Revised Straw Proposal

Multi-Stage Generator Unit Modeling Enhancements

August 5, 2011

MSG Enhancements

Prepared for Discussion on a Stakeholder Call – August 12, 2011

1   Introduction

In December 2010, the ISO implemented modeling functionality that optimizes the commitment and dispatch of generating units that, by their physical nature, have multiple operating configurations. The MSG functionality is designed to take advantage of the inherent flexibility of these resources while respecting their operating characteristics and the costs of their operation. The ISO has identified potential refinements to the MSG functionality through experience gained since deployment of MSG, the analysis of commitment, dispatch, and market outcomes for MSG resources, and with the help of stakeholder feedback.

As this stakeholder process continues we will further develop the potential refinements to the modeling of multi-stage generation units, and solicit feedback and suggestions from interested stakeholders. The targeted outcome of this process is policy resolution on the enhancements identified here.

2   Process and Timetable

The purpose of the present revised straw proposal is to provide stakeholders with a description of the suite of near-term improvements to MSG modeling identified by the ISO. This paper offers refined ISO recommendations for the design of these enhancements.

Date	Activity
June 24, 2011	Post issue paper / straw proposal
July 1, 2011	Stakeholder conference call
July 14, 2011	Stakeholder comments due *
August 5, 2011	Post revised straw proposal
August 12, 2011	Stakeholder conference call
August 19, 2011	Stakeholder comments due *
September 9, 2011	Post draft final proposal
September 16, 2011	Stakeholder conference call
September 23, 2011	Stakeholder comments due *
October 27–28, 2011	CAISO Board of Governors meeting

  * Please e-mail comments to msg-enhance@caiso.com

3   Description of the Issues & Proposed Resolutions

Following implementation of the MSG modeling functionality in December 2010, the ISO and stakeholders have identified several enhancements that can improve modeling to allow better real-time operation and MSG participation in light of the characteristics typical of MSG resources. In doing so, this list also addresses several stakeholder concerns. The issues and proposed resolutions

are described below along with the ISO's assessment of the next steps in this stakeholder effort that will be required to implement these changes.

3.1 Limitations on MSG configurations and paths in real-time

Issue
The current limitation in the number of MSG configurations in real-time is three plus the day-ahead and/or RUC committed configuration. Production experience indicates that the number of alternative transition paths among configurations in combination with the number of configurations themselves impacts the performance of the MSG algorithms and not just the number of configurations bid into the real-time market. As configurations and paths submitted to market increase in number, there is a corresponding increase in permutations that the optimization software must evaluate. To make these evaluations, the optimization must calculate and compare costs along each path requiring more iterations through the optimization decision algorithm. While the ISO would ideally not have any limitations on configurations and paths, some limits are in fact required to ensure that the software can perform as required in the real-time. The ISO anticipates that the need for such limitations to wane over time as the software continually tuned.

Stakeholder feedback
With respect to the proposed increase in the number of biddable configurations in real-time, PG&E, SCE, and CDWR expressed support.

CDWR suggested that more analysis be conducted on the benefits of increasing the limit on biddable configurations in real time. There are two key benefits of enabling more configurations to be bid into real time: first, having more bid-in configurations will provide the optimization more options for achieving the least-cost dispatch of the system; second, more bidding flexibility will give stakeholders a tool to help them bid their MSG resources into the market according to the operating characteristic and economics of the unit. Please note that, regardless of the magnitude of the benefits of this change, the cost is small as the optimization is not hampered in solving with these extra bid-in configurations and SIBR can readily be adapted to accommodate the needed rule change. Thus, the ISO views this change as a net benefit for stakeholders and the optimal dispatch alike.

Furthermore, as part of this suite of enhancements, the ISO proposes to require resource adequacy resources to bid in the entire range from the pmin of the resource to its RA capacity MW value. Increasing the number of biddable configurations is real-time will ensure that meeting this requirement is not onerous for participants.

Feedback on the limitation of the number of paths between any two configurations was mixed. SCE did not oppose this change. CDWR again expressed the need for additional analysis and PG&E expressed multiple concerns. In this initiative's initial straw proposal, the ISO asserted that MSG resources have generally not registered so many transition paths that this would negatively impact them. In fact, there are a handful of registered MSG resources with three paths between configurations.

Proposed resolution
In response to stakeholder feedback, the ISO is modifying its initial proposal to allow ten configurations to be bid into real time, but to limit the number of transition paths between any two

configurations to two. We propose to allow all MSG resources to bid up to six configurations (plus the day-ahead and/or RUC committed configuration) into the real-time market. This will increase the number of biddable configurations from today from a maximum of five to a maximum of eight. Being able to bid in more configurations will give market participants more flexibility in bidding in their MSG units. Additionally, having more bid-in configurations will aid the real-time market in optimizing the dispatch of MSG resources in situations of under- and over-generation.

By changing its proposal from ten real-time configurations to six, the ISO can loosen the proposed limitation on the number of paths between configurations. For resources with six or fewer registered MSG configurations, we propose no limit on the number of paths a resource can register between configurations. The ISO also proposes to provide an option for market participants that prefer to have more biddable configurations and are not as constrained by the path requirements. For resources with seven or more registered MSG configurations, the ISO proposes to limit the number of transitions paths between any two configurations to two.

As noted above, the ISO and stakeholders alike would prefer not to have limitations on real-time configurations, or on registered transition paths. The aim of this proposal is to strike a balance that meets participants' needs for flexibility without compromising the performance of the MSG algorithms in real time.

3.2   Bidding requirements on lower configurations

Issue
Current bidding requirements allow an MSG resource to bid in any start-able configuration. This leaves the capacity below the minimum operating level of that configuration unavailable to the market optimization. This is not consistent with the treatment of non-MSG resources for which the optimization can consider the operating levels from the plant-level Pmin up to the maximum bid-in capacity. As a consequence, the market solution may not have the option to dispatch resources at their lower capacity levels when the resource is bid into the market at its highest resource adequacy capacity requirement. This can result in the inability to make use of an MSG resource's resource adequacy capacity.

Stakeholder feedback
SCE expressed support for this change. PG&E requested clarification that the requirement to fully bid in resource adequacy capacity would not also impose a downward capacity must-offer requirement. The ISO confirms that, as is consistent with requirements for non-MSG resource adequacy resources, a downward capacity must-offer requirement is not proposed as part of this initiative.

Proposed resolution
The ISO proposes that MSG resources be required to offer the entire capacity range between the maximum bid-in energy MW and the higher of self scheduled energy MW and resource level Pmin on a MSG plant level in real-time market. Note that the enhancement to enable resources to bid up to six configurations (plus the day-ahead and/or RUC committed configuration) in real-time will make this possible without limiting participants' ability to supply other real-time bids. This will improve the market solution by giving it additional flexibility, and it will also ensure that all resource adequacy capacity is bid in as required.

3.3 Transition cost validation rules

Issue

In the initial straw proposal, the ISO proposed a change to the validation rules currently applied to the MSG transition cost registration. It was our understanding that the current rules, though originally intended to provide market participants with flexibility, have proved too limiting. However, stakeholder feedback indicates that this is not the case.

Stakeholder feedback

There was no support from the stakeholder community for the change from the current transition cost validation rules to a proxy calculation for transition costs. The Department of Market Monitoring submitted comments supporting moving to a proxy costs calculation for transition costs.

Calpine contended in its comments that the proposed proxy calculation, which is the same as that used for start-up and minimum-load costs, is not sufficiently detailed to adequately capture costs. SCE also opposed a change from the current transition cost validation rules providing an example of how a proxy calculation would not enable a resource to fully recover transition costs.

Calpine, CDWR, and PG&E stated that transitions between configurations should be analogous to start-ups and thus should be offered a registered cost option as is offered for start-up and minimum-load costs.

Proposed resolution

The ISO's straw proposal was to replace the existing transition cost validation rules with a proxy calculation for transitions between configurations. However, given stakeholder feedback described above the ISO is revising the proposal to leave the current transition cost validation rules in place as they are.

3.4 Limitation on the number of ramp-rates for each MSG configuration

Issue

The current MSG functionality allows only one ramp-rate to be defined and bid-in per configuration. This creates limitations for some resources. Some combined cycle units can ramp from, for example, one configuration that can operate in two modes: 2x1, and 2x1 plus duct firing. These two modes have largely different ramp-rates

Stakeholder feedback

PG&E, SCE, and CDWR supported the change from one ramp rate per configuration to two ramp rates for each configuration. PG&E requested clarification that the number of allowable ramp rates be limited through the registration process and not "hard-coded" in SIBR. That is the case – in other words, the limitation to two ramp rates per configuration is imposed in the registration process and not in the software rules.

Proposed resolution

The ISO proposes to allow two ramp-rates per MSG configuration.

3.5 Flexibility with respect to the self-scheduled real-time configuration to support the energy schedule or A/S award from the day-ahead market

Issue
Currently, if an MSG resource has a day-ahead energy schedule or ancillary service award in one configuration, then the resource can only self-schedule in real-time in that configuration. In actuality, there can be more than one configuration able to support that day-ahead schedule and ancillary service award.

Stakeholder feedback
SCE, CDWR, and PG&E support this enhancement.

Proposed resolution
The ISO proposes to enable market participants to self-schedule in real-time into a configuration different from that scheduled in the day-ahead so long as the real-time configuration can support the same awarded ancillary service and/or Residual Unit Commitment capacity. A configuration is considered to be able to support the A/S and/or RUC award if (1) the range of the configuration is such that the self-schedule can be met and while reserving enough capacity ("head room") to respond the A/S award if needed, and (2) the configuration is certified to an capable of providing the ancillary service.

Note that, while the ISO allows energy self schedule and ancillary service self provision to be in different configurations, we will continue to treat energy self schedule and ancillary self provision at the plant level.

3.6 Minimum Load Costs and Bid Cost Recovery calculation

Issue
Under the current rules, if an MSG resource is committed by the ISO to a higher configuration, its minimum load costs will be included in the Bid Cost Recovery calculation provided that the meter is within the 3 percent Tolerance Band of the Pmin.[1] If the resource falls short of the 3 percent Tolerance Band, no minimum load costs are considered in the Bid Cost Recovery calculation for that interval. However, the resource in this case may still be operating above the minimum load of a lower configuration and would be operating above the plant-level minimum load. There is therefore the concern that this rule be revised to align the BCR calculations for MSG resources with the BCR calculation for non-MSG resources.

Stakeholder feedback
SCE expressed support for the ISO's proposal of the second option described in the issue paper / straw proposal, and expressed opposition for the third option. PG&E also expressed support for the proposal and requested clarification of what was meant by "highest configuration" in the description of the proposal.

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[1] The Tolerance Band is calculated as 3 percent of the plant-level Pmax.

CDWR "does not support the proposed change because it would result in an increase of BCR amount, and increased BCR cost to Loads." The ISO recognizes that this can result in an increase in BCR uplift and allocation. However, this proposal aligns the BCR calculations for MSG resources with the BCR calculation for non-MSG resources. The fact that uplift can increase as a result of consistent BCR calculations for MSG and non-MSG resources is not a compelling reason to perform the calculations differently.

The Department of Market Monitoring expressed support for the second option stating they believe that "this option will most accurately account for minimum load costs actually being incurred." However, DMM does note that a "potential market inefficiency exists for MSG resources with overlapping configurations… The inefficiency comes from the resources incurring actual costs of operating in a lower configuration, while market settlement rules are assuming the resource incurred costs to transition and operate in the higher configuration to which [it] was dispatched."

The DMM "encourages the ISO to monitor this potential inefficiency to determine (1) if it is a material issue and (2) if the ISO can identify a way to verify the resource is physically operating in the correct configuration."

Proposed resolution
In the initial issue paper / straw proposal on this market design initiative, the ISO provided three options for revising the calculation of an MSG resource's minimum load costs for inclusion in the calculation of Bid Cost Recovery when a configuration of the MSG resource is qualified for BCR under the current rules. (Note that the qualification of a configuration for BCR requires that there is no energy self-schedule for ancillary service self-provision for any of the configurations below the qualified configuration.)

The ISO maintains its proposal to use the second of these three options to calculate the minimum load costs for the highest configuration equal or lower than the qualified BCR configuration for which the meter is within or above the 3 percent Tolerance Band of its Pmin.

As an example, consider a two-configuration MSG resource that is dispatched up from its lower configuration (C1) to the pmin of its higher configuration (C2). The current rules specify that if, for a particular interval, the resource does not come within 3% of the pmin of C2 then no minimum load costs are considered for that interval. However, the resource is in fact supplying energy at a level above its plant-level pmin, in this case the pmin of C1. Thus, the ISO proposes that for such intervals, the minimum load costs of C1 be included in the BCR calculation (provided that there is not an energy self-schedule or ancillary services self-provisions in C1). In general terms, the minimum load costs associated with the configuration with the highest pmin that is below the pmin of the target configuration will be included in the BCR calculation for such intervals.

4   Conclusion

The ISO invites stakeholder comments and discussion on the issues raised within this paper. The ISO will conduct a conference call to review this document on August 12, 2011 from 10:00 a.m. to 12:00 p.m. Comments should be sent to msg-enhance@caiso.com by close of business on August 19, 2011.