

Stakeholder Comments

Contingency Modeling Enhancements Issue Paper

Submitted by	Company	Date Submitted
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The following are Southern California Edison’s (SCE) comments on the California Independent System Operator’s (CAISO) Issue Paper¹. SCE shares the CAISO’s concerns over maintaining a reliable system and is committed to working with the CAISO and stakeholders to find appropriate and workable solutions.

Even in isolation the complexity of the proposal causes SCE serious concern. Moreover, SCE has even greater concerns in trying to understand how it will interact in conjunction with the myriad of proposals such as Flexible Ramping Product (FRP), Integrated Day Ahead Market (IDAM), Intertie Convergence Bidding (ICB), Energy Imbalance Market (EIM), etc.

In summary, SCE offers the following conclusion on the CAISO’s proposal: No, SCE does not believe the CAISO’s proposal is appropriate to address the issue it intends to solve. The new concept and the radical changes to the market as proposed by the CAISO are not validated – either through rigorous academic research or through real-world application elsewhere. As such, there is no reason to believe the CAISO’s proposal will solve the issue. In fact, the CAISO’s proposal is likely to cause problems in the existing markets. Instead, as detailed in the comments below, the CAISO should look into the existing products and tools it has, and existing design practices of other ISOs to provide a solution.

I. The CAISO should define the problem it is trying to solve, including details such as magnitude of the need and relation between the problem and its proposal.

Anticipating every contingency goes against prudent planning – setting reasonable, acceptable margins is the optimal approach

Electricity markets are applicable to economic situations where systems are running as intended with supply meeting demand and constraints being satisfied. Contingencies such as N – 1, N – 1 – 1, etc., are low probability events met by appropriate planning and setting margins of acceptable risk. Contingencies that are more severe than N – 1 – 1 can also occur regardless of design. The goal of any design is to optimize with respect to risk and cost. Thus, Exceptional Dispatches (ED), will always be an instrument necessary to meet unanticipated Real Time states. The CAISO’s goal should not be to “economize” reliability tools such as ED.

The proposal pays in advance to resolve a low probability event as if it will occur

¹ <http://www.aiso.com/Documents/IssuePaper-ContingencyModelingEnhancements.pdf>

The CAISO already incorporates contingency constraints within the current Security Constrained Economic Dispatch (SCED) market process. Beyond this, a contingent state should only be considered when planning appropriate reserve margins relevant to the acceptable risk. Instead, the CAISO wants to incur costs as if the low probability event will have already occurred. CAISO has ignored the existing market products accommodating reliability protocols and they make no effort to adjust them in their proposal to remove cost duplication. Such a proposal will result in additional costs that are neither just nor reasonable.

The integrity of the LMP structure and the Energy and AS co-optimization should not be breached just to solve a problem that is not well defined

Although the LMP structure and the Energy and AS co-optimization may have problems that may or may not have been identified to date, the integrity of the LMP structure and the Energy and AS co-optimization should not be breached just to solve a problem that is not well defined. The CAISO Issue Paper fails to, as a minimum, even detail how many EDs are caused by post-contingency events and how many of those EDs are unavoidable through other mitigation measures. Such measures could include committing fast-start units or deploying procured A/S capacity or Flexible Ramp capacity. However, it's clear that the current LMP structure and the Energy and AS co-optimization are well accepted across the nation including at other ISOs. Without careful and complete evaluation, introducing new components to the LMP and mixing the capacity pricing within the LMP pricing will breach the integrity of such structure which may result in adverse effects to a well-established market design. SCE is extremely concerned that, without the rigor of *any* academic research or *any* real-world demonstration of the validity of this approach, the CAISO instead would force the California market to be a guinea pig for this radical and unsupported proposal. Until such a demonstration, we urge the CAISO to use proven and accepted practice found elsewhere in the grid.

II. The CAISO should explain why it has not first considered the following:

a. Current products and market design.

The CAISO has failed to justify why current products and market design constructs have been overlooked. With one of the reasons for this effort being inability to flow zonally procured Ancillary Services (AS) to local areas needed for reliability², deliverability would most directly be resolved by addressing procurement. For instance, more granular procurement, leveraging the pre-contingency process/scheduling run, would be a productive and reliable fix, and would work within the proven constructs of our LMP design.

b. Existing design practices of other ISOs.

The CAISO has failed to consider the design practices of other ISOs. To our knowledge, no other ISO has proposed such radical and unproven changes, such as this proposal, when faced with these low probability events. The CAISO has in the past, proposed measures used by other ISOs for a variety of situations³. Yet for this proposal the CAISO considers other ISOs as not comparable⁴. We reject this assertion. The CAISO should study other ISO approaches to the problem it attempts to define and implement such

² As stated by CAISO staff during March 26. CAISO Webconference.

³ The CAISO proposed MISO's method of stakeholders allowing security interest in their receivables in Order 741 efforts. The CAISO proposed NYISO and IESO Ontario approaches to convergence bids in the Intertie Pricing and Settlement. The CAISO proposed PJM's approach to costs in its FLRR filing.

⁴As stated by CAISO staff during March 26. CAISO Webconference.

tested solutions. The CAISO should fully describe to stakeholders these other proven approaches before determining if they should reinvent the wheel.

III. The CAISO's proposal raises concerns on its design.

a. Under the CAISO proposal, there's no guarantee that the capacity paid and reserved will be actually utilized when a N – 1 – 1 contingency occurs

Under the CAISO proposal, capacity is reserved by enforcing the post-contingency transmission constraints where the amount of the capacity is determined purely based on the system operating point (such as unit availability and ramp rates) with no consideration of the AS bid price of the available units, or the energy cost associated with the capacity. Therefore, even as an N – 1 – 1 contingency occurs, as the system operating point will change, the procured capacity through the post-contingency constraints may no longer be optimal to solve the problem and there is no guarantee that the procured capacity will be actually utilized. Even this design flaw is recognized, but not addressed, in the issue paper⁵. Further, the CAISO proposal does not answer the fundamental question: *why is there a need to price and compensate such capacity if there is no guarantee that the capacity will be utilized when it is needed?*

b. Under the CAISO proposal, the markets, especially the Real-Time market, will become more volatile and unpredictable and harm liquidity and price transparency

The impact of the power balance constraint on price is well observed in the Real-Time market. As noted by the DMM report⁶, a significant portion of the price spikes are associated with the power balance constraint relaxation. Introduction of additional, multiple power balance constraints to the model, even under normal conditions with no contingencies, can only aggravate the issues that have arisen from Real-Time price volatility. Further, it will lead to reduced transparency in price formation and price discovery. If more price spikes arise simply due to the N – 1 – 1 contingencies (that may never occur), distinguishing price spikes that are due to the true supply shortage or price spikes that are due to the N – 1 – 1 contingencies becomes a difficult task at best, if at all possible.

c. It is questionable that the CAISO's proposal incentivizes flexible capacity (SEE APPENDIX)

Very likely, contradictory to its intent, the CAISO's current proposal will not incentivize flexible capacity and fast ramping resources. SCE illustrates this point with examples in the appendix.

d. Below are SCE's responses to questions listed in the CAISO's Issue Paper

1. Is it appropriate to provide compensation to generators for corrective capacity, and, if so, what is the appropriate basis to determine the amount of capacity compensated? For example, a resource is moved to a lower dispatch point in order to provide a larger upward corrective capacity after a contingency. Should the appropriate compensation be based on the movement (downward in this example) or the corrective capacity that is created (for the resource to eventually move upward)?

⁵ Page 9. *Preventive-Corrective Market Optimization Model*. In Issue Paper. The second to the last paragraph: "However, the actual re-dispatches may be different from $\Delta P(kc)$, as the energy cost would be considered in the actual re-dispatch".

⁶ Figure 1.8. Page 13. http://www.caiso.com/Documents/2012FourthQuarterReport-MarketIssues-Performance-Feb_2013.pdf

Answer: No, it is not appropriate to compensate generators for “corrective capacity”. Until the CAISO justifies the appropriateness of this radical change to our market – either through rigorous academic research or through real-world application elsewhere, we have insufficient information to judge the appropriateness of “corrective capacity”, and it is inappropriate to even propose this concept for consideration for implementation. There is no clear difference between “corrective capacity” and regular capacity that’s available in the system. For example, suppose a resource is marginal and is dispatched for energy below its full capacity. The capacity below its Pmax and above its dispatch will be readily available to the system. Clearly such capacity should not be compensated because its bid price is higher than the market price and that’s why the unit is not dispatched at Pmax. However, if a contingency occurs and the market price goes up, the resource will be dispatched for additional energy. It will not be fair to the units that provide regular capacity if the resource that provides “corrective capacity” is compensated.

2. Should all resource capacity contributing to meeting the corrective action be compensated at the resource location locational marginal capacity price or should only those resources that demonstrate a lost opportunity receive compensation?

Answer: Until the CAISO justifies the appropriateness of this radical change to our market – either through rigorous academic research or through real-world application elsewhere, we have insufficient information to judge the appropriateness of “corrective capacity”, and the CAISO is in no position to even propose this concept for implementation.

3. When there are multiple system operating limit constraints binding such that a resource is contributing to meeting the corrective capacity of multiple constraints, how should the resource be compensated considering its contribution to multiple constraints?

Answer: Until the CAISO justifies the appropriateness of this radical change to our market – either through rigorous academic research or through real-world application elsewhere, we have insufficient information to judge the appropriateness of “corrective capacity”, and the CAISO is in no position to even propose this concept for implementation.

Appendix

Scenario: The CAISO example

Consider the same example in the CAISO Issue Paper (as shown below), assume the pre-contingency flow is 700MW on Path A-B. Under post-contingency, the flow needs to be reduced to 350MW within 30 minutes.

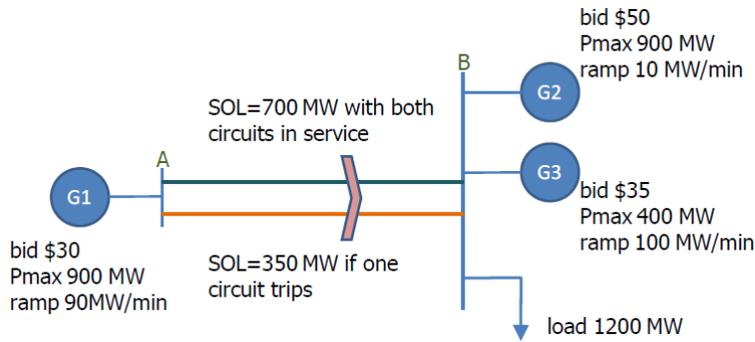


Figure 1: System in CAISO's example

Under the CAISO's proposal, the solution is to dispatch G2 at 250MW and G1 at 250MW. The "corrective capacity" for G2 is 200MW and for G1 is 150MW. As shown in Table 3 in the issue paper, also duplicated below, G2 will receive a revenue of \$12,500 for the 250MW energy dispatch, and a revenue of \$0 for its "corrective capacity" (based on opportunity cost) or a revenue of \$3,000 for its "corrective capacity" (based on locational capacity-energy mixed price). The total revenue for G2 will be at least \$12,500.

Gen	Energy					Corrective Capacity		
	P^0	LMP	Bid cost	Revenue	Profit	ΔP^{kc}	LMCP opportunity cost	Profit LMCP opportunity cost
G1	700	\$30	\$21,000	\$21,000	\$0	-350	\$0 \$0	\$0 \$0
G2	250	\$50	\$12,500	\$12,500	\$0	200	\$15 \$0	\$3,000 \$0
G3	250	\$50	\$8,750	\$12,500	\$3,750	150	\$15 \$15	\$2,250 \$2,250
total	1,200	N/A	\$42,250	\$46,000	\$3,750	0	N/A	\$5,250 \$2,250

TABLE 3: PREVENTIVE-CORRECTIVE SOLUTION AND LMCP COMPENSATION

Under the CAISO's solution, there would be no incentives for G2 to advance its technology and improve its ramping rate. The limited ramping capability of G2 contributes to the problem and if G2 were to improve that ramping, the problem may not exist, hence, G2 would not be paid. To illustrate the point, below is a scenario to show that the revenue of G2 will reduce if G2 improves its ramp rate.

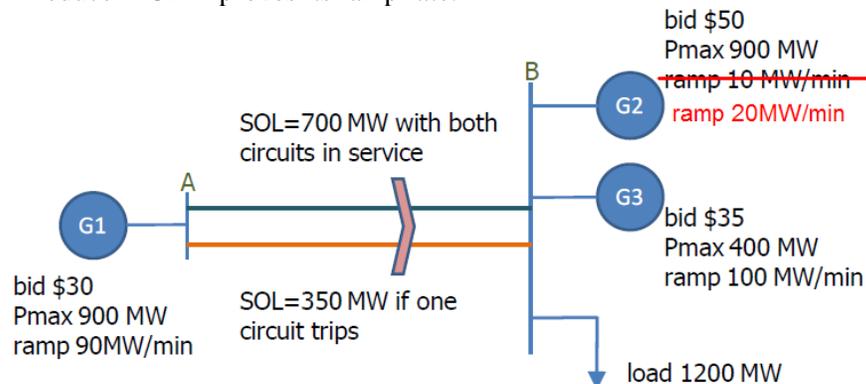


Figure 2: Same system except now G2 has improved its ramp rate

Scenario: G2 improves its ramp rate

As G2 increases its ramp rate to 20/MW/min, after the N – 1 – 1 contingency occurs, G2 can dispatch up by 350MW within 17.5min. So even considering the N – 1 – 1 contingency, the dispatch solution will be the same as the solution without considering the N – 1 – 1 contingency. The solution without considering the N – 1 – 1 contingency is shown in Table 1 in the CAISO issue paper, duplicated below. G2 is dispatched at 100MW and receives revenue of \$5,000 for energy. Notice the “corrective capacity” for G2 is 0MW, even though G2’s capacity beyond the energy, which is 800MW (Pmax 900MW – 100MW), is readily available to the system should the contingency occur.

Generator	Dispatch	LMP ^{EN}	LMP ^{CONG}	LMP	Bid cost	Revenue	Profit
G1	700	\$50	-\$20	\$30	\$21,000	\$21,000	\$0
G2	100	\$50	\$0	\$50	\$5,000	\$5,000	\$0
G3	400	\$50	\$0	\$50	\$14,000	\$20,000	\$6,000
total	1,200	N/A	N/A	N/A	\$40,000	\$46,000	\$6,000

Table: Dispatch solution under the CAISO’s proposal with an improved ramp rate for G2

The table below summarizes the reduced revenue for G2 after it improves its ramp rate from 10MW/min to 20MW/min under the CAISO current proposal.

G2 Revenue	Revenue from energy dispatch	Revenue from “corrective capacity”		Total Revenue	
		Based on opportunity cost	Based on LMCP	Based on opportunity cost	Based on LMCP
With 10MW/min	\$12,500	\$0	\$3,000	\$12,500	\$15,500
With 20MW/min	\$5,000	\$0	\$0	\$5,000	\$5,000
Reduced Revenue after the increase in ramp rate				\$7,500	\$10,500

Table: The revenue of G2 will reduce after it improves its ramp rate under the CAISO’s proposal

In summary, under the CAISO’s proposal, the revenue for G2 will reduce by at least \$7,500 after it improves its ramp rate. The situation is worse if G2 is paid for its “corrective capacity” based on LMCP. Therefore it is doubtful that the CAISO’s proposal incentivizes flexible capacity with faster ramp rate.