

Pricing Logic Under Flexible Modeling of COG Units



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Background

- 🌐 What are COG Units?
 - COG stands for Constrained Output Generation
 - COG units are “lumpy” in that
 - Their $P_{min} = P_{max}$, or very close to it
 - They have a minimum run time
- 🌐 Why are we modeling them as flexible?
 - So that when a COG is needed in order to meet system conditions, it is able to set the LMP.
 - FERC said so.

Context

-  Number of COG units currently in the Master File
 - #
 - %

-  Aggregate Capacity of those COG units
 - #
 - %

-  Location of COG Units

Market Design Issues

-  Temporal Issue
-  Spatial Issue
-  LMPM Issue
-  DA *versus* RT Markets Issue

Temporal Issue

- Due to COG unit minimum run times, and non-COG unit ramping constraints, a COG unit can set the LMP for more intervals that it is “marginal.”
- For example, given
 - COG with $P_{min} = P_{max} = 50$ MW, \$100/MW interval, min run = 3 intervals
 - Non-COG with range [0,500], \$40/MW interval

	t	t+1	t+2	t+3
Load	525	500	500	500
COG	50	50	50	0
Non-COG	475	450	450	500
Price	\$100	\$100	\$100	\$40

Spatial Issue

- Treating COG units as *inflexible* in the RT scheduling run and flexible in the RT pricing run can lead to inconsistent price signals among nearby generating units.
- This is expected to be a very limited problem both in size and in frequency. Due to
 - Small number and aggregate capacity of COG units
 - Issue would arise only under rare and specific circumstances
 - Unlikely to be systematic or predictable

Local Market Power Mitigation Issue

- COG units that elect to be modeled as strictly “lumpy” in the Scheduling Run do not submit energy bids, but rather just Start-Up and Minimum Load Bids.
- The P_{min} divided by the Minimum Load bid for a COG unit implicitly defines its “energy bid”
- To what extent do changes to the mitigation of SU-ML bids under MRTU Release 1 mitigate a COG unit’s ability to inflate its Minimum Load bid and thus circumvent LMPM?

Day Ahead *versus* Real Time Market Issue

- 🌐 In the DA Market, COG units are modeled as **Flexible** in the Scheduling Run, and **Flexible** in the Pricing Run.
 - This ensures that prices and quantities are consistent and thus CRR settlement will be accurate.
 - Note that the DA Market does not necessarily have to result in a feasible dispatch.
- 🌐 In the RT Market, COG units are modeled as **Inflexible** in the Scheduling Run, and **Flexible** in the Pricing Run.
 - The true operating constraints are imposed in the Scheduling Run in order to ensure a feasible dispatch.

DA *versus* RT Market Issue (continued)

- Using different assumptions about COG flexibility in the two markets can
 - Impact the consistency and clarity of price signals across the two markets
 - Cause price divergence across the two markets
- HOWEVER,
 - These are only potential impacts
 - They are likely to be very small and infrequent
 - They are likely to be unsystematic

Next Steps...

February 1	Issue Paper Posted at: http://www.caiso.com/1f60/1f60e4372fe40.pdf
February 8	MSC/Stakeholder Meeting
February 15	Stakeholder Comments Due: GBiedler@caiso.com
February 20	Straw Proposal Posted
February 27	Stakeholder Conference Call
March 5	Stakeholder Comments Due: GBiedler@caiso.com
March 12	Final Proposal Posted
March 14 (tentative)	MSC Opinion Finalized and Posted
March 26-27	Presentation to CAISO Board of Governors

Questions, Comments & Concerns...

 Please send me your questions, comments and concerns.

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