

RTO West Ancillary Services Markets

Lessons from California
and Next Steps Issues

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Ancillary Services

California ISO

- Acquired through daily markets:
 - Regulation Up
 - Regulation Down
 - Spinning Reserve
 - Non-Spinning Reserve
 - Replacement Reserve
- Acquired through contracts:
 - Voltage Support
 - Black Start

RTO West (proposed)

- Acquired through daily markets
 - Regulation
 - Load Following Up
 - Load Following Down
 - Spinning Reserve
 - Non-Spinning Reserve
 - Replacement Reserve
 - Congestion Redispatch
 - Balancing Energy
- Acquired through contracts and daily markets
 - Voltage Support
 - Black Start
- RTO West is sole provider
 - Scheduling and Dispatch

CA Lessons

- Sequential AS Markets caused high procurement costs and higher prices for less valuable services.
 - Use a Simultaneous Auction.
 - Need to specify Scoring and Settlement Rules.
- Several CA problems already addressed by RTO West proposed design.
- Energy markets interact with AS markets.
 - Not solved in CA.
 - Energy prices could impact AS in RTO West

Some CA Problems are Designed out of RTO West

<i>CA Problem</i>	<i>CA Redesign</i>	<i>RTO West Proposal</i>
<i>Single market for Regulation</i>	Separated Up/Down Regulation markets.	Already set up with separate regulation and load following up and down markets.
<i>Under-scheduling</i>	Settlement now based on metered rather than scheduled demand. Deviation replacement reserve charge implemented.	Already metered demand.
<i>Loading of committed resources</i>	No-pay for uninstructed deviations. 10-minute pricing.	A monitoring issue, but already employs 10-minute pricing.
<i>Illiquid markets</i>	Deferred at least 10% of day-ahead to hour-ahead. Trading among SC's. Raised limit on imports.	Trading among SC's and self-provision already part of design. RTO West can require participation if illiquid.

Old CA System: Sequential AS Markets

- Day ahead and hour-ahead markets with firm requirements for each category in order:
 - Regulation
 - Spinning Reserve
 - Non-spinning Reserve
 - Replacement Reserve
- SCs can bid same capacity into as many markets as desired.
- CAISO evaluates each market sequentially and separately.
- Losing bids may be passed onto following markets of SC specifies. SC can also specify different capacity prices and energy prices for each market.
- Led to “irrational prices”: higher prices for lower quality services
 - Many services are substitutable and mutually exclusive
 - Some are complementary - e.g. spinning reserve requires producing energy

CA AS Market Redesign

- Implemented “Rational Buyer” approach Summer 1999.
 - Allows ISO to increase demand for higher quality service and reduce demand for lower quality service if and only if this substitution is cost-effective
 - Implemented as ”pre-processor” to existing software.
 - More effective “long-term” measures are “being worked out”.
 - Cost savings and anomalies appear to have improved.
- Can be interpreted as a reformulation of service requirements as cumulative.
 - Substitutes higher quality A/ S to replace lower quality A/ S
 - Regulation used for any other service
 - Spin used for Non- Spin and Replacement
 - Non- Spin used for Replacement

Rational Buyer Example

Service	Old System			<i>Payment</i>			<i>Charge</i>			
	Req't	MCP	Cost	Rational Buyer due SC		Rational Buyer due ISO		Req't	MCP	Cost
	(MW)	(\$/MWh)	(\$/hr)	Req't	MCP	Cost	Req't	MCP	Cost	
				(MW)	(\$/MWh)	(\$/hr)	(MW)	(\$/MWh)	(\$/hr)	
Regulation	1,500	10	15,000	2,500	20	15,000	1,500	20	30,000	
Spin	1,000	20	20,000	1,000	20	20,000	1,000	20	20,000	
Non-spin	1,000	40	40,000	500	20	10,000	1,000	20	20,000	
Replacement	1,000	80	80,000	500	30	15,000	1,000	30	30,000	
Total Cost (\$)			\$155,000			\$ 95,000			\$100,000	

Regulation can substitute for Non-Spin and Replacement

Procure 1,000 MW more Regulation and 500 MW less Non-Spin and Replacement

Total Savings: \$155,000 - \$95,000 = \$60,000

AS Market Design for RTO West

- Use Simultaneous auction.
- Need to specify
 - Scoring Rule
 - Minimize procurement cost (*Market Clearing Price* Quantity*)
 - Minimize bid cost (*Bid*Quantity*)
 - Settlement Rule
 - Uniform price based on usage (*Reg used for Spin paid Spin*)
 - Uniform Price based on bid type (*Reg paid Reg Price*)
 - Marginal Value pricing (*highest price resource can be used for*)
 - Pay as bid

Secondary Design Issues

- First-Price vs. Second-Price MCP
- Two-Part Bids add complexity.
- Energy-A/S interactions need to be considered.

Next Steps Issues for RTO West

From WG Summaries

- Decide how much detail we need for Phase II
- Decide if we want to use simulation to model the design choices
- Decide how to reserve transmission for different AS products