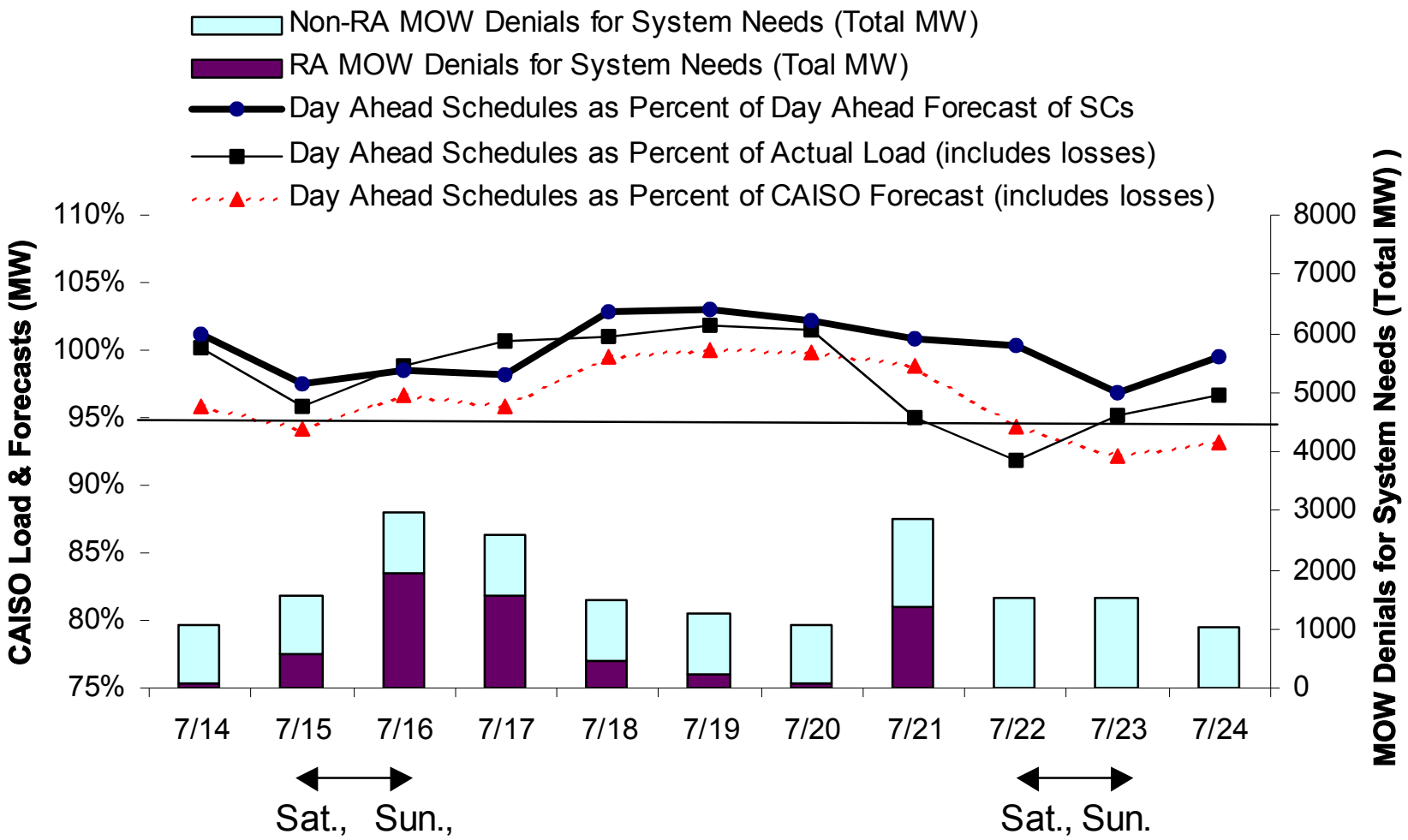
Aggregate Compliance with 95% Day Ahead Scheduling Requirements (Hour 16, July 14-24)



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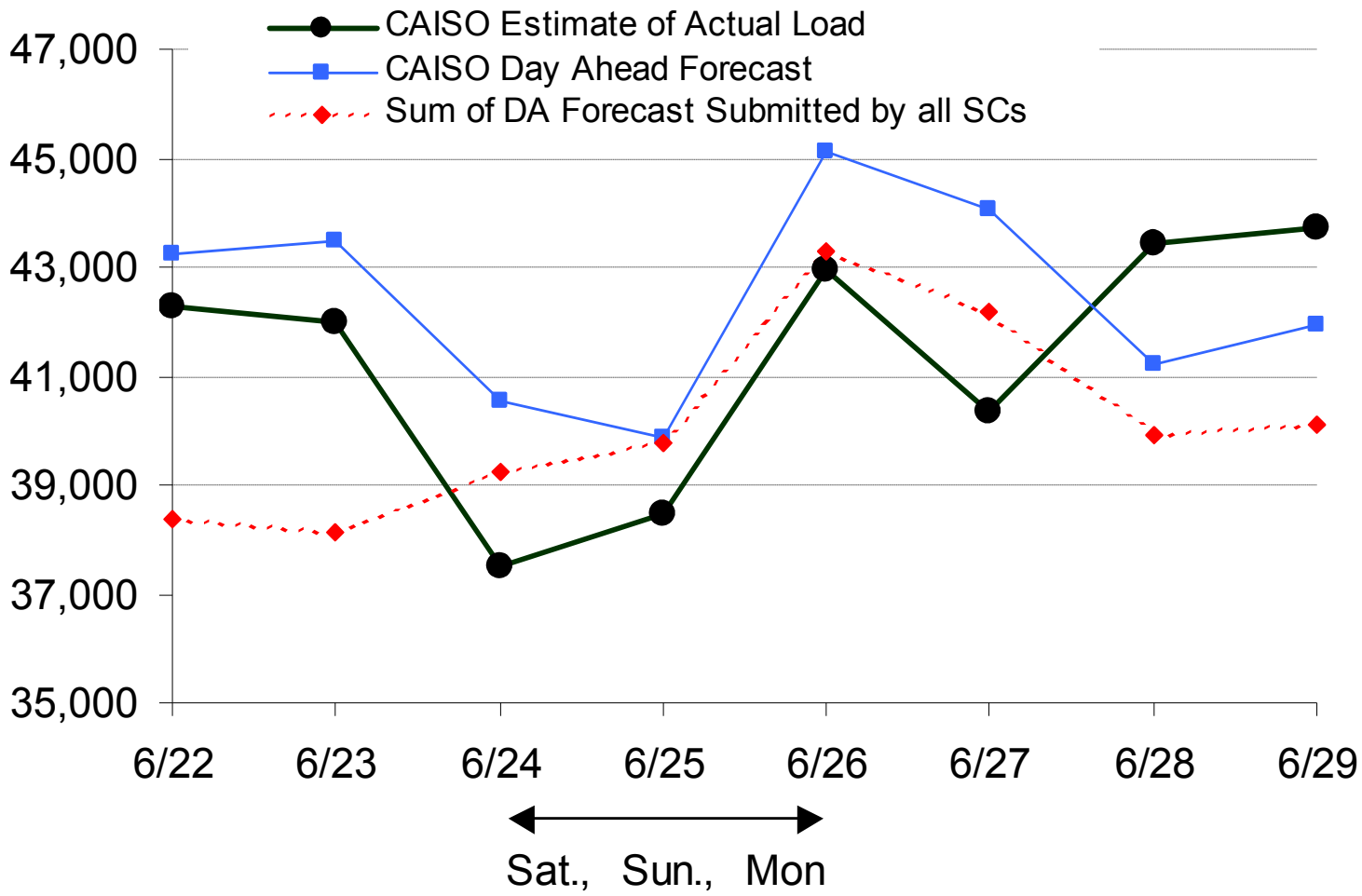
Day Ahead Load Forecasts vs. Actual Load (Hour 16, June 22-29)



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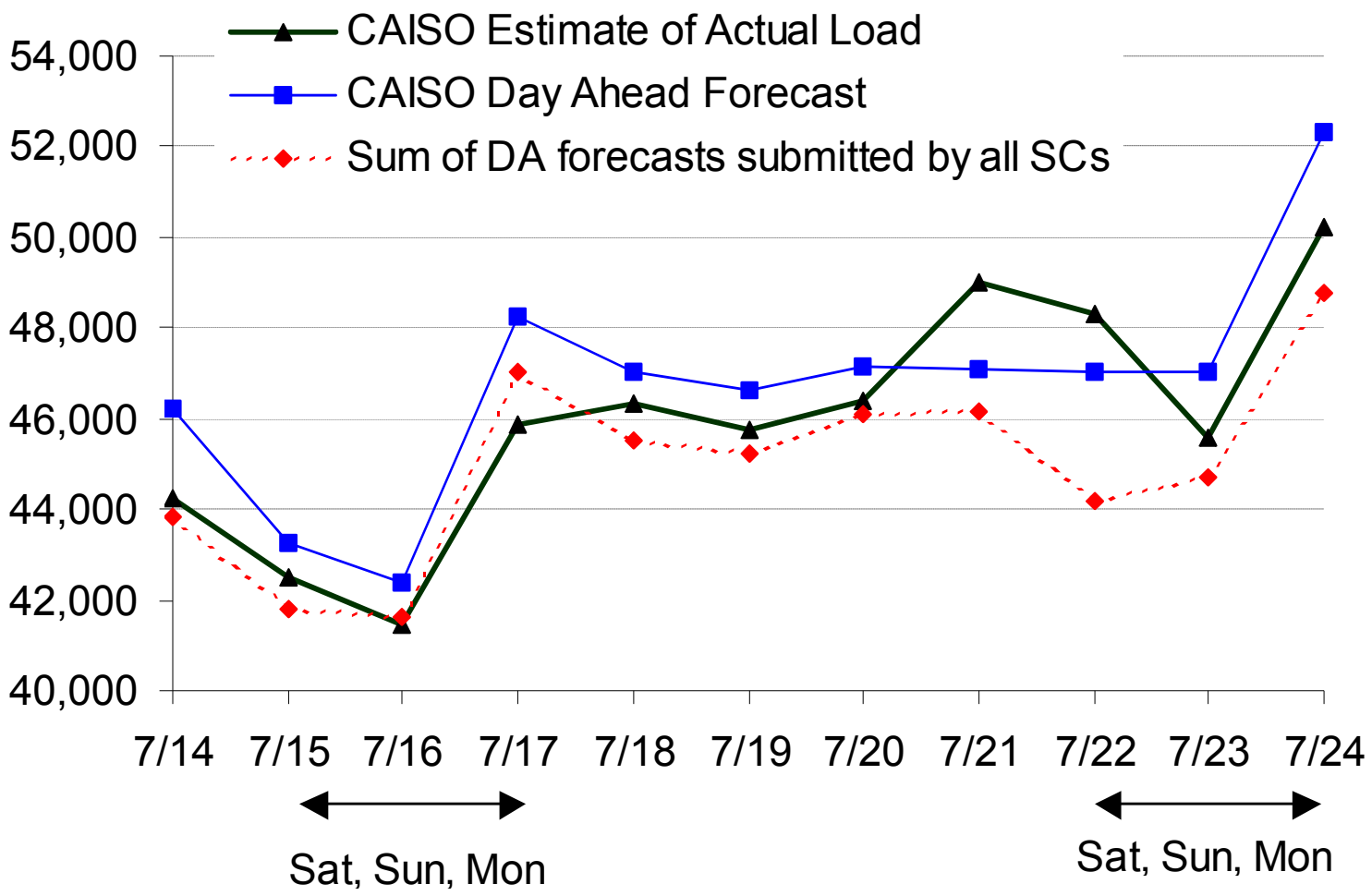
Day Ahead Load Forecasts vs. Actual Load (Hour 16, July 14-24)



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Resource Adequacy/Must Offer

- **RA showings of capacity ~ 53,000 MW in July, compared to peak load of ~50,000 MW**
  - ~ 6% margin due demand > 1-in-10 year forecast
- **High level of Day Ahead/Hour Ahead scheduling of RA capacity in energy markets**
  - Suggests many RA capacity contracts coupled with energy contracts?
- **RA resources receiving MOW denials often subsequently scheduled in DA/HA markets**
  - Reduces problems related to unscheduled minimum load energy
- **Quick start RA resources (e.g. CT's) not committed in Day Ahead MOW process, but counted by CAISO in making MOW decisions on non-quick start RA and non-RA units**
- **Non-RA units committed by CAISO through MOW process in cases where CAISO reliability needs could not be met by RA resources.**

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Reasons for Must Offer Waiver Denials

- **System (Overall system-level needs)**
  - Primarily due to system peak capacity margin targets incorporated into MOW process
  - Partly due to load uncertainty/over forecasting by CAISO
  - Do not appear due to DA under scheduling by SCs

- **Zonal**
  - Primarily due to operational targets for available unloaded capacity in SP26 to respond to transmission contingencies
  - Partly due to SCIT nomogram requirements for on-line capacity within parts of southern California
- **Local**
  - Limited volume due to transmission outages and local environmental restrictions

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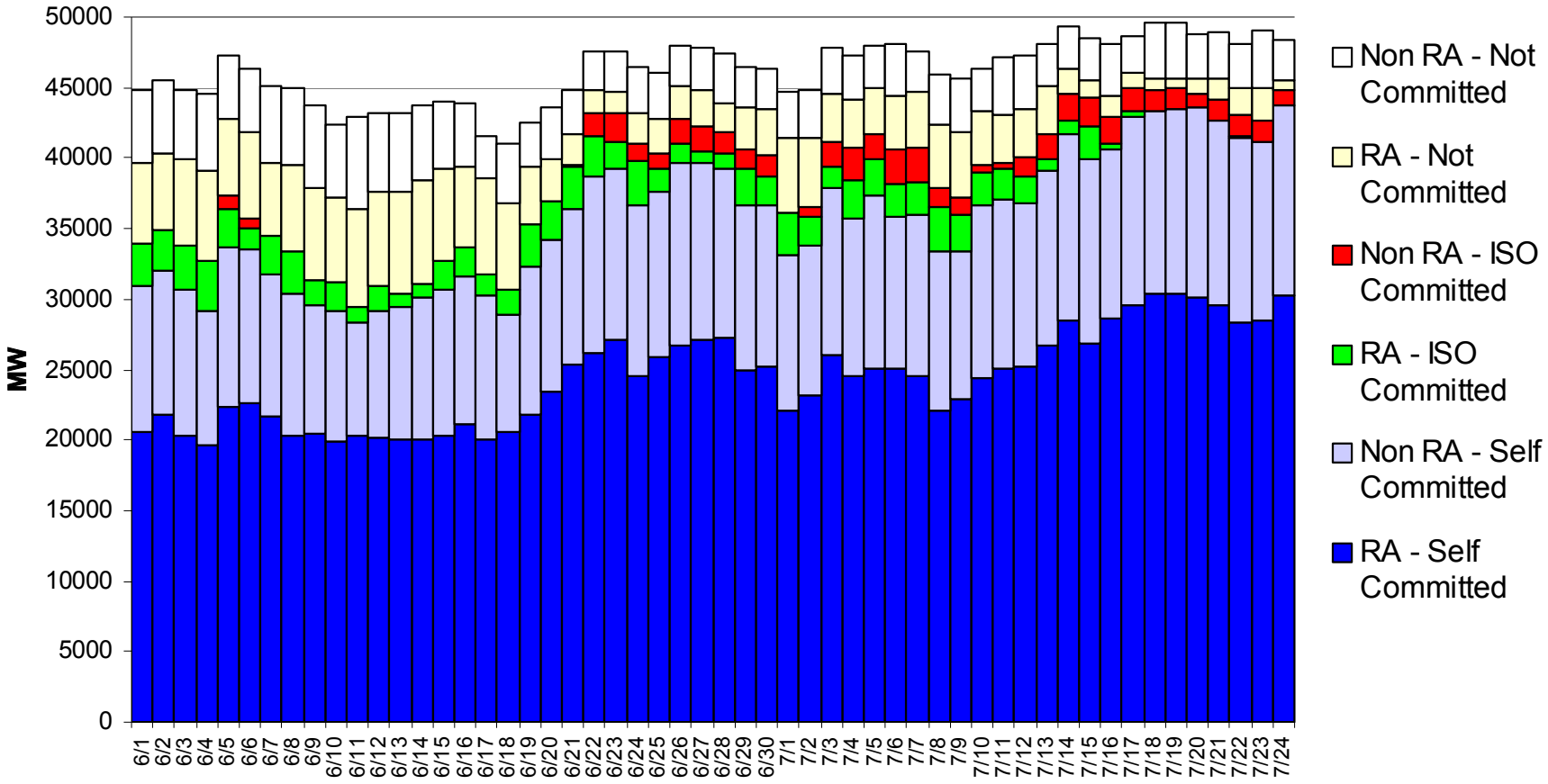
Commitment of RA and non-RA Units Subject to Must Offer Waiver Requirement

Self Committed vs. ISO Committed (MOW denial)



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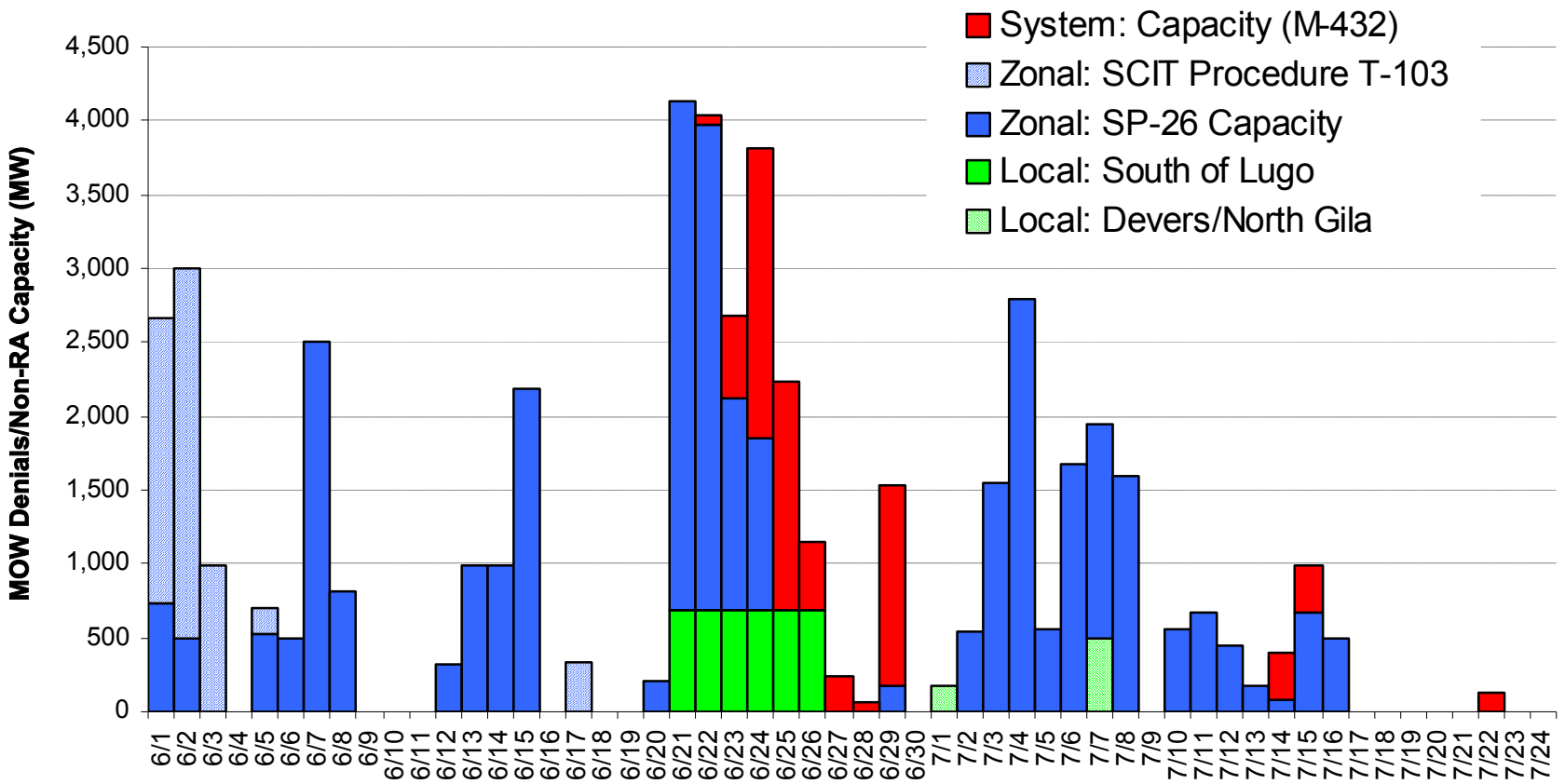
Reasons for MOW Denials of RA Capacity



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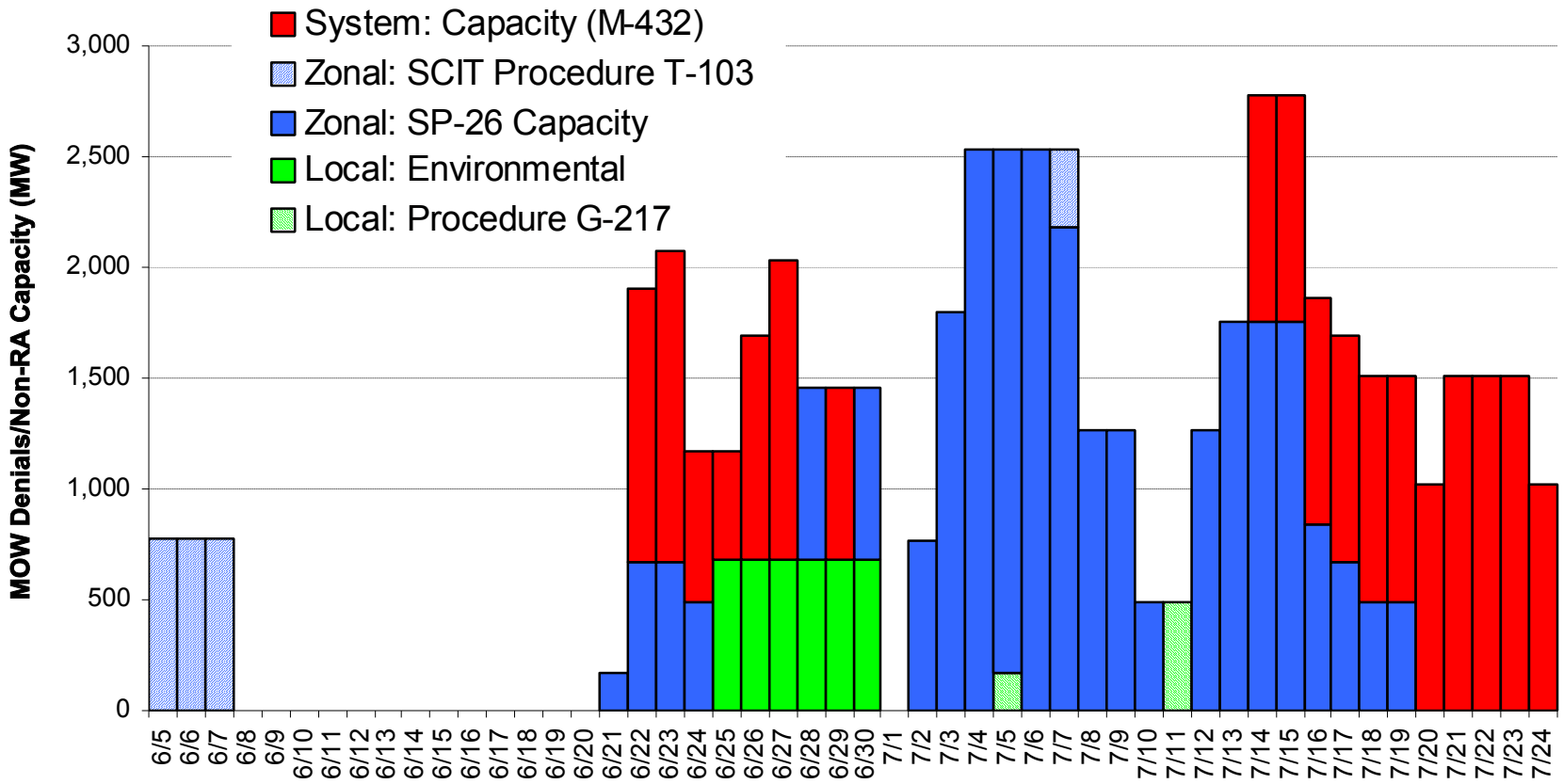
Reasons for MOW Denials of Non-RA Capacity



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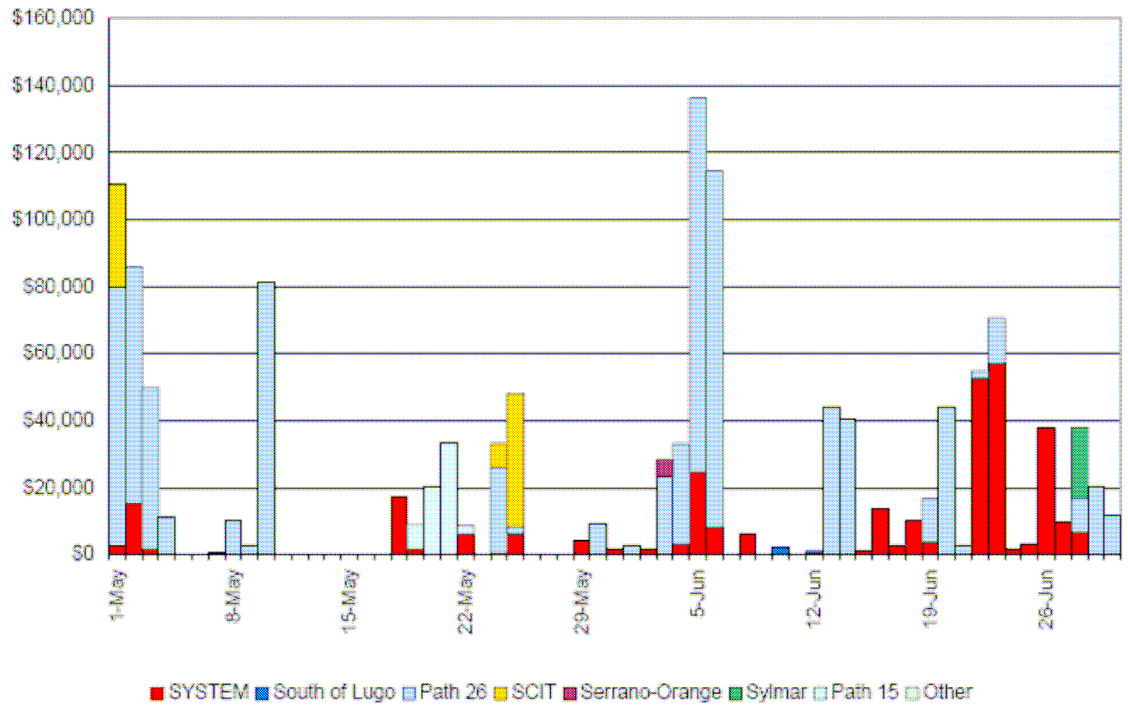
Out-of-Sequence Dispatches

As reported in June Market Performance Report



Source: CAISI Market Services, Market Performance Report, June 2006, dated July 21, 2006, p.16

Relatively large increase in OOS dispatches of incremental energy for SP15 and System reasons in May and June reported in CAISO Market Services report may <u>overstate</u> OOS dispatches due to overlap of "go to" operating levels for each unit represented by OOS instructions, and the market schedules and in-sequence energy dispatches of these units. CAISO staff working to resolve overlap.

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Super Peak Load Day Example (July 24)

- **High level of Day Ahead/Hour Ahead Scheduling**
  - Despite high prices in Day Ahead/Day of bilateral markets!
- **Minimal MOW denials**
  - ~ 1,000 MW of non-RA capacity committed for system needs
  - All other RA/non-RA capacity needed scheduled in the market
- **Moderate level of Out-of-Market Purchases**
  - Made to compensate for cut inter-tie schedules and minimal real time energy bids from imports
- **Limited demand in real time energy market**
  - Price spikes in real time market limited to intervals when demand very close to available 5-minute capacity
- **Load bias/regulation used to preserve operating reserve, rather than to "lean" on regulation for real time energy**

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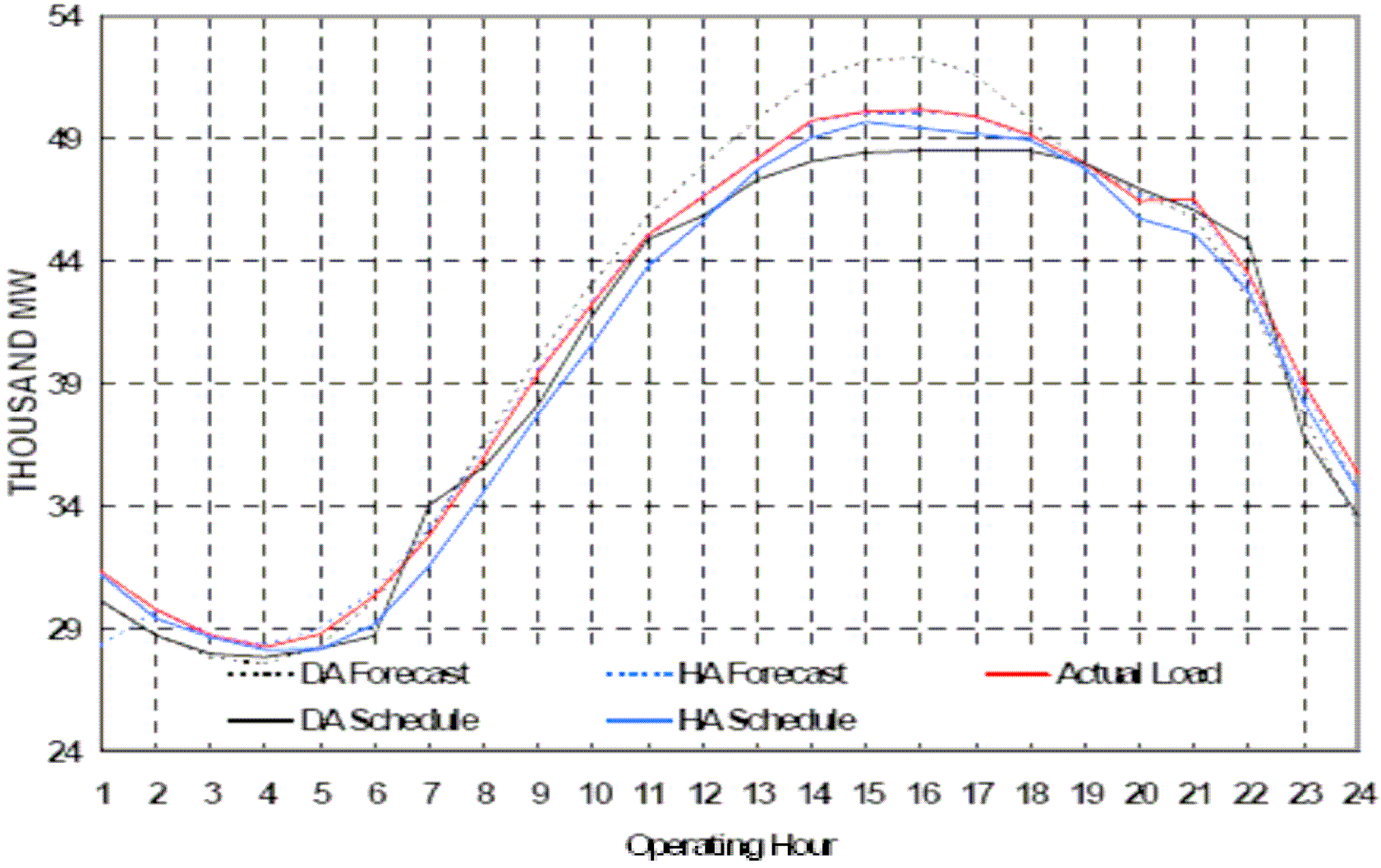
Loads and Schedules (July 24)



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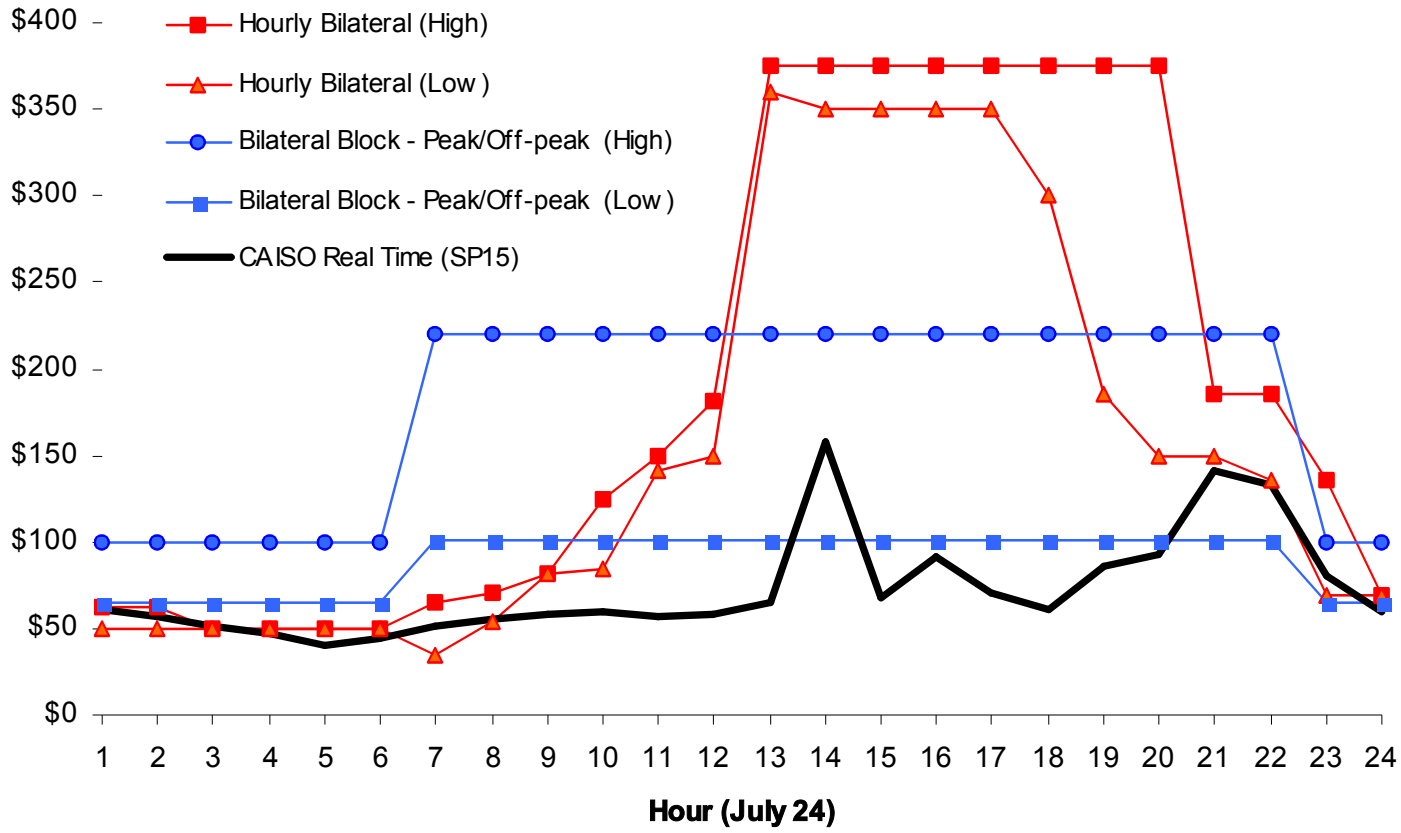
Bilateral vs. Real Time Market Prices (Julv 24)



Although prices in daily and hour ahead bilateral markets were relatively high, most LSE's procured enough energy to meet virtually all their expected load through Day Ahead and Hour Ahead schedules. Real time prices ended up rather low due to the high level of scheduling.

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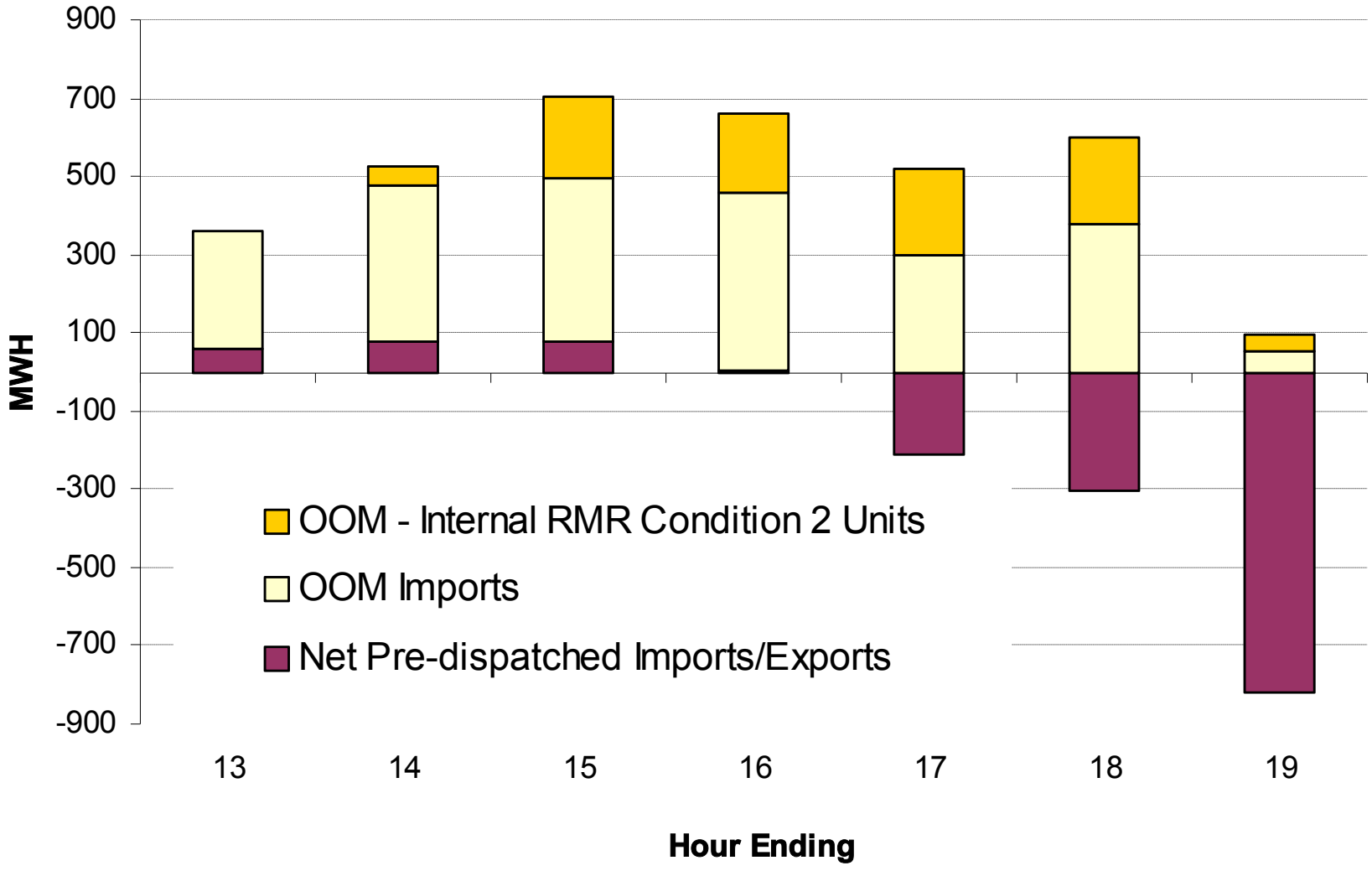
Out-of-Market Energy (July 24)



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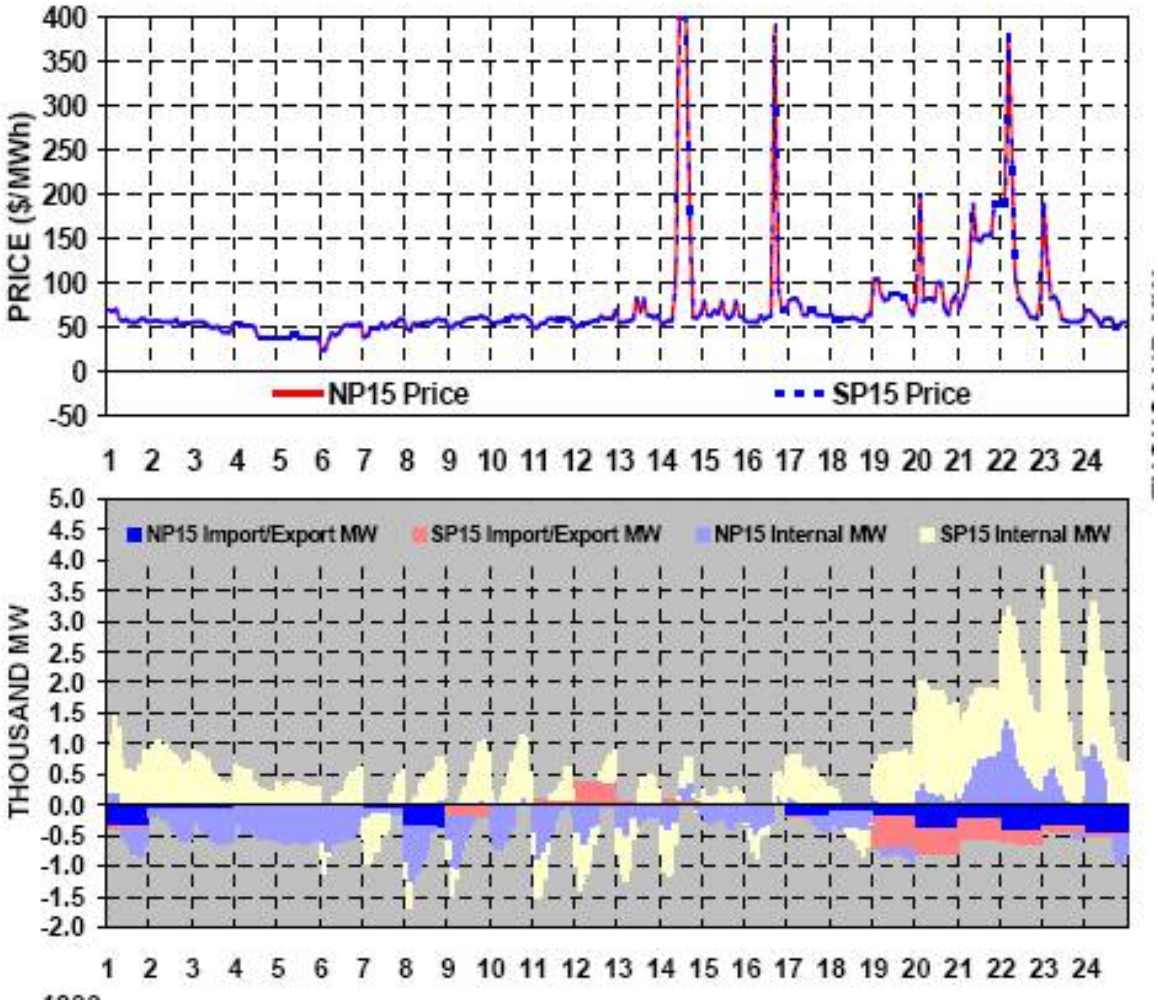
Real Time Energy Dispatches and Prices (July 24)



Due to a high level of forward scheduling, real time energy dispatches were relatively moderate most over the critical peak hours, with significant dec'ing of resource during many intervals. As a result, real time prices remained relatively low.

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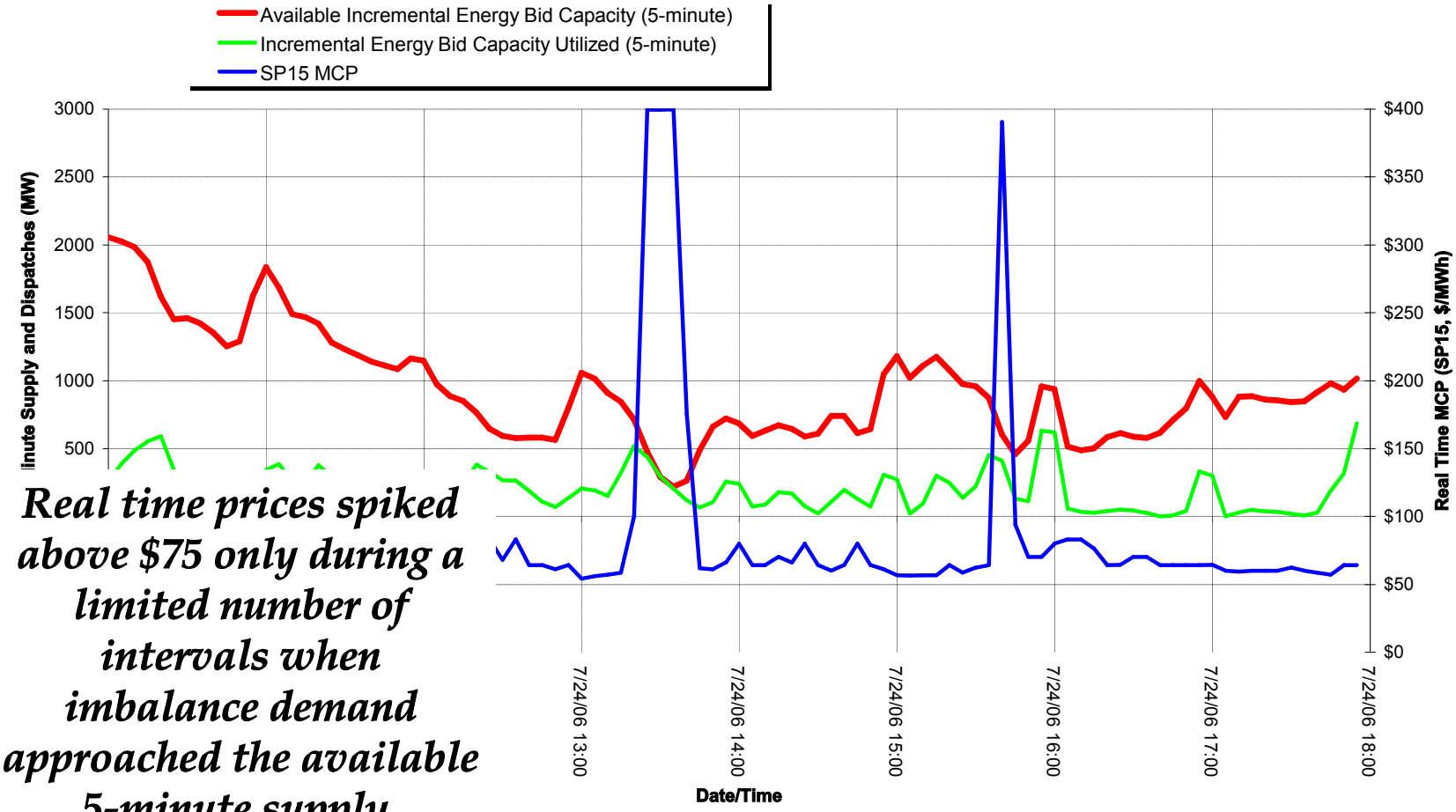
5-Minute Real Time Energy Bid Supply, Dispatches and MCP (July 24)



Real time prices spiked above $75 only during a limited number of intervals when imbalance demand approached the available 5-minute supply.

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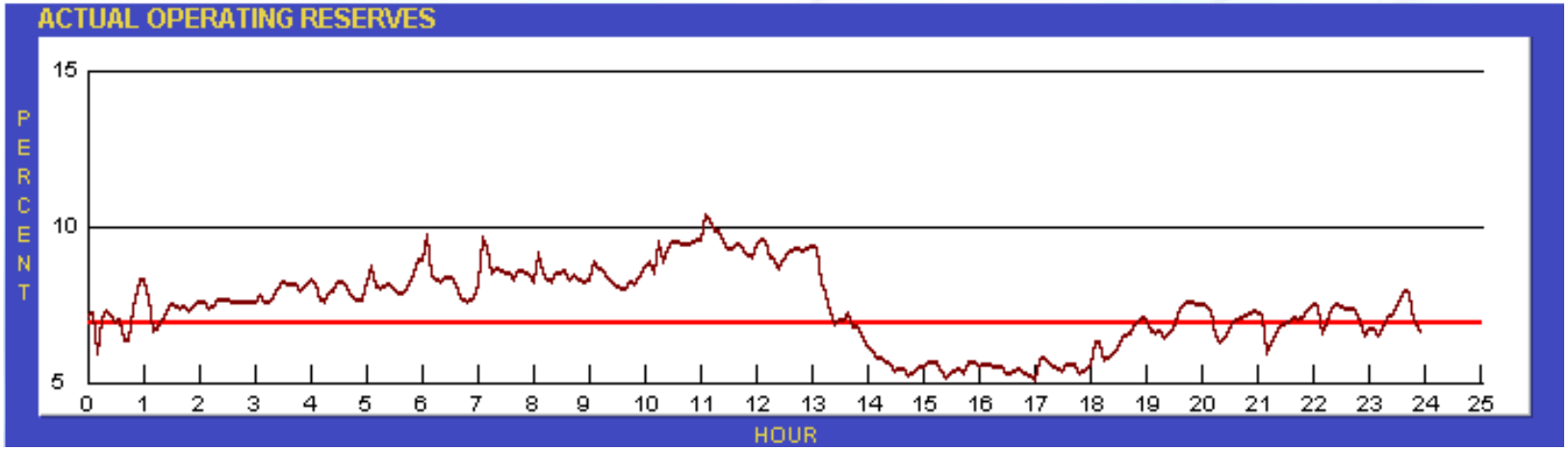
Operating Reserves (July 24)



Operating Reserves reported on OASIS include (1) unused spin and non-spin bids procured through market, (2) available upward regulation capacity, and (3) unused spin and non-spin scheduled from RMR units due to insufficiency in DA/HA A/S markets.

Reported 10-minute reserves do not include available 10-minute ramping capacity of other RA and non-RA resources.

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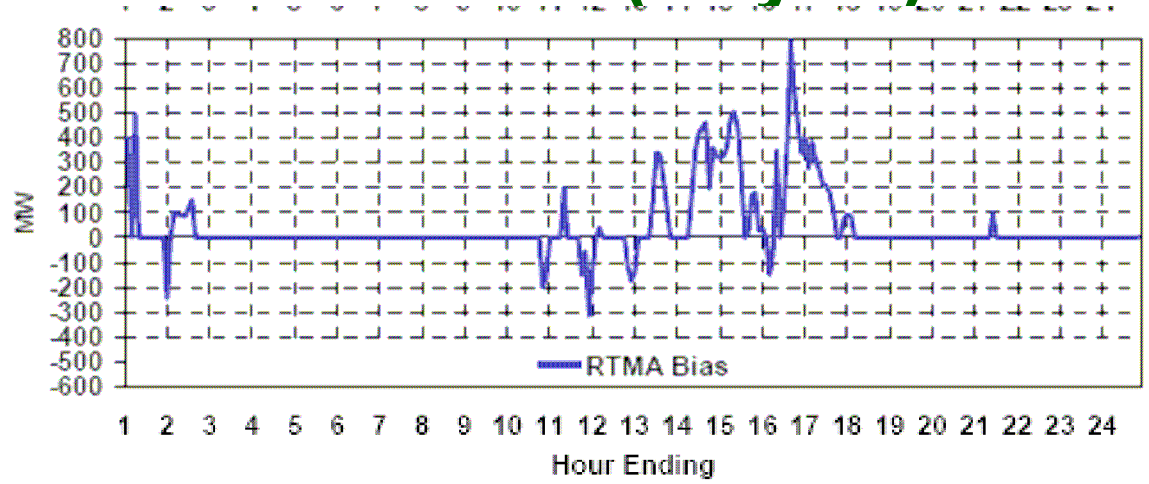
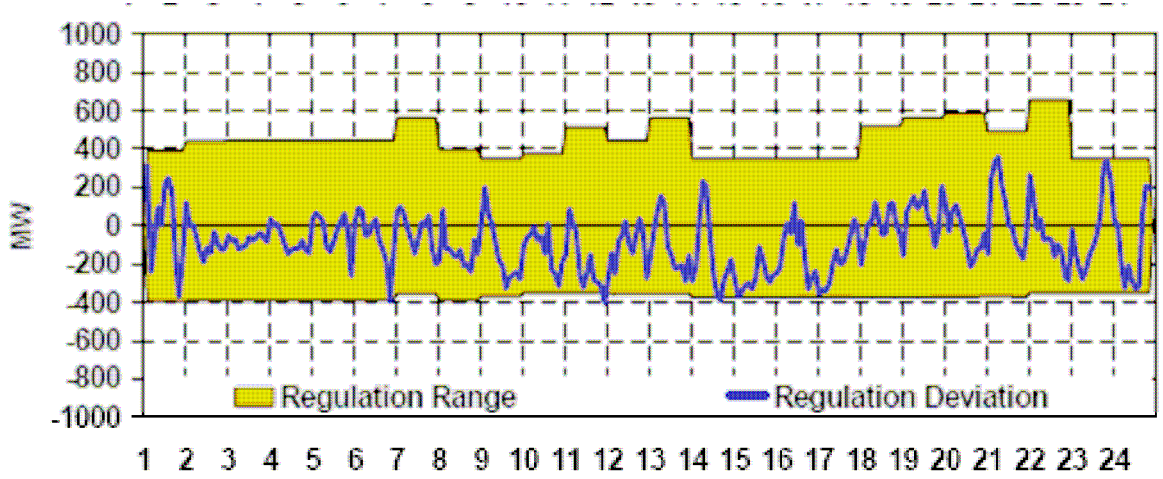
Real Time Load Bias and Regulation Deviation (July 24)





Operators entered positive load bias during many intervals when operating reserves were low. This increased RTMA dispatch of real time energy bids, which tended to drive regulation deviation negative, and thereby increase operating reserve.