

# Ancillary Services General Performance July 1, 2009 to September 30, 2009



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### **Overview**

- Review of A/S Market
- Procurement of contingency-only reserve
- Relationship between energy and ancillary service prices in real time



### **Ancillary Service Regional Procurement**

- Ten pre-defined Ancillary Service (A/S) procurement regions
  - To date, only four have been enforced
  - Minimum regional requirementsNested regions
- 100% of expected requirement procured in Day Ahead (DA) market

 Incremental procurement in Real Time Pre-dispatch (RTPD)

 Cascading/Substitution for upward A/S



Source: CAISO MRTU 200 Level Training Course



## **Ancillary Service Pricing**

#### Regional Ancillary Service Shadow Prices (RASSPs)

- Result of the regional procurement constraints
- Non-zero when regional requirement is binding, i.e. procurement is less than or equal to minimum requirement.

#### Ancillary Service Market Clearing Price (ASMCPs)

- Unit level market clearing prices
- Summation of RASSPs for which the one unit resides
- All units within same set of regions, for the same product, will receive the same ASMCP.



### **Real Time Ancillary Service Prices**

- **RASSPs** remain less than \$5/MW with a few exceptions
- Expanded regions binding more frequently
- **Regulation Down higher prices** in morning hours
- **Upward Services** 
  - Higher prices across peak hours Reg Up August price spikes
- Day Ahead prices higher than **RTPD** on average





### **Contingency Only Procurement**

- Contingency Only (CO) Procurement
  - DA CO elected by SC
  - All RTPD procurement is CO
  - Over procurement (\$0 priced bids) resulted in increased CO (fixed)
  - DA awards disqualified in RTPD resulted in increased CO
- Potential Issues with High CO
  - Reduces supply for imbalance energy
  - Potential price impact during noncontingent stressed conditions





# Co-optimization and Scarcity Pricing in Real Time

#### Co-optimization

- A/S energy procured jointly
- Lost opportunity cost (LOC) of not providing one product factored into pricing of the other product
- DA and RT

#### Scarcity Pricing

- Signal scarcity through higher, administratively set, A/S prices in times of insufficient supply
- Higher A/S price may influence the energy price at a pnode where both A/S and energy may be procured.
- Triggered off of DA and RT regional requirements for upward A/S and regulation down.



# Energy – Ancillary Service Co-optimization Day Ahead

Day Ahead Co-optimization

Financially binding energy and A/S awards
Procure 100% of requirement.

Correlation

LOC is reflected in the prices of A/S and energy.

 LOC creates a strong positive correlation between prices at the same location.

 Day Ahead Scarcity Pricing triggered off DA requirements.



 ASMCPs for upward A/S and Pnode LMPs at locations where A/S was procured in DA for July – September.



# Energy – Ancillary Service Co-optimization Real Time

- Real Time Pre-dispatch Cooptimization
  - Financially binding for A/SIncremental A/S procurement over DA
- Correlation
  - Expect high correlation when tight supply in energy and A/S through the LOC
- Real Time scarcity pricing triggered off A/S requirements in RTPD.



- •Same methodology as in DA chart
- •Only include data with A/S >\$15 and energy >\$40



# Energy – Ancillary Service Co-optimization Real Time

Real Time

 Financially binding energy awards and prices

Correlation

 High A/S and energy price at one pnode in RTPD may result in significantly different RTD energy prices.

- During times of tight A/S and energy supply, the cooptimization and correlation of prices does not hold.
- Reserve Scarcity Pricing in RTPD may not impact RTD energy prices.



•Same observations from RTPD chart

