Contingency Modeling Enhancements Straw Proposal Comments

Company	Date	Submitted By
Calpine	May 15, 2013	

Summary

The clarifications included in the Straw Proposal allow Calpine to offer further support for the development of the Contingency Modeling Enhancements ("CME") proposal. Specifically, we appreciate the CAISO's candor in discussing the difficulty it faces in managing mandatory SOL post-contingency (N-1-1) flow limits. We understand that the CAISO manages WECC and NERC standards today with inexact tools such as Exceptional Dispatch ("ExD") and Minimum Online Capacity ("MOC") commitments. In addition to the price-suppressive effects of these tools, the lack of both precision and locational attribute leads to over-procurement. Indeed, Calpine supports one of the primary conclusions of the Straw Proposal which is that SOL standards require a nodal market model for capacity.

ISO Response

The ISO agrees.

The Problem Is Clear, and Is Appropriately Addressed by CME

The CAISO is currently meeting WECC requirements related to preparing for and avoiding SOL post-contingency violations. This effort is uniquely required by the WECC and must be managed regardless of the likelihood of improbable events actually occurring. In fact, on a daily basis the CAISO commits units through ExD and/or MOC based on their maximum expectation of exposure to post-contingency capacity requirements. The problem expressed quite clearly in the Straw Proposal is not with CAISO compliance, but rather, with the cost and unintended consequences of their methods of compliance.

According to the CAISO, approximately 40 percent of their ExD volume is related to positioning units to meet SOL post-contingency flow limits. FERC has long-recognized that the unintended consequences of ExD, such as price suppression, should be avoided and has consistently and painstakingly encouraged the CAISO to reduce ExD volumes. This proposal represents an historic opportunity to move in the direction of FERC's unambiguous direction.

In addition, almost all of the volumes acquired through MOC commitments are intended to position those units to meet post-contingency SOL limits. Units placed at Minimum Load through MOC have the same price suppressive effects as ExD. These commitments interfere with normal price formation and often create systemic structural price spreads between DA and RT. When using ExD or MOC, the CAISO uses a very blunt instrument to address a dynamic and locationally specific need. The lack of precision of the tools and the required forward procurement horizon naturally leads to a conservatively large view of the need. All parties seem to agree that better model of the post-contingency capacity requirement is needed that will present a more locationally-specific, and dynamic assessment of need.

But a better predictive-corrective model alone will not solve the post-contingency need. Some parties support the continued use of the same blunt and troubling instruments used today such as ExD and MOC. They claim that the use of these instruments is insignificantly small or justified because of the low probability of multiple contingencies or they imply that CME is wrong because it may raise costs. Calpine disagrees with each of these allegations.
First, unpriced energy has the effect of suppressing marginal prices, regardless of volume. And the relative volume is not small or insignificant. Indeed, most ExD calls are made after the DA market closes. While the ExD is a small proportion of total load, ExD represents a significant

proportion the small volumes that flow in RT, and as suggested by the ISO's ExD FERC reports, has a material effect on RT prices. In addition, virtually all MOC energy is at Minimum Load. Since units at Minimum Load cannot set LMP, DA MOC energy pushes the supply curve to the right and suppresses DA prices.
Second, the probability of SOL contingencies actually occurring is irrelevant, because the CAISO must prepare for post-contingency flows 100 percent of the time.
And third, costs may rise – and they should rise -- as the price suppressive effects of ExD and MOC are eliminated.

Calpine supports the use of CME to develop a model which manages post contingency flows with real-time, dynamic, locational, capacity requirements and market-based energy re-dispatch. Integrating CME into CAISO market models will allow LMPs to better reflect marginal capacity and energy costs, eliminate structural differences between DA and RT and better encourage both economic bidding and enhancements to flexibility (such as improved ramp rates.)

ISO Response

The ISO agrees.

A Cost-Benefit Analysis Must First Acknowledge Price Suppression.

Several parties suggest the development of a cost-benefit analysis. Calpine disagrees. The Straw Proposal identifies the problem that the CAISO intends on addressing. It is not speculative. It is not unclear.

But if, nonetheless, the CAISO feels compelled to present such an analysis, it must start with a quantification of the price suppression that ExD and MOC create. Once this market inefficiency is removed from the calculus, Calpine is convinced that the more precise procurement envisioned by CME will result in substantial benefits associated with lower cost and high reliability.

ISO Response

There are benefits to the preventive-corrective constraint as compared to the cost of its implementation. These benefits are described in more detail at the end of Section 8.

The Explicit Inclusion of 10-Minute Reserves is Helpful

The Straw Proposal clarifies that if Spin or Non-Spin A/S is locationally advantageous it can be used in response to a targeted contingency. This cross-functional use is beneficial, and must be optimized to ensure that post-contingency SOL flow limits can be maintained while also meeting Contingency Reserves requirements. In other words, while the use of units may be fungible, the requirements need to be mutually exclusive.

The possibility of such cross-functional use implies that the Spin and CME capacity are interchangeable and that bid (including the provisions for an explicit capacity bid), market clearing and energy settlement must be co-optimized and handled similarly. Calpine suggests that the CAISO include a further discussion of this overlap, as well as a discussion of the possible FlexiRamp product in the next draft of the CME proposal. Examples of the co-optimization would help in understanding the interactions of these products.

ISO Response

Units procured to provide operating reserves and units which satisfy the preventive-corrective constraint are not fungible. Units providing operating reserves are certified to do so whereas any capacity which is effective to address the ISO's post-contingency need (correct location and ramping capability) can be used in the preventive-corrective constraint. Furthermore, operating reserves need to be provided in 10 minutes or less while the WECC SOL standard is a longer time frame (the violation needs to be resolved in 30 minutes or less). However, we agree that there is an overlap of certain units that can both provide operating reserves and address the WECC SOL standard. Under this scenario, the unit can be selected to fulfill both purposes. As noted in Section 8 of the revised straw proposal, this avoids procuring only 10 minute contingency reserves to fulfill a 30 minute need and avoids over-procuring by having two separate categories of contingency reserves. For further discussion on bidding, please see Sections 9.2 and 9.4.

Operating reserves (spin and non-spin) can be counted towards meeting upward corrective capacity requirement. In the market model, operating reserves (procured for a different WECC standard) will participate in the preventive-corrective constraint. This feature avoids double procuring capacity which has been a concern from stakeholders. We discuss this in detail at the end of Section 8 in the revised straw proposal. Flex ramp product will be separate capacity procurement from operating reserves and corrective capacity. This is because flex ramp is to meet net load variability/uncertainties, while operating reserves and corrective capacity are to cover contingencies, and net load variability/uncertainties and contingencies could happen on top of each other. Therefore, their procurement has to be separate. Having said that, when operating reserves or corrective capacity are deployed, flex ramp product will also be deployed to help the system to recover. However, when flex ramp product is deployed in RTD market to deal with net load variability/uncertainties, operating reserves and corrective capacity will be reserved to prepare for the next contingency.

CME Encourages Economic Bidding and Flexibility

CME is designed to reposition the dispatch of units in order to protect from post-contingency flow limits. The possible compensation for repositioning will encourage units to offer economic bids (including, and importantly, downward flexibility.) Additionally, since the ISO will be limited to roughly a 20 minute ramp, the possible compensation will encourage ramp speed. Durable capacity compensation for this ramp speed could create the incentive for investments in existing capacity to increase response time and ramp speed.

ISO Response

The ISO agrees and interprets the "economic bid" noted in the comment to mean economic bids for energy (as opposed to self-scheduling) and decremental bids.

Further Clarifications For the Next Draft

1. In the proposal, CAISO indicated that the CME model will only be applied to 8 paths for which CAISO is responsible and only the critical contingencies will be modeled. Calpine asks that the CAISO commit to full transparency of the model. For instance, will the critical contingencies be identified publicly and only be those which limit the transfer capability of the CAISO paths? Will the critical contingencies include generator contingencies? Will CAISO model the contingencies outside CAISO which may impact the path ratings? For instance, the loss of the Palo Verde nuclear units is a critical contingency for COI and Path15. Will that be considered? Since CAISO's Full Network Model doesn't cover the entire WECC footprint, how will CAISO implement the proposal

using the FNM?

2. When will the contingency rating for a path be calculated and published during actual DA/RT operations? WECC ratings for certain paths are highly dependent on their interaction with other paths, how does CAISO plan to deal with the dynamics in the new model?

3. How will the CRR be calculated under the proposed new market model? It will be great if CAISO can provide some numerical example to illustrate the approach.

ISO Response

1. The ISO agrees that data transparency is important. The 8 WECC paths in the ISO footprint that the WECC SOL standard applies to is available publicly and is provided in the papers for this stakeholder initiative. Currently, contingencies that the ISO intends to enforce (Pre Day-Ahead) and those that have been enforced (Post Day-Ahead) are reported on a day-to-day basis in the CAISO Market Results Interface (CMRI). Transmission contingencies that have occurred are also reported on OASIS. Information beyond that provided in these three sources are currently undergoing internal ISO review to ensure that pertinent information is provided to market participants but that the ISO protects sensitive or critical information. Should the ISO release more information regarding contingencies, it will do so through the appropriate forum.
2. See response above.
3. CRR examples have been added into each example in Section 7.

Company	Date	Submitted By
Department of Market Monitoring	May 30, 2013	

Opening Comments

The Department of Market Monitoring (DMM) appreciates the opportunity to provide comments on the Contingency Modeling Enhancements Straw Proposal

• DMM supports including the corrective constraints in the optimization. This should allow the ISO to more efficiently manage the 30-Minute contingency requirements through market processes, appropriately price the cost of meeting these constraints and compensate resources helping to meet these requirements.

• DMM does not support allowing separate bids for corrective capacity, since there does not appear to be any incremental costs associated with providing corrective capacity that are not covered by the LMPC – which will equal or exceed a resource's opportunity costs for providing this capacity.

• The additional demand for capacity and ramping services going forward may increase the potential for abuse of market power, especially if additional requirements are defined on smaller topologic regions. This issue can only be addressed as specific corrective capacity constraints

are defined by the ISO.

• We also recommend removing the option for resources to bid-in their ramp rates, since market power can also be exercised by using bid-in ramp rates to physically withhold corrective capacity (or other ramping energy and capacity) from the market.

ISO Response

See ISO responses below.

Advantages of the Preventive-Corrective Framework

The corrective constraints should allow the ISO to more efficiently manage the 30-Minute contingency requirements through in-market, optimized dispatches. DMM supports this approach on the basis that it should more efficiently procure capacity that is currently reserved through of out of market, non-optimized, manual operations. In addition, this new feature will require identifying which constraints require corrective capacity and a very specific formulation of the demand. The more precise and dynamic definition of demand, along with a procurement that leverages both capacity and power flow, will result in a least-cost in-market solution.

Historically, the ISO has met the corrective capacity requirements through on-line unloaded capacity and has manually committed and dispatched resources when needed to make additional corrective capacity available in real-time. The costs incurred from manual dispatch for corrective capacity are associated with the energy (and start-up, when applicable) a resource produces in order to be positioned to have unloaded ramping capacity. This energy is not eligible to set LMPs and there is no pricing of, or payment for, the resulting unloaded capacity that is counted toward meeting the non-modeled requirements for corrective capacity. The proposed corrective capacity product will value and pay for the corrective capacity and will also appropriately reflect the energy re-dispatch cost to obtain that capacity in the energy LMP.

Some stakeholders have commented that a benefit-cost analysis should be performed comparing the proposed product to the existing framework for meeting the corrective capacity requirements. This comparison is inappropriate as it would omit several important pricing and compensation issues inherent in the existing framework. The existing framework may appear lower-cost on the surface since there is no payment for the capacity that meets the requirement. Moving procurement into the spot market and co-optimizing with other energy and reliability products recognizes the persistent need for this service and appropriately values it through co-optimization with other spot energy and reliability products.

ISO Response

There are benefits to the preventive-corrective constraint as compared to the cost of its implementation. These benefits are described in more detail at the end of Section 8.

Breakdown of Price Components

Figure 1 breaks the LMCP and energy LMP into general components for comparison. DMM notes that while a resource may receive both energy and capacity payments, megawatts that are producing energy will not be paid the LMCP and megawatts providing corrective-capacity will not be paid the LMP. That is, a megawatt can only provide one service or the other, and only be compensated for one or the other.[1]

Both the LMP and LMCP have power balance components. For the LMP, the System Marginal

Energy Cost is the value of the marginal megawatt of energy in keeping the power balance constraint in the base dispatch from being violated. The LMCP includes the shadow value on the power balance constraint in the corrective-contingency case, referred to here as the Contingency Marginal Capacity Cost. This represents the marginal value the corrective capacity provides in ensuring that it is feasible to re-dispatch resources post-contingency without dropping load during the recovery period, a key part of the reliability requirement.

Figure 1 - Locational Price Components (at same location)

		Power Balance		Cong. (Preventive)		Cong. (Corrective)
LMP	=	System Marginal Energy Cost	+	$P_{Cong\ N-1}$	+	$P_{Cong\ Corr}$ same as in LMCP
LMCP	=	Contingency Marginal Capacity Cost	+	0	+	$P_{Cong\ Corr}$ same as in LMP

The preventive congestion component of the LMP, derived from the marginal congestion costs on the preventive constraints, represents the value of energy at the location in relieving, or cost in congesting, the preventive-constraint. The preventive congestion component for the LMCP will always equal zero, because the corrective-capacity will have no value in relieving the preventive constraints.
The corrective congestion component of the LMP represents the value of *energy* at the location in relieving, or cost in congesting, the corrective-constraint. This is consistent with the preventive congestion component, except that the corrective constraints are currently not modeled. The corrective congestion component of the LMCP represents the value of *corrective-capacity* at the location in relieving the corrective-constraint. The corrective congestion component will have the same value for the LMP and LMCP at the same location because one megawatt of *energy* will be just as effective as one megawatt *capacity* in relieving the corrective constraint.

As is shown in the straw proposal the Locational Marginal Capacity Price (LMCP) does not create double payments to resources that provide capacity effective on more than one constraint. Similarly, resources receiving both A/S and corrective capacity payments will not receive double compensation for these products. This is because the shadow prices will be incremental and their sum will never be more than the marginal value of the capacity at that location. To the extent that a resource can provide both A/S and corrective capacity, the combination of the ASMP and LMCP will signal this value, and the market will more likely procure capacity that is effective for both these reliability requirements rather than procure each type of capacity separately from more resources. In this way the corrective constraints may also improve the procurement of AS capacity, helping to locate it where it is more valuable and less vulnerable to being undeliverable post-contingency.

[1] However the same capacity may provide both A/S and corrective services, but as explained below, this will not result in over compensation.

ISO Response

The ISO agrees. As noted in Section 8 of the revised straw proposal, the preventive-corrective constraint can include operating reserves so that we avoid procuring only 10 minute contingency reserves to fulfill a 30 minute need and avoid over-procuring capacity by having two separate categories of contingency reserves. We also agree that the constraint will likely improve the procurement of operating reserves capacity. As Section 7.4.4 explains, there will be no double payment if operating reserves are used to satisfy the constraint.

No Need for Separate Bidding of Corrective Capacity
DMM is not aware of any costs associated with providing corrective capacity that are not covered by the LMCP (which will at the very least cover opportunity costs). A resource's energy bid states its willingness to produce energy or leave capacity unloaded (that is, its willingness to provide capacity). For purposes of corrective capacity procurement, the energy bid is an implicit capacity bid which the Preventive-Corrective framework leverages to find the cost minimizing solution that meets the model constraints and correctly compensates capacity provided. Because the corrective capacity will be re-optimized in the real-time market, corrective capacity sold day-ahead can be converted to energy or other capacity awards in real-time if it makes economic sense to do so. Thus, there is no foregone opportunity to sell energy or capacity in real-time due to corrective capacity awards in the day-ahead market. Because there is no identifiable cost associated with providing corrective capacity, under competitive conditions we would expect to see price-taking offers if bidding were allowed. Under these circumstances there is not clear justification for allowing offers in the corrected capacity product.
ISO Response
We appreciate DMM's comments.
Potential for Market Power in Corrective Capacity LMCP
The corrective constraints can be resolved in three general ways, with the LMCP being set differently in each case. 1. The marginal cost of moving a resource to a dispatch point where it can provide one more MW of capacity (or marginal value of moving it back down). 2. The marginal value of allowing one more MW to flow over a transmission line. 3. The opportunity cost of energy not sold due to holding the capacity in reserve. In the first case, the LMCP can be increased by raising the energy bid. In this case existing mitigation measure would apply.[2] Under the second case, the LMCP could be raised through higher energy bids on the congested side of the constraint, and current mitigation would apply, or by reducing energy prices on the uncongested side of the constraint. Because uncongested areas are generally assumed to be competitive, it is less likely a resource could influence prices to a significant degree. Therefore, the second case represents is less of a market power concern. The third case is where market power could be exercised by bidding below true marginal costs.[3] Existing measures would not be able to mitigate this market power. In order to exercise market power in corrective capacity through submitting low energy bids, a generator would need to have a sufficient amount of the available 20-minute capacity in a location where the LMCP is set by the opportunity cost of reducing energy production to reserve corrective capacity. It is not clear how frequently the LMCP will be set by energy opportunity cost, however with constraints covering larger topological areas (as is the case in the ISO proposal) we believe that the LMCP will be more frequently set by moving resources upward to achieve greater ramp capability or reserving existing online unloaded ramp capacity that is higher-priced (in energy) and has zero opportunity cost. While it appears less likely to occur, this third case where market power may be exercised by lowering the energy bid price should be

monitored for.

DMM does have a more general concern with market power in ramping energy and capacity. Additional demand for flexible capacity through the introduction of corrective capacity constraints, flexible ramping product, and potential increase in ancillary service requirements may reduce regional competitiveness for capacity and ramp. Currently, the requirements for these existing and proposed products are no more granular than the existing north and south zones. However, if the ISO chooses to apply these requirements more granularly, competitiveness of supply will need to be evaluated more closely before doing so.

[2] The pivotal supplier test that determines constraint competitiveness in the mitigation process will have to be augmented to include corrective capacity. Otherwise, the existing framework is appropriate for corrective capacity constraints as well as (existing) preventative constraints.
[3] Constrained by the price at

ISO Response

We discuss our thoughts on this issue in Section 9.4.

Eliminate Bid-In Ramp Rates to Limit Opportunity to Withhold Ramp Capacity

Market power can also be exercised by using bid-in ramp rates to physically withhold corrective capacity, or other ramping energy and capacity, from the market. DMM views the ramp rate as a physical characteristic of a resource and not a market mechanism that should be varied based on market conditions. With the increased emphasis on valuing ramping energy and capacity going forward – combined with the additional demand for these services that will be required by the contingency modeling enhancements and the flexible ramping product – the potential for deleterious market impacts resulting from withholding ramp could be more severe. DMM recommends that the option to bid in a resource's ramp rate be eliminated prior to implementing any additional market instruments that require and value capacity or ramping energy. Doing so will leave two venues for adjusting a resource's ramp rates: the Master File which facilitates slower moving or anticipated changes and SLIC in the event there is an abrupt and temporary change in the physical ability of a resource to ramp.

ISO Response

The ISO agrees that ramp rates are physical characteristics of the resource and need not be changed via bids. We agree that the Master File and SLIC can be used to make changes should the resource experience a change in its physical characteristics. We discuss this in more detail in Section 9.1.

Suggestion for Empirical Analysis

DMM appreciates that it may not be practical or even feasible to test the proposed design in a setting that would lend itself to estimating the market impact. However, it may be informative to evaluate existing supply, procurement, and pricing of Spinning Reserve and Non-spinning Reserve as well as on-line unloaded ramping capacity that is not reserved for these services in the context of the anticipated requirements for the few broad-area constraints that the ISO is proposing to apply under the corrective capacity design. We recognize that adding the corrective capacity product in the market co-optimization will alter procurement, however this type of analysis will provide stakeholders a view of the extent to which existing supply and procurement would naturally cover the proposed requirements (and thus have minimal market impact).

ISO Response
We discuss our thoughts related to this issue in Section 9.4.
Clarifications from ISO
DMM would like the ISO to clarify that the corrective constraints will be enforced in both the IFM and RUC markets, as well as the real-time markets. It should be noted that virtual bids in the IFM may distort the commitment and positioning of resources to meet the corrective constraints. The RUC market may help with the commitment issues, but the not the positioning issues created by virtual bidding. DMM would also like clarification on whether corrective capacity awards in day-ahead markets are permanent going into real-time, or whether they are free to be re-optimized based on changing market conditions.
ISO Response
The preventive-corrective constraints will be enforced in the IFM, RUC, and real-time markets. Virtual bids in the IFM will have the same impact on the preventive-corrective constraint as it does for other constraints and products in the IFM today so there is no change. However, only physical supply will be used to meet the constraint in RUC. The corrective capacity awards will be free to be re-optimized in the real-time based on changing market conditions. We have added this discussion to Section 10 of the revised straw proposal.

Company	Date	Submitted By
NRG Energy, Inc.	May 28, 2013	Brian Theaker
NRG strongly supports the CAISO's efforts in this initiative.		
First, NRG strongly supports developing mechanisms that meet reliability requirements through the CAISO's market optimization rather than outside of that optimization. It is far better for the CAISO to leverage the $200 million spent on implementing its now four-year-old nodal market by building more reliability dispatch into that optimization than to continue to manage reliability through out-ofmarket mechanisms that have no impact on nodal energy prices. NRG also strongly supports efforts to reduce the amount of Exceptional Dispatch ("ExD"). While some parties may point to the small volume of ExD (relative to the total amount of energy serving demand) to assert that such ExD volumes should simply be tolerated in perpetuity, ExD, by its very nature, confounds a primary purpose for which the CAISO invested $200 million in a nodal market, namely, to ensure that CAISO market prices reflect *all of* the actions that must be taken to maintain a reliable bulk electric system. NRG requests that the CAISO present its position on the interaction between corrective capacity and Capacity Procurement Mechanism designations. As NRG understands, the CAISO's position is that the act of submitting an energy bid associated with non-RA capacity effectively renders that capacity ineligible for a CPM designation. While a recent FERC order1 indicated that the CAISO was not required to provide a backstop capacity designation if non-RA capacity was "dispatched" (presumably meaning if energy was dispatched from that capacity) when non-RA capacity was available, a principle underlying the December 2011 CPM settlement was that the CAISO would provide a CPM designation for the amount of non-RA capacity needed to address the reliability issue, independent of whether energy was dispatched from that capacity. Consistent with that principle, NRG requests the CAISO address the implications of a situation		

in which the CAISO obtained corrective capacity that was not RA capacity.
ISO Response
Under this scenario, the CPM would not be triggered. Resources with market awards do not trigger CPM. There are numerous constraints built into the ISO market. Resources committed or dispatched by the market are not eligible for CPM. In this initiative, the ISO is proposing to incorporate an additional constraint.
NRG supports the preventive-corrective constraint approach, and has no alternative to that approach to offer.
While the preventive-corrective approach values the capacity that the CAISO will rely on to adhere to WECC standards, NRG is not yet persuaded that this approach will fully address the problem created by committing units at minimum load to provide corrective capacity, namely, that minimum load energy does not set price. The problem of minimum load energy not setting price could and should be addressed by another mechanism such as extended LMP.
ISO Response
Extended LMP is listed as "Extended Pricing Mechanisms" in the 2012 Stakeholder Initiatives Catalog as a separate discretionary initiative. We encourage stakeholders to voice their opinions in that annual process to help the ISO prioritize discretionary initiatives.
What type of cost or lost opportunity would a bid signify?
Neither. Similar to the CAISO's existing ancillary services markets, a bid would signify the value of providing the service.
ISO Response
Capacity bids must reflect a cost. The "value" of the corrective capacity will be automatically calculated by the constraint and reflected in the LMCP for the marginal unit. Please see the more detailed discussions in Sections 9.2 and 9.4.
Would a bid be appropriate day-head, real-time, or both? Why?
While NRG would prefer to be able to bid in all markets, NRG notes that the CAISO is proposing to allow day-ahead bidding for the Flexible Ramping Product, so it would be consistent with that product to at least allow day-ahead capacity bidding.
ISO Response
Though the ISO sees many parallels between the Flexible Ramping Product and the preventive-corrective constraint, bidding in one does not necessary compel the ISO to allow bidding in the other. We will consider each issue on its own merits and provide a bidding opportunity to reflect costs for the capacity provided (in so far as that cost is not reflected elsewhere).
What are potential bidding parameters (such as bid cap)? Why?
The most analogous bidding parameter would be the CAISO's $250/MW cap on ancillary service bids.
ISO Response

We note NRG's comment.

Are there market power concerns with allowing bids and how can the ISO mitigate those bids?

Given that the CAISO is proposing to secure corrective capacity to address the eight *major* WECC rated transfer paths that the CAISO operates, it is possible that there would be a competitive pool of suppliers that could supply corrective capacity, and the CAISO would not need to apply any local market power mitigation. It is possible that, under the very stringent three-pivotal supplier test used to assess competitiveness, the pool of corrective capacity suppliers could be non-competitive under certain conditions. In that case, similar to how energy bids from resources that the CAISO deems have the potential to exercise local market power are treated, the CAISO would mitigate the capacity bids of those suppliers to a default level.

With regards to what the default capacity bid could be: the schedules to the RMR contract specify how to calculate "default" ancillary services bids; however, those schedules use unit specific information, and NRG understands only one resource is currently subject to an RMR contract. Since resources would not be able to use individual RMR contract schedules to determine their default capacity bids, an alternate approach would be to direct Potomac Economics to calculate default capacity bids (based on typical information) that would apply to several categories of resource types using a methodology similar to the methodology set forth in the RMR schedules.

ISO Response

ISO appreciates NRG's thoughts on this matter. We discuss our thoughts on this issue in Section 9.4.

Given the above answers, how could ISO evaluate the cost-benefit analysis of including bid functionality? In other words, how much would the benefit be as compared to the added complexity of modeling bid functionality?

The CAISO can determine the cost of providing this functionality. Without knowing how market participants may bid, or how much corrective capacity the CAISO will require, it is not possible to quantify the benefit of providing this functionality a priori. One intangible benefit of providing bidding functionality would be for the CAISO to demonstrate its commitment to competitive markets to its market participants.

ISO Response

ISO appreciates NRG's thoughts on this matter. However, capacity bids must reflect a cost that cannot be recovered through the market otherwise. Allowing capacity bidding in and of itself does not reflect a commitment to competitive markets. Please see the more detailed discussions in Sections 9.2 and 9.4.

We would like to hear from stakeholders on why the bid-in ramp rate functionality should be retained or removed, and potential inefficiencies or benefits from its removal.

NRG does not support the CAISO's proposal to eliminate a market participant's ability to bid in the unit's ramp rate. Master file ramp rates should reflect a unit's maximum capabilities, but a resource owner may not want its unit to be required to perform at those maximum capabilities at all times. An owner can manage risk by bidding in a ramp rate below the maximum capability of its unit. If the CAISO eliminates this bidding capability, resource owners may seek to manage

risk by reducing the unit's ramp rate in the CAISO's master file.

ISO Response

The ISO believes that ramp rates are physical characteristics of the resource and need not be changed via bids. The Master File and SLIC can be used to make changes should the resource experience a change in its physical characteristics. We discuss this in more detail in Section 9.1.

The fifth topic is a broad consideration of the exercise of local market power and potential manipulation of capacity-based mechanisms such as the preventive-corrective constraint, ancillary services, and the flexible ramping product. We encourage feedback from stakeholders on these issues.

See responses above.

ISO Response

Noted.

The sixth topic is cost allocation. Since the reliability standard is a WECC-wide concern, the current ISO understanding is that costs should be allocated to all load. The ISO would like to hear more detailed arguments for or against this proposal.

The preventive-corrective approach will produce nodal-specific capacity and energy prices that will be paid to suppliers. As with the current market, these payments should be collected from load. As the CAISO correctly notes, the preventive-corrective algorithm does not introduce a heretofore unknown reliability paradigm – a paradigm that warrants a re-examination of how reliability costs are allocated. Instead, this algorithm provides that the costs of maintaining capacity in particular locations are compensated for and collected, to the maximum extent possible, through market prices. If anything, the preventive-corrective approach to reliability would suggest re-examining the aggregation of nodal prices paid by load, since nodal energy (and capacity) prices will now, to an even greater extent, reflect the costs of ensuring reliability at specific locations in the bulk power network. However, the issue of load aggregation is such a politically weighted issue that NRG is not proposing to link load aggregation pricing with the implementation of the preventive-corrective approach.

ISO Response

ISO appreciates NRG's thoughts on this matter. As noted in Section 9.3 of the revised straw proposal, the ISO proposes to allocate costs to all metered demand because this is a WECC-wide requirement.

Company	Date	Submitted By
Pacific Gas & Electric	June 4, 2013	Will Dong (415) 973-9267 Paul Gribik (415) 973-6274

Introduction

Pacific Gas & Electric (PG&E) offers these comments on the California Independent System Operator's (CAISO) Contingency Modeling Enhancements (CME) Initiative Straw Proposal. The objective of the CME initiative is to develop an in-market mechanism to meet the Western Electricity Coordinating Council (WECC) standard for the CAISO to return flows on critical transmission paths to a reduced system operating limit (SOL) within 30 minutes after a real-time

contingency leads to an insecure state. Today, the standard is successfully met by deploying Exceptional Dispatches (EDs) and enforcing Minimum Online Commitment constraints (MOCs). The CAISO proposes to replace these out of market tools by enforcing new "corrective" constraints in the optimization and to reflect the cost of meeting these new constraints with a Locational Marginal Capacity Price (LMCP).
PG&E appreciates the CAISO's work in the Straw Proposal to refine its CME design and supports some of the refinements. Specifically, PG&E supports two improvements from the Issue Paper:

• Operating reserves will be included in the corrective capacity supply as applicable. (PG&E would like additional definition on what is meant by "as applicable.")
• Offline generators can provide corrective capacity as long as it can start within the given time frame.

In these comments, PG&E recommends four design improvements and identifies three areas that need additional work by both the CAISO and stakeholders. PG&E will continue to evaluate the proposal against the current practices as further design details become available.

ISO Response

The ISO appreciates PG&E's comments.

PG&E offers three guiding principles for the CME initiative.

1. Cost Appropriateness: The design must be carefully developed to avoid over-procurement of corrective capacity and overpayment for this capacity (e.g., limit the payments to resources' opportunity costs).
2. Limit the Complexity: Since the 2009 MRTU implementation, the CAISO market has undergone a near constant evolution such that even highly engaged parties have expressed difficulty with its complexity[1]; PG&E agrees that increasing and unnecessary complexity is not a beneficial outcome, and the CAISO should avoid complexity that has minimal return. Moreover, the CAISO is implementing other significant changes over the next year, including Pay for Performance Regulation, the FERC Order 764 reforms, and the Flexible Ramping Product. Given the additional complexity expected from these initiatives, the CAISO should seek to implement a less complex CME solution. This will help ensure optimization performance is not degraded and guard against unforeseen interactions with other market elements. Finally, this initiative is seeking to build an in-market solution to replace exceptional dispatches that account for approximately 0.25% of load.[2] This is a relatively small scale issue that calls for a small-scale, relatively simple solution.
3. Interaction with EIM: The scope of the CME initiative should be bound by the set of critical transmission paths in the CAISO Balancing Authority Area (BAA). Any market mechanism designed through this initiative shall not apply to transmission paths in other BAAs, even if they are within the foot print of an Energy Imbalance Market (EIM).[3]

1 See WPTF presentation on *"Market Pricing, Transparency and Liquidity"* at the March 19, 2013 Market Surveillance Committee meeting (http://www.caiso.com/Documents/MarketPricingTransparency-Liquidity-StakeholderPresentationMar19_2013.pdf).

2 In 2012, based on the DMM report, ED as a percentage of load averaged at 0.53% (page 11 http://www.caiso.com/Documents/2012AnnualReport-MarketIssue-Performance.pdf). In the same period, according to the CME proposal, the percentage of ED that is deployed to serve the SOL requirement is

roughly 50% (page 18 http://www.caiso.com/Documents/2012AnnualReport-MarketIssue-Performance.pdf).

[3] The EIM is an active CAISO initiative, under which the CAISO would play the role of a Market Operator and be able to dispatch energy in real time across the entire EIM foot print.

ISO Response

1. There are several benefits to the preventive-corrective constraint - one of which is the precise procurement of needed corrective capacity based on flow. Since the constraint is deployed in the day-ahead market and re-optimized in the real-time, the procurement of corrective capacity will change based on changes in flow. These benefits (and a comparison with NYISO) are described in more detail at the end of Section 8 in the revised straw proposal. We discuss the payment of corrective capacity in more detail in response to PG&E's comments below.
2. We agree that the additional complexity will require careful market simulation and analysis. We believe we and our systems are capable of adopting this constraint. To demonstrate this, we are taking steps to develop a prototype to share with market participants. We will provide a realistic example using a production level case. We will rerun a saved case with the constraint to demonstrate how the constraint will function and impact the results of the saved case. We believe this effort will take about two months to accomplish. We discuss our thoughts on this issue in Section 9.4. While the volume of exceptional dispatch (MWh) is small compared to the overall market, all of these manual actions are made after the IFM and have a disproportionately larger impact on the real-time market. We have also noted in Section 7.1 that exceptional dispatches related to the WECC SOL standard cost $47 million for 2012 (Figure 3). Note that this does not take into account the price-suppressive impacts of the exceptional dispatches nor the MOC constraints.
3. Reliability functions for other BAs are not within the scope of the EIM discussions. As noted in the most recent revised straw proposal for the EIM, "Each BA is responsible for meeting NERC and WECC reliability standards in its respective BAA" (see: http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyImbalanceMarket.aspx).

Compensate Providers for Opportunity Cost Only

Compensation for corrective capacity should be limited to opportunity costs since there does not appear to be incremental costs, beyond the opportunity costs of providing energy or other ancillary services, to provide corrective capacity. Compensating providers beyond the opportunity cost would result in overpaying for this capacity and an unreasonable cost for California consumers.

ISO Response

The ISO responds to the comment above as well as #1 under PG&E's "three guiding principles for the CME initiative." The LMCP can reflect three different costs and/or values, only one of which is an opportunity cost. The other two are the marginal congestion savings and the marginal capacity value to support following ISO dispatch. This is discussed in detail via examples provided in Section 7.4. It is important to provide compensation for the marginal congestion savings because the LMCP will signal the need (and reflect the value of) increased ramping capability. The preventive-corrective constraint may also position units to such a level that it creates a revenue shortfall, which the resource can avoid if it deviates from dispatch.

Under this scenario, the LMCP will reflect the revenue shortage so that the resource follows dispatch. This last point is particularly important because the resource is being used to meet the WECC SOL standard.

The LMCP reflects a marginal capacity value and is paid to all resources at the node in the same way that LMP reflects the marginal cost of providing energy and is paid to all resources at that node. Marginal pricing is not a new concept and is already deemed just and reasonable and therefore does not reflect an "overpayment" by consumers. Both the LMP and LMCP send appropriate market signals and compensation.

No Bids for Corrective Capacity

Related to the first recommendation, there should be no bids to provide corrective capacity. Since the LMCP is designed to pay providers their opportunity costs and there appears to be no incremental costs, there seems little need to implement a bidding feature. Moreover, by excluding a bidding feature, the CAISO simplifies its design and reduces the changes stakeholders need to implement for their systems.

ISO Response

The ISO appreciates PG&E's comments. We discuss our thoughts on this issue in Section 9.4.

Use a 25-minute Ramping Window

The twenty minute ramping window contemplated by the CAISO unnecessarily shortens the actual time needed to respond, and, therefore, could disqualify resources that can meet the WECC requirement, potentially resulting in higher costs. In a contingency, the CAISO can immediately initiate a new Real-Time Dispatch (RTD) run with dispatch instructions occurring generally five minutes later. Given the CAISO's ability to initiate a new RTD, the CAISO should use a 25-minute ramping window instead of 20 minutes discussed in the Straw Proposal.

ISO Response

The ISO is not proposing a 20 minute ramping window. The use of "20 minutes" only appears in the examples and was meant to illustrate an approximate amount of time left over after the operators initiate the real-time contingency dispatch (RTCD). Therefore, the amount of time operators would need varies depending on the situation and the remaining time available is represented by "T" in the formulation in Section 7.3.1.

Replenish Reserves via RTUC after the Contingency Ramp

Replenishments should occur naturally through RTUC runs to avoid unnecessary price spikes that might occur if procured during a SOL contingency ramp period. WECC standard BAL-STD-002-0 allows Transmission Operators 60 minutes to replenish operating reserves so immediate replenish the reserves is not required and will likely create unnecessary stress on the market.[4]

4 http://www.wecc.biz/library/Documentation%20Categorization%20Files/Regional%20Standards/BAL-STD-002-0.pdf (see section C. Measures)

ISO Response

The ISO agrees with PGE's reference to the WECC standard and will adhere to its provisions.

Cost Allocation

The next proposal should provide more details on what an appropriate cost allocation method

may be for capacity procured to meet the SOL requirement on the identified paths for the contingencies modeled.

ISO Response

As noted in Section 9.3 of the revised straw proposal, the ISO proposes to allocate costs to all measured demand because this is a WECC-wide requirement.

Local Market Power Mitigation (LMPM) Rules

PG&E supports recommendations made by the Department of Market Monitoring (DMM) to consider measures to detect and mitigate the potential exercise of market power as part of this initiative.[5] As the DMM notes, the proposed preventive-corrective constraints may increase local market power for some participants, and existing LMPM procedures apply only to energy bids into the market and would not be effective in mitigating local capacity market power.

[5] See DMM's comments, under section *"Potential for Local Market Power in Corrective Capacity"* http://www.caiso.com/Documents/DMM-Comments-ContingencyModelingEnhancementsIssuePaper.pdf

ISO Response

We discuss our thoughts on this issue in Section 9.4.

List of Contingencies for Major WECC Paths

PG&E appreciates the CAISO providing the list of eight major WECC paths which have SOLs. However, the CAISO has not provided a list of contingencies it will consider when procuring corrective capacity. PG&E asks the CAISO to provide the list of contingencies for each of the eight major paths so stakeholders can better understand the scope of the initiative.

ISO Response

The ISO agrees that data transparency is important. Currently, contingencies that the ISO intends to enforce (Pre Day-Ahead) and those that have been enforced (Post Day-Ahead) are reported on a day-to-day basis in the CAISO Market Results Interface (CMRI). Transmission contingencies that have occurred are also reported on OASIS. Information beyond that provided in these three sources are currently undergoing internal ISO review to ensure that pertinent information is provided to market participants but that the ISO protects sensitive or critical information. Should the ISO release more information regarding contingencies, it will do so through the appropriate forum.

Company	Date	Submitted By
Southern California Edison	May 30, 2013	Wei Zhou – (626)302-3273 Aditya Chauhan – (626) 302-3764

General Comments

The following are Southern California Edison's (SCE) comments on the California Independent System Operator's (CAISO) Straw Paper1. SCE supports the CAISO's procurement of tools to research and analyze this problem to improve current process such as ED and MOC's.

However, before implementing solutions, SCE feels it imperative that the CAISO and PTOs have a common understanding of what the relevant NERC and WECC standards require and allow. Moreover, this problem represents fraction of a percent of the total transactions in the CAISO's electricity market. As a result, SCE believes the CAISO should refine existing practices through enhanced situational awareness and enhanced planning tools. At this time, SCE is far from persuaded that the correct solution is to make major, unproven changes to the entire market as proposed by the CAISO.

ISO Response

The ISO believes that its current practice of relying on exceptional dispatches and MOC constraints to meet the WECC SOL standard should give way to a more sophisticated mechanism. As FERC has directed, the solution should be market-based and the preventive-corrective constraint both meets the flow-based standard of the WECC requirement and appropriately reflects the value of the solution in the market.

We have extensive explanation of the relevant NERC and WECC standards in Sections 4 and 6.

Common understanding of the NERC and the WECC standards must be reached among PTOs and the CAISO as a precondition to moving forward. Technical details of the NERC TOP-007 and TOP-007-WECC-1 standards must be properly understood by PTOs before initiating any implementation changes.

Based on the assumptions displayed in the Straw Paper analysis of attributes[2] in conjunction with internal discussion, the proposal may have been drafted without first reaching a common understanding of transmission operations and standards as interpreted by the PTOs and the CAISO. Vetting this proposal by experts, and gaining understanding, and hopefully agreement, on the proper implementation of these standards should be a prerequisite to any further determination of a proper solution.

SCE suggests the CAISO coordinate with PTOs to obtain technical agreement on the interpretation of the NERC and WECC requirements. SCE suggests the CAISO hold a technical forum to discuss these issues with the PTOs and reach a common understanding of the standards. For example, there may not be common agreement on if the WECC standards apply to pre or post contingency SOLs. Moreover, SOLs may have been created to addresses unique operating issues, and thus a "one-size-fits-all" approach may not be warranted. However, based on the CAISO's proposal, the CAISO seems to believe the standard should apply to post-contingency SOLs in all cases. To clarify and reach common understanding on this, it is essential for the CAISO and PTOs discuss such details. Other technical aspects which need to be clarified in order to obtain a common understanding, include:

(1) What are the limits pertaining to the NERC and WECC requirements? When are 4 hour or 1 hour emergency limits (rather than 30 minutes) applicable?
(2) What are the definitions of the pre-contingency SOLs and the definitions of the post-contingency SOLs?
(3) What is allowed and what is not allowed after an N-1 event within 30 minutes, to comply with the NERC and WECC requirements?
(4) Under what conditions is load-shedding an allowed response? Does this vary depending on the SOL and the N-1 event?
(5) What is the role of the Demand Response Programs3?
(6) What are the roles of RAS or other relief schemes in this process?

(7) What are the roles of ancillary services, and other flexibility (e.g., Flexi-ramp) services procured by the CAISO?

2 Including path ratings, SOLs, the nature of contingencies and available options, time dimensions allowed to address contingencies, etc.
3 Demand Response Programs are part of LTPP and the subject of on-going workshops for developing a roadmap for its implementation. It's not clear whether the CAISO proposal would be in conflict and derail this effort.

ISO Response

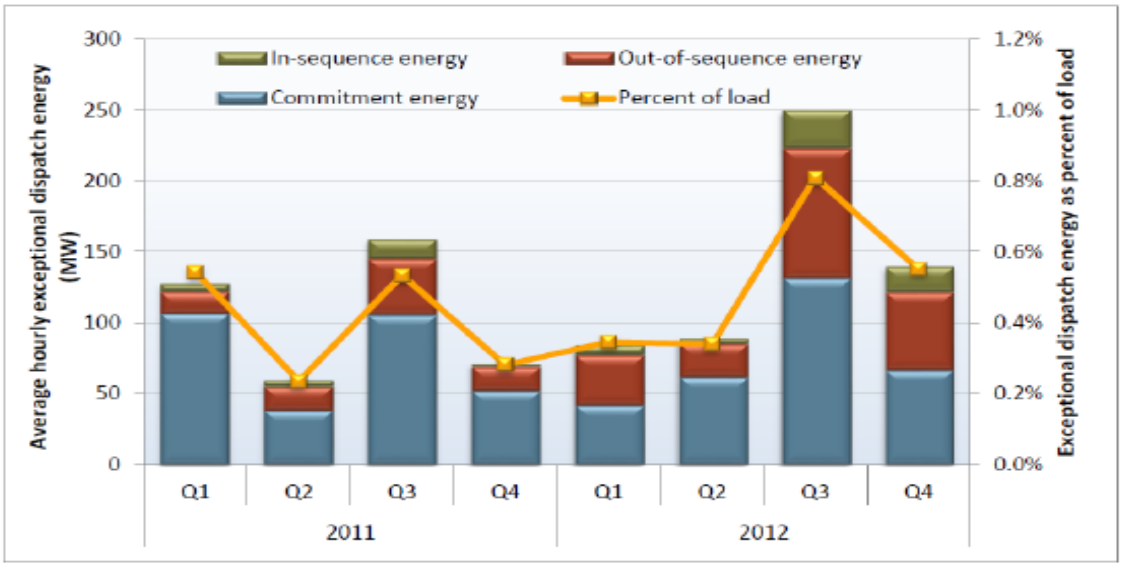
We have extensive explanation of the relevant NERC and WECC standards in Sections 4 and 6. Please refer to these sections for more detail. We provide brief responses to each question above.

(1) The WECC SOL standard is a 30 minute limit.
(2) The SOLs are provided in Table 2. Currently, contingencies that the ISO intends to enforce (Pre Day-Ahead) and those that have been enforced (Post Day-Ahead) are reported on a day-to-day basis in the CAISO Market Results Interface (CMRI). Transmission contingencies that have occurred are also reported on OASIS. Information beyond that provided in these three sources are currently undergoing internal ISO review to ensure that pertinent information is provided to market participants but that the ISO protects sensitive or critical information. Should the ISO release more information regarding contingencies, it will do so through the appropriate forum.
(3) The standard is provided in Table 1.
(4) Load drop is not allowed per the WECC SOL standard. However (and as noted in the paper), load drop is appropriate if within the 30 minute transition period another contingency occurs. Note that the preventive-corrective constraint allows demand response to participate in providing corrective capacity.
(5) As noted, demand response in the ISO's market will automatically be optimized in the preventive-corrective constraint. There are several efforts to include IOU demand response programs into the ISO market. We believe this is a positive step forward. A demand response order initiating rulemaking (DR OIR) is scheduled to open later this year to discuss DR attributes such as flexibility.
(6) Does not apply. See (4) above.
(7) Operating reserves (spin and non-spin) can be counted towards meeting upward corrective capacity requirement. In the market model, operating reserves (procured for a different WECC standard) will participate in the preventive-corrective constraint. This feature avoids double procuring capacity which has been a concern from stakeholders. We discuss this in detail at the end of Section 8 in the revised straw proposal. Flex ramp product will be separate capacity procurement from operating reserves and corrective capacity. This is because flex ramp is to meet net load variability/uncertainties, while operating reserves and corrective capacity are to cover contingencies, and net load variability/uncertainties and contingencies could happen on top of each other. Therefore, their procurement has to be separate. Having said that, when operating reserves or corrective capacity are deployed, flex ramp product will also be deployed to help the system to recover. However, when flex ramp product is deployed in RTD market to deal with net load variability/uncertainties, operating reserves and corrective capacity will still be put aside to prepare for the next contingency.

Recent Exceptional Dispatches comprise less than 0.32% of Energy in the current market4. The stability and integrity of the current market design should not be jeopardized over an issue impacting a de minimis fraction of the electricity market.

As DMM noted, the total Exceptional Dispatches (EDs) fall below 1% in all quarters in 2012, with most quarters below 0.6% (see chart below from 2012 DMM Annual Report)

Figure E.7 Average hourly energy from exceptional dispatches



Further, the EDs due to the TOP-007-WECC-1 standard only account for 40% of all EDs, as the CAISO states: The technical paper attached to the previous ISO issue paper (as well as reproduced in Figure 2 below) showed that for 2012, 21 percent to 77 percent of all exceptional dispatch volume measured in MWhs issued by month (40 percent annual) were due to the WECC SOL standard.[5]

However, the CAISO proposal introduces fundamental, complicated, untested and unproven changes to the core of the market design. To SCE's knowledge, no other ISO/RTO prices and dispatches for N-1 SOLs and no market calculates nodal prices for "corrective capacity". The price stability of the current market will be impacted under the current CAISO proposal, and no party, including the CAISO, can demonstrate the degree of this impact. Current market stability will face additional significant challenges in the near future, including addressing RTCIO uplift, moving to the 764 15-min market, EIM, etc. There is no evidence that a proposal of this complexity has been successfully implemented elsewhere, nor is there any available research, review, debate, simulation, analysis, or a demonstration of functional benefits. Without such a demonstration, SCE simply cannot conclude that disrupting the current proven and well established core LMP market framework simply to address an issue that represents a fraction of a percent of total transactions[6] is a prudent course.

[4] Figure E.7. Page 12. http://www.caiso.com/Documents/2012AnnualReport-MarketIssue-Performance.pdf shows Exceptional Dispatches (ED) peaking at 0.8% of Energy. The CAISO's proposal addresses 40% of EDs = 0.8 x 0.4 = 0.32% of Energy.
[5] Page 14. http://www.caiso.com/Documents/StrawProposal-ContingencyModelingEnhancements.pdf
6 The CAISO should consider how this proposal would work with the proposed IDAM, or if, the IDAM could be enhanced to materially address and residual concerns. In addition, the CAISO should consider how the proposed Flexible Ramping products could be use, as well as if refinements to the current Ancillary Service procurement (e.g. more granular procurement to improve deliverability in the event of a contingency) could address concerns.

ISO Response

While the volume of exceptional dispatch (MWh) is small compared to the overall market, all of these manual actions are made after the IFM and have a disproportionately larger impact on the real-time market. We have also noted in Section 7.1 that exceptional dispatches related to the WECC SOL standard cost $47 million for 2012 (Figure 3). Note that this does not take into account the price-suppressive impacts of the exceptional dispatches nor the MOC constraints.

We agree with SCE that the implementation of the preventive-corrective constraint will add complexity to the market and the market software. We discuss our thoughts on this issue in Section 9.4.

SCE agrees that the CAISO's must comply with reliability standards. SCE also supports the use of reliability tools such as enhanced situational awareness tools to enhance reliability and improve on current processes.

a) NERC/WECC does not require a market solution to meet these reliability needs.

NERC/WECC reliability standards define the reliability requirements for planning and operation. The Reliability Functional Model, rather than an ISO market structure where all different parties including physical and financial players are involved, defines the functions that need to be performed to ensure the reliability. The Reliability Functional Model is the foundation upon which the reliability standards are based.

b) Once the PTO's and CAISO understand the interpretation of the standards, all options on meeting reliability standards should be explored.

There are many reliability tools outside of the optimization that can be used to address reliability needs. These include situational awareness tools, RAS schemes, Exceptional Dispatches, load shedding, etc. Mechanisms that are out of the CAISO market also exist that can help to address reliability needs. For instances, the entire RA program exists outside of the optimization. In addition, the Local Resource Adequacy program ensures sufficient capacity to meet local reliability needs.

All the existing tools, including those outside and inside the CAISO market, need to be fully explored before making complicated changes to the already complicated CAISO market. Further, an optimization based, market based solution for each and every reliability issue is neither required nor a preferable approach. Moreover, if a particular situation is causing "excessive" use of out-of-market tools, the CAISO should first see if existing market features and tools, such as an additional constraint in a localized area, can reasonably address the unique situation. If not, the CAISO should explore if incremental enhancements to existing structures (such as introduction of additional ancillary service regions) would suffice. It is therefore not clear why the CAISO has concluded that a solution outside of the core optimization is inappropriate in this instance.

In sum, the CAISO should look to refine existing tools and processes before introducing new complexities to the market.

c) SCE supports the use of, and the development of enhanced situational awareness tools as well as refining the use of existing tools.

SCE supports the CAISO refining Exceptional Dispatch (ED) and Minimum Online Constraints (MOC) to address perceived shortcomings and to reduce EDs. This includes building new off-line tools to better assist operators in making appropriate, and minimally invasive reliability commitments and dispatch decisions. To the extent the CAISO needs to look further, refining Residual Unit Commitment (RUC), or changes to the proposed IDAM, may also be considered.

If deemed necessary, the CAISO can consider the use of the current study methodology in the CAISO's proposal to assist situational awareness. Implementing viable new "off-line" optimization tools to inform operation decisions should be considered.[7] Such tools could even use the CAISO current proposal as a starting framework for off-line analysis. This approach would also provide real-world experience with the approach and would be useful in helping to determine what, if any, aspects of this proposal could ultimately be incorporated into the core market optimization.

[7] If generators are being harmed via DECs under the current structure, they should be made whole. SCE is not aware of any generator is being harmed via Exceptional Dispatch or DECs under the current structure. California has extensive Resource Adequacy program, and many resources receive capacity payment through Local Resource Adequacy. For resources that are not under a RA contract, they receive ICPM capacity payment if they are deemed being needed by the CAISO. All these capacity payment programs exist for long time, and have been fully tested and proved in the real life.
However, if it's decided generators are being harmed, the CAISO and the stakeholder may consider make them whole by refining the BCR rules.

ISO Response

(A) The WECC SOL standard does not dictate a specific solution; however, this does not preclude the ISO from using the efficiency of the market to address our reliability needs. FERC has made this point and the ISO has a corporate goal to reduce reliance on out of market mechanisms.
(B) As mentioned above, the ISO has already been relying on manual actions such as exceptional dispatch. The ISO has explored other mechanism (such as the MOC constraints and potentially expanding the current operating reserves procurement) but neither would ensure that the WECC SOL flow-based standard would be met in an efficient manner.
(C) The preventive-corrective constraint represents an evolution in our response to the WECC SOL standard in much the same way that the MOC constraint was an improvement on exceptional dispatch.

Only after gathering actual experience or thorough simulation and research, should stakeholders and the CAISO consider this new and complicated change to the current CAISO market.

Before the CAISO introduces any new and complicated changes to the current market, as a prudent practice, the CAISO, involving the stakeholders if necessary, should perform thorough research, analysis, and simulation testing. Only after gathering actual experience with the new idea, should the stakeholders and the CAISO consider policy changes to the current market rules or the proposal of new rules. The CAISO should have a "sand box" to simulate such ideas, and use the results to inform and help guide new design features.

a) SCE strongly opposes complicated changes to today's LMP price formation without thorough research and real life testing.

To observe the obvious, the CAISO's LMP market is complicated. Any new and complicated changes, without thorough research and real life testing, will likely lead to unintended consequences. Further, alternatives, including in-market and out-of-market, must be fully considered and evaluated before introducing changes to the current market to address a reliability need.
The CAISO's current market is arguably the most complex in operation. This complexity makes it difficult, if not impossible, to understand what impacts a new design will have based purely on theory or intuition. As a rule the CAISO should build models of reasonable scale, simulate results, and analyze the result before finalizing a market design and before putting the new features into production.

b) SCE supports the use of the existing tools and processes to reduce EDs. However, as stated above, unless thoroughly researched and tested, unproven and untested changes to the current market rules should be avoided.

While SCE agrees that the EDs exist for certain reasons including ensuring reliability, SCE supports the use of the existing tools and processes to reduce EDs. For example, some of the EDs might be avoidable should appropriate and better situational awareness tools be put in place. Offline simulation tools may also assist in providing a better understanding of current grid operation conditions, which will lead to less EDs, in concept. A better utilization of the capacity procured through Ancillary Services, Flexible Ramping Constraints and RUC may help reducing EDs too. Minor changes to the existing market structure, such as additional ancillary service regions or additional local constraints, might also provide significant improvement. All these existing tools can be evaluated and refined to reduce EDs. However, unless thoroughly researched and tested, unproven and untested changes to the current market rules should be avoided.

ISO Response

(A) The ISO agrees that the preventive-corrective constraint will add complexity to the market. We believe we and our systems are capable of adopting this constraint. To demonstrate this, we are taking steps to develop a prototype to share with market participants. We will provide a realistic example using a production level case. We will rerun a saved case with the constraint to demonstrate how the constraint will function and impact the results of the saved case. We believe this effort will take about two months to accomplish. We discuss our thoughts on this issue in Section 9.4.
(B) See ISO's responses to previous comments.

Company	Date	Submitted By
SDG&E	May 22, 2013	
The Market Surveillance Committee's December 5, 2012 *Opinion on Mitigation Measures for Exceptional Dispatch in Real-Time* expressed the following concerns:		
"In particular, one consequence of the use of exceptional dispatch to solve constraints is that market prices in the constrained region will not reflect the impact of the constraint. On the one hand, this may necessitate bid-cost recovery (BCR) payments to resources that are dispatched		

out-of-merit to solve the constraint. At the same time, this also means that LMPs for other resources that contribute to relieving the constraint may be lower than would be the case if the constraint were fully modeled (while LMPs may be inflated for resources that increase congestion on the constraint).

A second consequence that is important in the context of the California ISO's proposed mitigation design is that, because the CAISO's dispatch software is not used to determine the dispatch, the resources selected for exceptional dispatch may not provide the least-cost means of resolving the constraint. A third consequence which we note, but which is not important to the present discussion, is that because the CAISO's dispatch software is not used to determine the dispatch, there may be a potential for adverse cost or reliability impacts if the operators fail to recognize that the output of the exceptionally dispatched resource adversely impacts other constraints."

ISO Response

The ISO agrees with these points.

The CAISO's March 11, 2013 *Contingency Modeling Enhancements Issue Paper* proposes to address these concerns as follows:

> "With the contingency model enhancement (CME), the market optimization advances from a pure preventive mode to a preventive-corrective mode, where both pre contingency dispatches and post contingency re-dispatches are co-optimized to meet the reliability standards. With the mandatory standards incorporated into the market optimization, the need for operators to exceptionally dispatch resources to their dispatchable Pmin or utilize MOCs to comply with the SOL standards is expected to significantly decrease."

The CAISO is proposing a market-based approach to restore the system to a secure state within thirty minutes following an N-1 contingency and to prepare the system such that the system will be within emergency limits following a subsequent contingency (an N-1-1 contingency condition). [1] The market-based approach will benefit generators that are most effective in mitigating the contingency conditions at issue. The market-based approach will benefit loads by reducing the uplift costs associated with out-of-market dispatches and by ensuring that the least-cost mix of generators is selected to mitigate the contingency conditions at issue. In this sense the CAISO proposal represents the use of a scalpel rather than what might now be considered an axe.[2] The CAISO's as-yet untested solution will change market dynamics and CAISO believes it will save money.

Naturally, stakeholders—including the CPUC—want comfort that the CAISO's proposal will be cost effective and several stakeholders have requested that the CAISO perform a cost-benefit analysis. There has been no full scale study or market simulation that supports the CAISO's belief that its proposal will save money. Cost-benefit analysis is difficult to conduct for proposed changes in market design because a principle purpose of the proposal is to change market participant behavior in ways that support the CAISO's efforts to meet applicable reliability requirements. Changes in behavior are often subtle and can play out over long periods of time. Market simulation of the proposal is unlikely to reveal much about the magnitude of the potential benefits. In large measure, it is necessary to accept as an article of faith that where the amounts of money in play are significant, market solutions provide better overall results than command and control solutions.

In these comments, SDG&E reaffirms its support for the theory behind the CAISO proposal. However SDG&E continues to believe that prior to implementation, the CAISO needs to do more studies that consider how the CAISO's proposal may be affected by other initiatives including Energy Imbalance Markets and the Must Offer Obligations associated with flexible Resource Adequacy capacity. Market simulations should be run with actual market data. It is SDG&E's understanding that the CAISO agrees with SDG&E on the need for this additional analysis.

Upon further consideration SDG&E recommends that only resources exhibiting a lost opportunity should be compensated at the LMCP. If it can be demonstrated that the LMCP is a market signal that creates benefits beyond its cost, then SDG&E could support paying the LMCP to all resources contributing to meeting the corrective action. If the LMCP is a price signal that the market is unlikely to respond to it has the potential of creating e a windfall for free riders at the expense of others. SDG&E is open to expanding compensation to all contributing resources at LMCP if it can be demonstrated that the market response would create net savings.

SDG&E also notes that the CAISO proposed solution is far from a complete answer for the relatively high costs associated with MOC and ED. The CAISO's proposal does not address the problems that unscheduled flows in real-time create on critical paths. The day-ahead solution proposed by the CAISO would still need some MOC and ED to cover for actual real-time flow uncertainty. Perhaps an expansion of the CAISO's Full Network Model to other Balancing Authorities would be as effective as this proposal in reducing MOC and ED.

1 Currently, the CAISO's market software prepares the system to be within emergency limits immediately following an N-1 contingency condition. The CAISO uses minimum on-line commitment constraints (MOC) and out-of-market exceptional dispatches (ED) to restore the system to a secure state within thirty minutes of an N-1 contingency and to prepare the system such that emergency limits will not be violated were a subsequent contingency to occur (an N-1-1 contingency condition).

2 It should be noted that the CAISO is obligated to comply with reliability standards as they apply to N-1 contingency conditions. This means that--regardless of whether the next contingency actually occurs and regardless of the probability of the next contingency--within thirty minutes following the first contingency, the CAISO must get the system to a condition that can withstand the next contingency.

ISO Response

ISO agrees that there are many benefits to the preventive-corrective constraint. We detail these benefits at the end of Section 8 in the revised straw proposal. We also agree that the impact of current practices is especially difficult to quantify, and a counter-factual analysis would be extremely difficult and speculative. For example, several stakeholders point out that the volume of exceptional dispatch attributed to meeting the WECC SOL standard is small compared to the entire MWh volume of the ISO markets. However, exceptional dispatches are made after the IFM and have a disproportionately larger impact on the real-time market. We have also noted in Section 7.1 that exceptional dispatches related to the WECC SOL standard cost $47 million for 2012 (Figure 3). Note that this does not take into account the price-suppressive impacts of the exceptional dispatches nor the MOC constraints.

We agree that the preventive-corrective constraint will add complexity to the ISO market and market software. We believe we and our systems are capable of adopting this constraint. To

demonstrate this, we are taking steps to develop a prototype to share with market participants. We will provide a realistic example using a production level case. We will rerun a saved case with the constraint to demonstrate how the constraint will function and impact the results of the saved case. We believe this effort will take about two months to accomplish. We discuss our thoughts on this issue in greater detail in Section 9.4.

The LMCP can reflect three different costs and/or values, only one of which is an opportunity cost. The other two are the marginal congestion savings and the marginal capacity value to support following ISO dispatch. This is discussed in detail via examples provided in Section 7.4. It is important to provide compensation for the marginal congestion savings because the LMCP will signal the need (and reflect the value of) increased ramping capability. The preventive-corrective constraint may also position units to such a level that it creates a revenue shortfall, which the resource can avoid if it deviates from dispatch. Under this scenario, the LMCP will reflect the revenue shortage so that the resource follows dispatch. This last point is particularly important because the resource is being used to meet the WECC SOL standard. The LMCP reflects a marginal capacity value and is paid to all resources at the node in the same way that LMP reflects the marginal cost of providing energy and is paid to all resources at that node. Both the LMP and LMCP send appropriate market signals and compensation.

The ISO intends to improve its market solution and accuracy by expanding the full network model (FNM). The ISO has recently announced a separate stakeholder process to include modeling of external Balancing Authority Areas in the FNM aiming to better account for loop flows (see: http://www.caiso.com/informed/Pages/StakeholderProcesses/FullNetworkModelExpansion.aspx). We agree that such an effort will tend to decrease exceptional dispatch.

Company	Date	Submitted By
Six Cities	May 28, 2013	Bonnie S. Blair bblair@thompsoncoburn.com 202-585-6905

The "Six Cities" submit the following comments on the ISO's May 15, 2013 Straw Proposal on Contingency Modeling Enhancements (the "Straw Proposal").

As the Six Cities understand the Straw Proposal, the ISO proposes the contingency modeling enhancements in an attempt to achieve the following objectives: (i) to improve the probability that the ISO grid will be able to meet SOL requirements (*i.e.*, restoration of stable system operating conditions within thirty minutes) following an N-1-1 contingency; and (ii) to improve efficiency in meeting SOL requirements by relying on a market mechanism and reducing reliance on Exceptional Dispatch and Minimum Operating Constraints ("MOC"). The Six Cities consider these objectives worthwhile and support further evaluation of the potential benefits of contingency modeling enhancements. It is critical, however, that the evaluation process include detailed consideration of at least three factors that the ISO has not yet addressed: (i) the cost of implementing the modeling changes; (ii) the potential for the exercise of market power if the modeling changes are implemented and the measures that will be required to mitigate market power; and (iii) the interactions of the proposed modeling changes with other market design features that are either in place (*e.g.*, convergence bidding) or under development (*e.g.*, the Energy Imbalance Market). All of these factors will affect the likelihood that the contingency modeling changes in fact will meet the stated objectives of improved reliability and efficiency,

and they will affect the associated costs.

The Six Cities are concerned that the ISO has persuaded itself that the contingency modeling changes should be implemented based upon a theoretical analysis of potential benefits. Theoretical benefits, however, do not necessarily materialize in practice. The effects of convergence bidding in the ISO's markets provide a dramatic case in point. FERC encouraged and the ISO implemented convergence bidding based on the expectation that it would lead to market benefits, including expanded competition, convergence between day-ahead and real-time prices, and improved day-ahead unit commitment. *See, Calif. Indep. Sys. Operator*, 143 FERC ¶ 61,087 at PP 5-6 (2013). Instead, as implemented in the ISO's markets, convergence bidding has allowed speculators to extract more than $100 million from ISO load, first by exploiting systematic differences between HASP and real-time prices until convergence bidding at the interties was suspended (*Id.* at P 67, n.128) and then by profiting from differences between day-ahead congestion and real-time congestion (Department of Market Monitoring 2012 Annual Report on Market Issues and Performance at 8-9), all without making any meaningful contribution to efficiency or improved convergence between day-ahead and real-time prices. While this stakeholder initiative is not the proper forum for a comprehensive evaluation of the benefits versus burdens of convergence bidding, the ISO's experience with convergence bidding provides a compelling example of the fact that unintended consequences are a potential if not likely result of introducing market design changes in markets as complex as the ISO's based on theoretical benefits.

As related to this specific stakeholder initiative, the ISO has not explained clearly how convergence bidding would affect the ability of the contingency modeling changes to satisfy the objective of enhancing the probability that the ISO will be able to recover from an N-1-1 contingency within the required thirty minute period. As emphasized in the Straw Proposal (*e.g.*, at page 12), the requirements for post-contingency recovery are flow-based. Convergence bidding, however, results in virtual flows that may either add to or offset physical flows. If virtual bids are included in the optimization used to select resources for corrective capacity under the proposed contingency modeling approach, how can the ISO be confident that the selected resources will be effective in recovering from an actual contingency leading to a post-contingency topology that may be very different from the combination of virtual and physical flows utilized in the optimization process? The Straw Proposal suggests at page 13 that one disadvantage of the current practice of using MOC constraints (along with Exceptional Dispatch) to address SOL requirements is that the ISO cannot be certain that a MOC constraint will be effective in maintaining reliability until an actual contingency occurs. Given the impact of virtual flows in the outcome of the proposed optimization process, however, it appears that the proposed contingency modeling approach could lead to reduced, rather than greater, confidence in the ISO's ability to meet SOL requirements.

The Straw Proposal emphasizes (*e.g.*, at page 16) that FERC has directed the ISO to seek to reduce the incidence of Exceptional Dispatch. However, FERC has never suggested that the ISO must minimize Exceptional Dispatch without any consideration of cost impacts. According to the Department of Market Monitoring Annual Report, total above-market costs for Exceptional Dispatch in 2012 were approximately $34 million, and, considering that Exceptional Dispatch volumes due to SOL requirements were approximately 40% of annual Exceptional Dispatch volumes, a substantial portion of that total undoubtedly was associated with Exceptional Dispatch to address needs other than satisfaction of SOL requirements. The Straw Proposal provides no basis for assessing the relative costs of addressing SOL requirements though

Exceptional Dispatch versus implementation of the proposed contingency modeling approach.

With respect to market power, the Straw Proposal acknowledges at pages 26-27 the potential for the exercise of market power under circumstances identified by the DMM. The Straw Proposal suggests, however, that market power mitigation measures need not be considered in this stakeholder initiative, because the concerns identified by the DMM apply generally to capacity products and, therefore, "are not originated from this contingency modeling enhancement initiative . . . ." This dismissive response to an identified market power concern is insufficient. It seems apparent that implementation of the contingency modeling changes would expand opportunities for the exercise of market power over capacity products. Measures to effectively mitigate the exercise of market power should be developed on a preventive basis, not after it occurs and imposes substantial costs on customers.

While the Straw Proposal asserts (*e.g.*, at pages 38-39) that the proposed contingency modeling changes will result in the most efficient selection of resources to satisfy SOL requirements, that conclusion is based entirely on theory. Although the ISO indicated that it plans to circulate data on the costs of meeting SOL requirements under the current approach (*i.e.*, using 10 minute contingency reserves, Exceptional Dispatch, and MOC), that information obviously is not sufficient to allow a comparison of overall costs under the current approach versus a reasonable estimate of overall costs under the proposed preventive-corrective constraint approach. The ISO should not abandon the current method of addressing SOL requirements without performing a comprehensive cost/benefit analysis (*i.e.*, one that considers not only costs under the current approach but also estimated costs under the proposed approach) based on historical market data.

Finally, the Straw Proposal does not explain how the ISO will assure that resources selected and paid for corrective capacity in fact will be available if an N-1-1 contingency event occurs. In the absence of enforceable performance requirements for corrective capacity resources, customers will receive no value at all for their capacity payments, and there will be less assurance, relative to the current approach of relying on Exceptional Dispatch and MOC, that the ISO will be able to maintain reliability. Because N-1-1 contingencies are not expected to occur frequently, the remedy for non-performance with a corrective capacity obligation must be more stringent than simply rescission of the capacity payment during a specific contingency event.

ISO Response

There are benefits to the preventive-corrective constraint as compared to the cost of its implementation. These benefits are described in more detail at the end of Section 8.

We appreciate Six Cities' discussion of convergence bidding. We have added this discussion to the revised straw proposal in Section 10. This provides a good opportunity to point out that the preventive-corrective constraint will not inadvertently rely on virtual supply for the ISO's contingency needs. It is also consistent with our current and proposed market processes. The preventive-corrective constraint will be enforced in the IFM (as well as RUC and real-time) and optimized with convergence bids. This is as designed and is consistent with the ISO's Board approved market redesign discussed in FERC Order 764. However, RUC will ensure that only physical supply is procured to meet the constraint. Moving out of the day-ahead market, the preventive-corrective constraint is re-optimized to provide the best solution with the most up-to-date information on flows. This increases the ISO's confidence in meeting the WECC SOL

standard.

We agree with stakeholders that the preventive-corrective constraint will add complexity to the ISO market and market software. We believe we and our systems are capable of adopting this constraint. To demonstrate this, we are taking steps to develop a prototype to share with market participants. We will provide a realistic example using a production level case. We will rerun a saved case with the constraint to demonstrate how the constraint will function and impact the results of the saved case. We believe this effort will take about two months to accomplish. We discuss our thoughts on market power mitigation and implementation issues in Section 9.4.

While we have described the many reliability and market benefits the preventive-corrective constraint can provide, the impact of current practices is difficult to quantify and a counter-factual analysis would be extremely difficult and speculative. For example, Six Cities points out that the volume of exceptional dispatch attributed to meeting the WECC SOL standard is small compared to the entire MWh volume of the ISO markets. However, exceptional dispatches are made after the IFM and have a disproportionately larger impact on the real-time market. We have also noted in Section 7.1 that exceptional dispatches related to the WECC SOL standard cost $47 million for 2012 (Figure 3). Note that this does not take into account the price-suppressive impacts and uplift allocated to load because of these exceptional dispatches nor the MOC constraints.

To clarify, there is no explicit penalty for deviating from an exceptional dispatch. There is only a charge for uninstructed imbalance energy. The MOC constraint does not have any associated penalty because the constraint only commits the resources. We note Six Cities' desire to implement a penalty associated with non-performance and we will consider this point.

Company	Date	Submitted By
Western Power Trading Forum	May 28, 2013	Ellen Wolfe ewolfe@resero.com 916-791-4533

Opening Comments

WPTF appreciates the opportunity to submit these comments and in particular appreciates all of the ISO's efforts on its modeling enhancements. The information offered in the May 15, 2013 straw proposal related to the drivers behind the ISO's contingency needs is useful and aids in the consideration of the proper market structure.

WPTF supports the ISO's proposed approach to represent the post-contingency needs in the network model and to co-optimizing them with the balance of the system requirements. We vehemently support the ISO's perspective of the importance of providing for these needs through market mechanisms rather than through exceptional dispatch or minimum on-line constraints (MOCs).

WPTF seeks additional information from the ISO about how transparency will be provided as to the constraints enforced and their market impacts (e.g., clearing prices, etc.), and we would like

more information at this time to confirm which constraints and contingencies will be modeled through this mechanism.

Lastly, we find it entirely appropriate to make the provision of post-contingency reserves a bid-based capacity service. The ISO found it appropriate to offer a bid-based product for flexible ramping. Further the ISO has indicated that the use of reserves would be appropriate if the constraints were more regional and less specific, and that - in fact - in other markets ancillary services are used to provide for post-contingency constraint reserves. Lastly, the ISO indicated that it intends to use operating reserves to meet these needs when doing so creates a least-cost solution. To not make this service one based on bids could create significant distortions between the various services, and no basis for doing so is evident. WPTF believes that if participants have virtually no cost for providing the service that bids will be at, or close to, zero. It is not necessary for the ISO to force the capacity value (above opportunity cost) to zero by not providing a bid-based structure.

ISO Response

See ISO responses to each point below.

What type of cost or lost opportunity would a bid signify?

The bid need not signify specific cost or opportunity but rather would signify the net value to the supplier of offering into the market.

ISO Response

Capacity bids must reflect a cost. The "value" of the corrective capacity will be automatically calculated by the constraint and reflected in the LMCP for the marginal unit. Please see the more detailed discussions in Sections 9.2 and 9.4.

Would a bid be appropriate day-head, real-time, or both? Why?

Bids would be appropriate in both markets consistent with the bidding structure approved for spinning and non-spinning reserves.

ISO Response

Though spinning and non-spinning reserves can be used to satisfy the preventive-corrective constraint, bidding for operating reserves does not necessary compel the ISO to allow bidding in another. We will consider each issue on its own merits and provide a bidding opportunity to reflect opportunity costs for the capacity provided.

Bids would be appropriate in both markets consistent with the bidding structure approved for spinning and non-spinning reserves.

A bid cap of $250/MW would be consistent with the other ancillary services and seems appropriate.

ISO Response

We note WPTF's comment.

Are there market power concerns with allowing bids and how can the ISO mitigate those bids?

It seems the ISO is primarily interested in a small number of paths, and as such DMM should be able to assess the market power situation and/or use the local market power mitigation to

indicate the potential for reserve market power. If there is market power under certain situations then proxy prices – perhaps based on unit type – could be applied as bid caps.

ISO Response

ISO appreciates WPTF's thoughts on this matter.

Given the above answers, how could ISO evaluate the cost-benefit analysis of including bid functionality? In other words, what would be the benefit as compared to the added complexity of modeling bid functionality?

The ISO could assess the cost with making the product biddable. Given other biddable products in place at this time at the CAISO, it is not clear that adding an additional product would be particularly costly. Benefits may not be able to be assessed directly given that they may be second order or delayed in time. However, to make the markets consistent should be of value and potentially easy to justify once the cost is known. Further, while a cost-benefit approach may be of interest, primarily the ISO should use good, just, and reasonable market design as the basis for making the structure of this product consistent with the ISO's other capacity-based services.

ISO Response

ISO appreciates WPTF's thoughts on this matter. As noted above, we will judge the preventive-corrective constraint on its own merit.

Proposal to remove bid-in ramp

WPTF does not support at this time removal of the bid-in ramp rate. The ability to bid ramp rates allows a supplier to express its max ramp rate in the RDT yet specify more conservative ramp rates if conditions require such. Moving to a static ramp rate will require resource owners to provide their most conservative ramp rate in the RDT and will thereby cause a reduction in the overall flexibility offered to the ISO.

ISO Response

The ISO believes that ramp rates are physical characteristics of the resource and need not be changed via bids. The Master File and SLIC can be used to make changes should the resource experience a change in its physical characteristics. We discuss this in more detail in Section 9.1.

The preventive-corrective constraint is designed to encourage flexibility by valuing it explicitly.

Cost allocation:

Given that this is a reliability service, costs should be allocated based on load share. It is unclear at this point whether the constraints and contingencies are regional in nature warranting something other than system-wide cost allocation.

ISO Response

ISO appreciates WPTF's thoughts on this matter. As noted in Section 9.3 of the revised straw proposal, the ISO proposes to allocate costs to all metered demand because this is a WECC-wide requirement.