Renewables Integration Market Vision & Roadmap
Revised Straw Proposal – 8/29/2011

Submitted by	Company	Date Submitted
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INTRODUCTION

The Revised Straw Proposal steps back from the significant redesign of the CAISO's real-time markets described in the Initial Straw Proposal and instead offers a phased approach to modifying the CAISO's day-ahead (DA) and real-time markets. GenOn supports this proposed approach – instead of discarding the CAISO's existing imbalance energy market, the Revised Straw Proposal offers modifications based on the current five-minute dispatch interval. There is no clear evidence that this interval, which aligns with the existing five-minute pricing interval, is not a reasonable time frame over which to instruct flexible resources in response to deviations in net load as increasing intermittent renewable resources are integrated.

Recognizing the uncertainty the CAISO faces, the CAISO needs a portfolio of products and services that the CAISO can procure, with operator-specified characteristics such as locational granularity, volume, procurement term, and perhaps other variables (e.g., evaluation period for ramping), to assure that the system is capable of integrating a significant volume of distributed energy, and is able to respond to the uncertainty regarding the location and amount of wind and solar ultimately developed. The key first step is to define the products. Market prices can inform forward procurement and resource investment. The use of explicitly defined and priced products is also consistent with the CAISO's newly added cost causation principle.

The CAISO recognizes that renewable resources will lower energy prices, displace energy production, and increase cycling by gas-fired resources, thereby reducing revenues and increasing maintenance costs to the same resources required to reliably integrate 33% renewable resources. An additional factor that will have significant impacts on the flexibility available to the CAISO is the declining Resource Adequacy (RA) capacity contracts that will be available for these same thermal resources. A projected doubling of the volume of intermittent renewable resources in the next three years,[1] and increased capacity credits to installed renewable capacity that are likely due to the use of an effective load carrying capacity methodology to determine the RA value

[1] See Keith Casey Memorandum to CAISO Board of Governors entitled "Briefing on Renewable Generation in the ISO Generator Interconnection Queue", July 6, 2011, page 2, available at: http://www.caiso.com/Documents/110713Briefing_GenerationInterconnectionTrends-Memo.pdf

of wind and solar resources as required by the 33% RPS legislation[2] will significantly increase the portion of the existing RA requirement assigned to renewable resources. Unless the planning reserve margin is increased, these factors will significantly reduce the RA capacity available to thermal resources, further decreasing revenues to conventional resources.

Solving all the revenue adequacy challenges facing conventional resources may not be within the scope of this stakeholder process. However, the CAISO must assure that its markets transparently define and price the reliability services it needs, and assure reasonable compensation to flexible, dispatchable resources. Essential reliability services not currently procured and priced, such as frequency response, voltage support and inertia, must continue to be available to the CAISO. Consequently, the CAISO should carefully consider how to define and competitively procure products to provide these services.

SHORT-TERM ENHANCEMENTS

The CAISO is undertaking important short-term enhancements that should not be delayed. The use of 72 hour Residual Unit Commitment (RUC) will help assure that long-start units are efficiently committed and not uneconomically cycled.

Enhanced operating reserve management is another important short-term measure. The CAISO's current practice is that all operating reserve procured in the Day-Ahead market from any particular unit is treated as contingency-only if any incremental procurement from that unit occurs in real-time, even if that resource has not flagged its capacity as contingency-only. This practice arbitrarily limits the CAISO's flexibility to use the dispatchability of operating reserve that might prove to be excess to the CAISO's requirements in real-time.

The CAISO plans modifications to allow procurement of incremental operating reserve in real-time from a resource that has already supplied some operating reserve in the Day-Ahead Market without reclassifying all operating reserve from that resource as "contingency-only," thereby preserving the CAISO's flexibility to dispatch operating reserve, when appropriate. These changes to operating reserve management may also facilitate the use of operating reserve as a substitute for the flexible ramping constraint, as discussed below.

FLEXIBLE RAMPING

GenOn recognizes that the CAISO has a need for sufficient ramping capability in real time to assure reliable system operations. However, the CAISO's recently approved proposal to compensate suppliers that resolve the constraint using opportunity cost pricing is not a long term solution, as it only assures that suppliers providing an essential reliability service will not be harmed by providing that service.

[2] *See* Cal. Public Util. Code § 399.26(d), added by SB 2 (2011-12 First Extraordinary Session, Stats. 2011, Ch. 1).

Our understanding is that the CAISO recognizes the limitations of its current proposal, and plans to develop a competitively procured market product to replace the flexible ramping constraint. As noted in GenOn's comments on the Initial Straw Proposal, it is unreasonable to rely on the flexible ramping constraint with opportunity cost compensation over a long period of time (e.g., for 3 or 4 years originally contemplated). The CAISO now plans to establish a separate stakeholder process in October, 2011 to provide a report requested by the Board of Governors in February, 2012. It appears that the CAISO has accelerated the schedule for replacing the flexible ramping constraint, and now intends to implement a "flexi-ramp" product in 2013. While GenOn appreciates this step, we continue to believe that the CAISO should consider the use of an interim product, such as increased procurement of spinning reserve, so that the use of the flexible ramping constraint can be discontinued as soon as possible.

The CAISO Should Pursue an Interim Product to Replace the Flexible Ramping Constraint

In the short-term, the CAISO plans "operating reserve management" enhancements that are consistent with the idea of increasing flexibility by allowing the CAISO to use dispatchable Operating Reserve when the CAISO has Operating Reserve in excess of its requirements. The CAISO should include additional consideration of the use of additional Spinning Reserve procurement to replace the flexible ramping constraint until a flexi-ramp product can be developed and deployed. No fatal flaws to this approach have been identified, and the most challenging task may be determining how to assure that costs are properly assigned consistent with the CAISO's cost causation principle. The CAISO should explore with stakeholders whether this hurdle might be reasonably overcome to allow increased procurement of Spinning Reserve to replace the flexible ramping constraint before the new flexi-ramp product is deployed in 2013.

Our understanding is that the CAISO Tariff provides the CAISO with the flexibility to elect to run the real-time unit commitment with or without the contingency flag, meaning that the CAISO could allow Spinning Reserve procured in real time to be dispatched. The problem is that the CAISO cannot presently constrain real-time procurement to assure a minimum amount of dispatchable Spinning Reserve (i.e., bids flagged as contingency-only would be awarded on an economic basis along with bids for dispatchable Spinning Reserve that are not so flagged). The CAISO should give further consideration to the definition of a constraint to assure procurement of a minimum quantity of dispatchable Spinning Reserve.

Imposing such a constraint would not create two products since dispatchable and contingency-only Spinning Reserve are already different products due to the greater flexibility provided by operating reserve that is not flagged as "contingency-only." Dispatchable operating reserve is a higher quality product, since it meets the requirements of both dispatchable and contingency-only Spinning Reserve, while bids flagged as contingency-only may never be dispatched economically, even if the CAISO has procured excess operating reserve.

The CAISO should provide additional information on the viability of procuring an operator-specified amount of dispatchable Spinning Reserve in the day ahead market or

in real-time. The issue of how to price contingency-only operating reserve when a constraint is imposed to procure a minimum amount of dispatchable operating reserve should be thoroughly discussed. Pricing options for contingency-only operating reserve procured when such a constraint is binding might include:

1) Same price as the marginal dispatchable reserve

2) Clearing price that would result without the constraint

3) Bid price of highest clearing contingency-only reserve

The CAISO should explore available pricing options and their pros and cons in the initial paper it publishes to begin the separate stakeholder process on flexible ramping that it plans to undertake in October 2011.

In addition, the CAISO should be clear about what it intends to present to the Board of Governors in February 2012. At a minimum, that report should include:

1) A full assessment of the issues, alternatives and schedule for possible interim replacement of the flexible ramping constraint with increased procurement of operating reserve, including options for allocating the cost of such increased procurement, and

2) A description of the objectives and design considerations for the "mid-term" product, and a specific schedule for its implementation.

Flexi-ramp and RUC are Not Substitutes

The CAISO states that procurement targets for flexi-ramp and RUC must be "done together since the capacity procured under each of these mechanisms will generally offset the need for the other." The CAISO requested comments on the "co-optimization" of RUC and flexi-ramp in the day-ahead market.

The narrow purpose of RUC should not be expanded. RUC is intended to assure that sufficient resources are committed to meet any excess of forecast load over bid-in demand. One consequence of using RUC to meet its intended purpose is that additional capacity is committed, and that additional capacity may have ramping capability that reduces the likelihood that the flexible ramping constraint will bind in Real-Time Pre Dispatch (RTPD) – but such an outcome masks the true system requirement, and should be avoided. Just as RUC awarded capacity is eligible for award of other A/S in the Hour Ahead Scheduling Process (HASP) or RTPD, such capacity should also be eligible for any flexi-ramp compensation (whether by opportunity cost compensation when the flexible ramping constraint is in use, or through the flexible ramping product when it is implemented).

It also seems that the idea of including RUC in the Integrated Forward Market (IFM) is completely unrelated to the addition of a flexi-ramp product. RUC is well-named – its purpose is to commit any "residual" capacity required to assure that the CAISO's

forecast of peak load can be served. The approach most consistent with the idea of providing relevant price signals for all required reliability services would be to specify the requirement for those services, including the flexi-ramp product, and define market clearing prices through the IFM optimization, and preserve RUC's existing role in a subsequent process, after all reliability services are separately priced and procured in the IFM, to assure that sufficient capacity is committed to serve CAISO forecast load.

It is unreasonable to increase RUC procurement as a means of reducing procurement of flexi-ramp. Such a strategy amounts to appropriating a reliability service rather than procuring it. After the DA Market is closed, and any RUC procurement completed, flexi-ramp ought to be treated like any other Ancillary Service, with RUC and RA resources fully eligible to provide and be compensated for any incremental regulation, operating reserve or flexi-ramp needs identified in HASP or RTPD.

Several Questions are Raised by Incorporating Energy Bids into Flexi-ramp Evaluation

The CAISO indicates that energy bids for spinning or non-spinning reserve will only rarely set the energy price because they are dispatched infrequently, while energy bids from flexi-ramp are more likely to be dispatched. Although energy bids are not considered in awarding spinning or non-spinning reserve, the CAISO suggests that the probability of dispatching energy out of flexi-ramp capacity is greater than the probability of dispatching energy out of operating reserve, and that as a result the total expected cost of flexi-ramp including both capacity and the probability-weighted cost of energy should be considered in evaluating flexi-ramp bids. The CAISO also proposes to limit changes in energy bid prices for flexi-ramp capacity between the DA Market and real time. These proposed characteristics raise several questions:

1) Does the CAISO have information based on the dispatch of energy out of operating reserve that supports this proposal? (e.g., how often is excess operating reserve released for dispatch into the real time market, how often is such reserve dispatched, and how often does that dispatched operating reserve set the market clearing price?)

2) How would the CAISO determine the probability of dispatch of energy out of flexi-ramp? Would that probability be published in advance with procurement targets? Would that same probability of dispatch be applied to all flexi-ramp capacity procured in a particular market? Would the probability be based on the historic dispatch, or would the CAISO have discretion to choose a different probability? Would the CAISO publish information on the actual dispatch?

3) Since this procurement would be co-optimized with energy and other ancillary services, the CAISO will need to make an assumption about what portion of the bid curve would be dedicated to flexi-ramp. What energy output would be assumed for each resource in the absence of a flexi-ramp award? Would the CAISO need to assume some amount of flexi-ramp procurement from each resource to determine the energy cost component?

4) Currently there is no restriction on changes to energy bid prices associated with DA Market awards of other ancillary services.[3] How would the restriction on changes to energy bid prices for flexi-ramp capacity be coordinated with energy bid prices on capacity from the same resource that is awarded spinning or non-spinning reserve?

Other Flexi-ramp Design Details Need to be Analyzed

The CAISO asks for input regarding the evaluation period for procurement of flexi-ramp, and poses several other questions around the procurement of flexi-ramp, including the evaluation period for flexi-ramp, the confidence interval used for specifying the procurement target, and how flexi-ramp would fit into the cascading hierarchy of ancillary services (i.e., where regulation is the highest quality service and can substitute for spinning reserve and non-spinning reserve.)

The CAISO proposal suggests that the amount of flexi-ramp capacity may need to be "managed" by maintaining a sufficient amount of flexi-ramp through real-time if ramping needs are "expected to persist". This suggests that the CAISO would use some criteria to skip the bids of fast ramping capacity with lower energy prices and instead dispatch higher priced energy with a lower ramp rate. The application of rules regarding the dispatch of flexi-ramp should be as transparent as possible.

The Revised Straw Proposal states that the CAISO will procure flexi-ramp in terms of MW/minute, and poses the question of what interval should be used for procurement. The key question is the duration over which the CAISO's requirement is specified. Any given procurement quantity will yield quite different results depending on the procurement interval (e.g., if 500 MW is procured, a shorter evaluation interval will yield higher quality service since slower ramping, lower cost capacity will tend to be edged out by faster ramping, higher cost capacity – assuming similar energy prices.) One option would be for the CAISO to leave both the procurement quantity (MW) and the evaluation interval (minutes) as operator specified variables – as long as these procurement details are transparent to the market.

The CAISO proposes a confidence interval of 95% for flexi-ramp procurement (i.e., the amount of flexi-ramp procured would be sufficient to meet the CAISO's ramping requirements 95% of the time). This proposal suggests the CAISO has some operating history over which to determine the correct procurement quantity, and deserves further discussion in the flexi-ramp stakeholder process. The CAISO should specify the trade-offs involved (e.g., higher cost of "excess" flexi-ramp procurement vs. "excessive" violation of the power balance constraint). Here again, if the procurement quantities, prices, results and supporting rationale are transparent, GenOn does not object to some degree of flexibility in the CAISO's use of flexi-ramp.

[3] Section 30.5.1(b) of the CAISO Tariff provides that "Incremental Bid prices for Energy associated with Day-Ahead AS or RUC Awards in Bids submitted to the HASP may be revised."

With regard to the hierarchy of ancillary services, it would seem that regulation or spinning reserve procurement might be substituted for flexi-ramp – although it is unclear how the economics of increased procurement of regulation or spinning reserve would be evaluated given that the energy bid price is only considered in terms of the opportunity cost of reserving the capacity, not as the total cost of dispatching the capacity, as the CAISO proposes with flexi-ramp. Assuming flexi-ramp needs to be synchronized and immediately available to deliver energy in response to a CAISO dispatch instruction, then non-spinning reserve may not be a reasonable substitute for flexi-ramp, as non-spinning reserve may reasonably take several minutes to deliver any energy (if provided by an off-line, quick-start resource).

CAISO Should Rely on Ancillary Service Experience in Evaluating Flexi-ramp Performance

The CAISO proposes that capacity providing flexi-ramp be expected to perform, and that if such performance is outside a tolerance range the resource might forfeit the capacity payment for providing flexi-ramp similar to "no-pay", be subject to an additional penalty, or possibly be "de-certified" after several incidents of non-performance.

Some risk of forfeit of capacity payment similar to the existing "no-pay" provisions that apply to other ancillary services may be reasonable. Since flexi-ramp capacity is paid to be available and capable of performing, it seems reasonable to have the same type of consequences for being unavailable or failing to ramp when dispatched that would apply to operating reserve, and the CAISO has substantial experience with the operation of the "no pay" framework for ancillary service non-compliance. However, there is no justification for the flexi-ramp product to be subject to additional penalties, and the CAISO should discard that concept. Additionally, the CAISO should rely on its experience with the ancillary service certification process, and should not create a separate certification process for flexi-ramp,

CAISO Should Keep Open its Options for Cost Allocation

Regarding cost allocation, the most important principle is for the CAISO to assure that it leaves open options for further consideration. First, the specific quantity and cost of services required to reliably maintain frequency and meet all other reliability criteria regardless of the magnitude and rate of change in net load deviations must be transparent. No decisions regarding pricing deviations or defining "instructed" deviations should be made that obfuscate responsibility for integration costs. By keeping the volume and cost of integration services transparent, and assuring that the potential billing determinants are readily available, the CAISO can assure that all reasonable cost allocation proposals can be given further consideration.

The CAISO should assure that transparent information regarding the reliability services it requires is available, including the cost of those services. Regardless of how the cost of services is assigned, it will be easier to assign costs when reliability products are separately defined and competitively procured.

INTERMITTENT RESOURCE AVAILABILITY UPDATES

The proposal to allow intermittent resources additional opportunities to provide near real-time schedule updates rests on an assumption that different rules should apply indefinitely to the bidding and scheduling of renewable resources, which violates the principle of technology agnosticism, unless all resources are provided the same accommodation.

The CAISO offers possible alternatives to assist intermittent resources to update their availability, and uses the dynamic transfer policy that the CAISO is implementing as a possible framework. Providing intermittent resources with opportunities to update their availability near real time makes sense, but the CAISO may need to consider how to distinguish "instructed energy" associated with near real-time updates to forward schedules by intermittent resources (whether inside or outside the Balancing Area) from instructed energy that reflects dispatch instructions issued by the CAISO to help balance the system and meet applicable reliability criteria. To the extent that such near real-time schedule updates by intermittent resources allow the CAISO to reduce the cost of following net load deviations, then it is reasonable that such schedule adjustments yield a corresponding reduction in the assignment of any costs associated with flexi-ramp or other services that are incurred due to the need to balance net load deviations. However, such adjustments should not be treated as if they were the response of flexible resources to CAISO dispatch instructions necessary to reliably operate the system.

LONG-TERM ENHANCEMENTS

In a report to the Board of Governors in August on the status of renewable integration, the CAISO reported that additional resources capable of providing up to 4,600 MW of flexible, incremental upward balancing would be needed in 2020, and that CAISO studies are underway to determine what resources are required to replace once-through cooled resources to maintain local reliability. In that same report, the CAISO explained that developing new generation has significant lead time and included an exhibit suggesting that project development may take 8 years.

The CAISO's Revised Straw Proposal indicates that the CAISO will consider a forward market for capacity resources that can provide balancing capacity, although such a market would not replace the CPUC's resource adequacy program. The CAISO further notes that this market would not be implemented until 2015 to 2020. In light of the potential need for incremental capacity, the CAISO's approach to long term market enhancements does not appear to reflect an appropriate sense of urgency. Given the likely need for new resources, the long development time-frame for new capacity, and the scope of issues that must be resolved, the CAISO and CPUC should take immediate steps to establish rules and processes to procure the required capacity.

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potential need for incremental capacity, the CAISO's approach to long term market enhancements does not appear to reflect an appropriate sense of urgency, and may not provide a long-term contract framework that will support new build. Given the likely need for new resources, the long development time-frame for new capacity, and the scope of issues that must be resolved, the CAISO and CPUC should take immediate steps to rely on traditional methods of procuring new capacity to meet needs that must be addressed by 2020.