



California ISO
Shaping a Renewed Future

Third Revised Draft Final Proposal

Bid Cost Recovery Mitigation Measures

DRAFT

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Third Revised Draft Final Proposal Bid Cost Recovery Mitigation Measures

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1 Introduction

The ISO market optimization considers the costs for starting up a generating resource, the costs of operating the resource at minimum load, and the resource's marginal cost of producing energy. However, because only the incremental energy cost is reflected in the locational marginal price, it is possible that a generator's revenue from energy paid at locational marginal price (LMP) is not enough to cover its minimum load and start-up costs. In addition, energy payments at the LMP may not cover a resource's energy bid costs because the ISO market must ramp resources up or down at their ramp rate. Bid cost recovery (BCR) is the process by which the ISO pays scheduling coordinators for resources' start up, minimum load and bid costs, in the event these costs are not covered by their LMP-based market revenue.

Currently, the bid cost recovery calculation is performed over the entire trade day and netted across the day-ahead and real-time markets for that trade day. The ISO has proposed as part of phase 1 of the *Renewable Integration Market and Product Review* ((RI-MPR) *Phase 1* initiative to change the bid cost recovery rules so that bid cost recovery amounts calculated for the day ahead and real-time markets, respectively, are not netted together. This change, which was approved by the ISO Board in December 2011, is an important element of the RI-MPR Phase 1 proposal because it will provide increased incentives to provide economic bids in the real-time market. More economic bids in the real-time market, and fewer self-schedules, will be vital to managing the grid reliably as more variable energy resources come online. This change is expected to be implemented at the end of 2013.

This change to the bid cost recovery calculation will increase the incentive for submitting economic bids to the real-time market because it will tend to increase resources' eligibility for real-time bid cost recovery. However, increasing resources' eligibility for real-time bid cost recovery can also provide an incentive for adverse market behavior because real-time bid cost recovery payments will no longer be reduced by revenues earned in excess of bid costs in the day-ahead market.

As a result, the ISO is proposing several mitigation measures as part of this *Bid Cost Recovery Mitigation Measures* initiative to stem the incentives to engage in such adverse market behavior. In addition, to ensure bid cost recovery is not paid for dispatched energy that is not delivered, the ISO is proposing changes based on the "metered energy adjustment factor" used as part of the existing bid cost recovery design.

In developing the recommended mitigation measures, the ISO has employed the following design principles:

- Bid cost recovery should enable eligible resources to appropriately recover bid costs.
- Bid cost recovery mitigation measures should remove incentives for adverse market behavior to increase uplift payments.
- Bid cost recovery mitigation measures should preserve incentives to provide economic bids into the real-time market.

2 Cost Recovery at other North American ISOs and RTOs

Cost recovery, is offered by almost every one of the major ISOs in North America. PJM, New York ISO, Midwest ISO, New England ISO, Ontario IESO, ERCOT, and Alberta Electric System Operator all offer similar cost recovery provisions to guarantee that a resources recovery at least their bid costs from the electricity market.

The larger ISOs – PJM, New York ISO, New England ISO and Midwest ISO – all have cost recovery provisions similar to the California ISO. That is, they offer their market participants cost recovery in both the day ahead and real-time markets. However, only the California ISO has its current provisions for netting cost recovery between the day ahead and real-time markets.

The other ISO/RTOs also have provisions to ensure bid cost recovery is only paid for delivered energy and to mitigate adverse incentives. For example:

- Midwest ISO cost recovery rules were recently adapted so that payments are deducted from the higher of the day ahead or real-time market energy bids rather than the day ahead market energy bid alone thus mitigating incentives to bid above marginal cost in the real-time market.
- PJM requires a generator to closely follow dispatch instructions in order to be eligible for a cost recovery payment.
- ERCOT has the authority to claw back 100 percent of real-time market revenues if a generator does not participate in the day-ahead market.

In addition to these provisions, other ISO/RTOs have less real-time bidding flexibility. Only in the California ISO can market participants change their bids between the day-ahead and real-time markets, and submit different real-time bids for the hours of the day. This flexibility, in combination with the lack of provisions to provide incentives against deviations from dispatch results in possibilities for the inflation of bid cost recovery payments in the ISO market.

3 Background

In the first half of 2011, the ISO made two emergency filings with the Federal Energy Regulatory Commission (FERC) to mitigate observed adverse market behavior involving bid cost recovery. There were actually several strategies being employed, all aimed at inflating bid cost recovery payments. Recently, on August 28, 2012 the ISO made a filing with FERC to address residual imbalance energy, as well as price mitigation for certain exceptional dispatches. A summary of the three filings is provided below.

March 25, 2011 Emergency Bid Cost Recovery Filing¹

In the March 25 filing, the ISO identified a bidding strategy that inflated bid cost recovery payments.² This strategy consisted of bidding resources into the day-ahead market in a manner that essentially forced the market to commit the resources at maximum capacity. The resources were subsequently bid into the real-time market in such a way that the ISO decrementally dispatched the resources to their minimum load. Because the metered energy adjustment factor (MEAF) neared zero when the resources were decremented by the ISO in the real-time market, the bid cost recovery calculations under-accounted for day-ahead market revenues, and bid cost recovery payments were inflated.

¹ FERC approved this amendment on May 4, 2011. http://www.caiso.com/Documents/2011-05-04_Order_ER11-3149-000_ER11-3149-001.pdf

² http://www.caiso.com/Documents/March25_2011Errata-March18_2011TariffAmendment-ModifyMarketSettlementRulesinDocketNo_ER11-3149-000.pdf

In response to this market behavior, the ISO modified its bid cost recovery calculation to account for day-ahead market revenues based on scheduled (rather than delivered) energy for decremented resources. In short, the day ahead MEAF is no longer applied to day-ahead market revenues when the ISO dispatches a resource downward from its ISO committed schedule in the day-ahead market.

June 22, 2011 Emergency Bid Cost Recovery Filing³

Subsequent to the March 25 filing, the ISO observed continued bidding strategies that inflated bid cost recovery payments. This prompted the ISO to develop rule changes to remove the incentives for these and an additional related potential strategy.⁴

The first of the observed strategies consisted of a continuation of the strategy addressed in the March 25, 2011 filing. The ISO addressed this strategy by modifying the bid cost recovery rules to no longer apply the MEAF to bid costs in the case bid costs were negative.

The second of the observed strategies involved bid cost recovery payments for uneconomic bids such that the ISO market was forced to ramp a resource down in the real-time market from a day ahead market schedule for the previous day that was near the resource's maximum operating level. The potential strategy the ISO identified was similar but involved ramping a resource down, or up to, self-schedules combined with uneconomic bids in the hours between the self-schedules. The ISO addressed these strategies by first identifying periods in which the ISO instructs a resource to ramp at its full ramp rate due to the uneconomic bids. For such full ramp periods, the net day-ahead market energy shortfall is not included in day-ahead market bid cost recovery calculations.

Post-Emergency Bid Cost Recovery Filing Review

In the initial March 25, 2011 filing, the ISO committed to "conduct a stakeholder process to provide stakeholders an opportunity to comment and raise any further changes or refinements to the ISO's proposed tariff amendments."

That stakeholder initiative provided stakeholders with a forum through which any residual issues related to the two filings could be discussed. That initiative provided a forum through which rule changes needed to address strategic market behavior to inflate bid cost recovery could be developed.

The following issues were raised through the Post-Emergency Bid Cost Recovery Filing Review stakeholder process:

- The need for changes to the cap for the registered cost option for start-up and minimum load costs.
- The need for increased granularity in bid cost recovery monitoring reports.

³ FERC approved this amendment on August 19, 2011. http://www.caiso.com/Documents/2011-08-19_BCR-EDOrder_ER11-3856.pdf

⁴ http://www.caiso.com/Documents/2011-06-22_Amendment_ModBCRules_EDEnergySettRules_ER11-3856-000.pdf

- The need to assess potential increases in bid cost recovery payments through strategic use of resource identification numbers for intertie resources.
- The need to address increased bid cost recovery due to deviations from dispatch by resources with forbidden operating regions, as well as inefficiency of ancillary services procurement from such resources.
- The need to clarify a tariff provision related to the minimum load tolerance band for resources receiving a residual unit commitment (RUC) award.

Descriptions of these issues, stakeholder feedback on them, and the ISO's proposal on each item are discussed in the final proposal for that initiative.⁵ Also discussed in that initiative, as well as in the RI-MPR Phase 1 effort, was the need for mitigation measures to address strategic market behavior that may be exacerbated by the separation of the netting of the real-time/RUC and day-ahead bid cost recovery calculations. These mitigation measures are addressed in this revised draft final proposal.

*August 28, 2012 Emergency Filing Addressing Exceptional Dispatch Mitigation and Residual Imbalance Energy*⁶

In addition to addressing price mitigation of certain exceptional dispatches, the ISO is proposing to change the settlement of residual imbalance energy.⁷ Residual imbalance energy is energy attributable to a resource ramping down from a real-time dispatch at the end of a previous hour or ramping up to a real-time dispatch at the beginning of an upcoming hour. As described in more detail in Section 7.1, below, the ISO proposed in the August 28 filing to settle residual imbalance energy at a resource's default energy bid or the LMP. In addition to being consistent with the price basis of mitigated exceptional dispatches, this change will also address a potential opportunity to inflate residual imbalance energy payments by deviating from dispatch. This issue was previously being addressed as part of this *Bid Cost Recovery Mitigation Measures* initiative.

4 Overview of the revised draft final proposal

This section provides an overview of the mitigation measures addressed in this revised draft final. It also summarizes stakeholder feedback received on the draft and revised draft final proposal previously released and describes changes in the proposal.

In summary, the ISO proposes the mitigation measures listed below be put in place simultaneously with separating (i.e., no longer netting) the day-ahead and real-time bid cost recovery calculations, and simultaneously with lowering the energy bid floor.

⁵ http://www.caiso.com/Documents/DraftFinalProposal_Post-EmergencyBidCostRecoveryFilingReview.pdf

⁶ FERC approved this amendment on October 26, 2012. <http://www.caiso.com/Documents/October262012OrderAcceptingTariffRevisions-Ordering-Non-PublicFormalInvestigation-DocketNoER12-2539-000.pdf>. FERC encouraged the ISO to continue to work with stakeholders to develop a long-term solution to the settlement of residual imbalance energy. P 43.

⁷ <http://www.caiso.com/Documents/August282012ExceptionalDispatch-ResidualImbalanceEnergyMitigationTariffAmendment-DocketNoER12-2539-000.pdf>

Section 5 – Modified day-ahead metered energy adjustment factor:

The ISO proposes to apply a modified day-ahead metered energy adjustment factor (MEAF) to the energy portion of the day-ahead market bid cost recovery calculation. Unlike the current MEAF, this modified MEAF will not reduce day-ahead bid cost recovery for resources that the ISO dispatches downward in the real-time market.

Section 6 – Real-time performance metric:

The ISO proposes to implement a real-time performance metric (PM) that will scale components of the real-time bid cost recovery calculation in the case of under-delivered incremental or decremental energy and will replace the current real-time metered energy adjustment factor (MEAF).

Section 7 – Cost and revenue basis for energy bid cost recovery:

The ISO proposes the following changes to the calculation of a resource's costs and revenues as part of the bid cost recovery calculations.

- The ISO proposes to use the minimum of a resource's default energy bid, its bid, and the locational marginal price as the bid basis for real-time bid cost recovery calculation in the event that the resource deviates from its real-time dispatch. The ISO proposes to implement a persistent deviation metric that measures the extent to which a resource follows its real-time dispatch instruction, and will flag intervals that are outside of a tolerance band. If the resource was persistently deviating according to these criteria, the bid basis for real-time bid cost recovery will be changed based according to rules described in section 7. If the resource was not persistently deviating according to these criteria, the cost basis for real-time bid cost recovery will remain the resource's economic bid. The ISO's previous proposal was to base all bid cost recovery on default energy bids. The current proposal modifies the bid basis for bid cost recovery in a manner that targets deviations that can be used to inflate bid cost recovery without changing the existing bid cost recovery design when dispatch is followed.
- The ISO proposes ~~to include residual imbalance energy settlements in the calculation of bid cost recovery for the real-time market. This change represents a refinement to the settlement of residual imbalance energy as proposed in the ISO's August 28, 2012 FERC filing. The second revised draft final proposal will provide for that~~ residual imbalance energy to be paid "as-bid" so long as the resource is not deviating outside the deviation threshold, with certain exceptions. The ISO proposes to use the same deviation threshold for residual imbalance energy and bid cost recovery. ~~Further, the ISO proposes to include residual imbalance energy surpluses in the calculation of whether a resource has a revenue shortfall for the purpose of bid cost recovery payments.~~
- Analogous refinements are proposed for the special cases of residual imbalance energy and un-mitigated exceptional dispatches and minimum load re-rates.

Section 8 – Start-up and shutdown instructions:

The ISO proposes several measures to address the potential for strategic behavior to inflate bid cost recovery payments by ignoring a real-time market shutdown instruction, over-generating so that the real-time market does not issue a shutdown instruction when it otherwise would have, or starting up without receiving an ISO instruction. The measures to mitigate the potential for this behavior are:

- Resources issued a binding shutdown instruction by the ISO's automated dispatch system (ADS) will not be eligible for bid cost recovery after the effective time of the shutdown instruction.
- To address the potential for resources strategically over-generating to avoid ADS issuing a binding shutdown instruction, the ISO proposes to implement a metric to identify this behavior and to subsequently disqualify the resource from minimum load cost recovery. More details are provided in section 10.1 of this proposal.
- The ISO intends to clarify in the tariff that the period in which a resource starts up without an ISO instruction will not be considered an ISO commitment period, and thus will not be eligible for bid cost recovery for this period.

5 Modified day ahead MEAF

As part of phase 1 of the renewable integration market and product review (RI-MPR) initiative, the ISO recommended basing day-ahead market bid costs used in the bid cost recovery calculations on scheduled energy instead of delivered energy, i.e., not apply the day-ahead metered energy adjustment factor (MEAF) in the day ahead market bid cost recovery calculations. The rationale for this proposal was that it was consistent with the ISO's proposal to eliminate the netting of costs and revenues in the day-ahead market against those in the residual unit commitment process and the real-time market. One of the stated goals in this initiative is to ensure that bid cost recovery provides the proper incentive for the targeted bidding behavior. As discussed in this paper's introduction, to limit disincentives to submit economic bids in the real-time market, it is important to decouple the markets and eliminate the netting of costs and revenues across them.

Notwithstanding the reasoning described above, in the draft final proposal the ISO refined its proposal to include the application of a modified version of the day ahead MEAF. The impetus for this change was the ISO's identification of an adverse incentive created by having the day ahead market cost recovery calculations for a resource be completely isolated from its actual performance in real-time.

Specifically, a resource could have the incentive to bid in such a way as to get bid cost recovery in the day-ahead market, and then not deliver its day-ahead schedule in real-time. In this case the resource would still receive its day-ahead bid cost recovery including minimum load cost recovery, but not participate in the real-time market. This is not consistent with the intended interaction of the day ahead and real-time markets. The day-ahead market runs in order to set up feasible schedules. The real-time market, in turn, makes incremental changes to these schedules. Thus, this bidding practice described could have negative market and reliability impacts.

The ISO proposes to address this potential adverse incentive through a modified day ahead MEAF. This MEAF will not impact day ahead bid cost recovery if the ISO dispatches a unit downward from its day ahead schedule in the real-time market, but will reduce day ahead bid

cost recovery if a unit operates below its day ahead schedule in real-time without being dispatched down by the ISO. The lowering of the cap on the registered cost option for minimum load, recently approved by the ISO board under a separate stakeholder initiative, will also address this adverse incentive.⁸ A lower registered cost cap for minimum load would reduce the incentive to engage in a strategy that leaves the resource running at minimum load in the real-time.

The current day ahead MEAF is calculated using the following formula (simplified from actual):⁹

$$DA\ MEAF = \frac{Metered\ Energy - DA\ ML\ Energy}{DA\ Sched\ Energy - DA\ ML\ Energy}$$

The modified day ahead MEAF proposed by the ISO is shown below:

$$Modified\ DA\ MEAF = \min \left\{ 1, \left| \frac{Metered\ Energy - DA\ ML\ Energy - Regulation\ Energy}{\min\{TEE, DA\ Sched\ Energy\} - DA\ ML\ Energy} \right| \right\}$$

(Note that TEE is total expected energy.)

Table 3.1-1 summarizes how the ISO proposes to apply the modified day ahead MEAF:

Table 5-1: Application of the modified day ahead metered energy adjustment factor

Costs *	Revenues	Apply modified day-ahead MEAF to...
+	+	Costs
+	-	Costs & Revenues
-	+	n/a
-	-	Revenues

* “Costs” refer to day ahead energy bid costs, and “Revenues” refers to revenues for the day ahead schedule above minimum load.

Note: There are circumstances not captured by the simple formula above. However, the same intent of the policy will be applied in such circumstances.

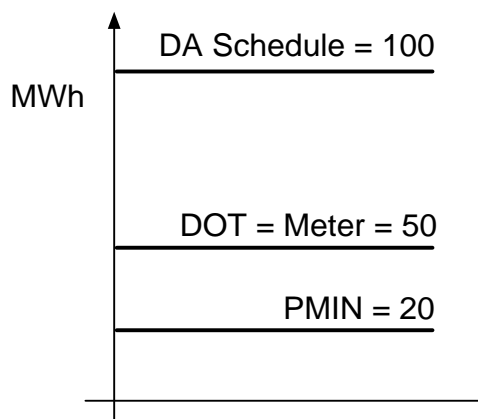
The simplified example below shows the difference between the current day ahead MEAF and the proposed, modified day ahead MEAF. The example shows the current calculation of the day ahead MEAF would result in a scaling of elements of the day-ahead bid cost recovery calculation in the case that a generating resource has a day-ahead schedule of 100 MWh and then heads the ISO’s decremental dispatch to 50 MWh in the real-time market. Under the

⁸ <http://www.caiso.com/informed/Pages/StakeholderProcesses/CommitmentCostsRefinement2012.aspx>

⁹ The two emergency bid cost recovery filings modify the rules to set the day ahead MEAF equal to 1 for revenues in the case of decremental real-time dispatch and sets the day ahead MEAF equal to 1 for costs in the case of negatively priced energy bids.

modified approach, the day ahead bid cost recovery calculation would not be scaled in such a case because, as shown in the formula above, metered energy is evaluated relative to the lower of the day ahead scheduled energy and the real-time ISO dispatch rather than simply the day ahead scheduled energy. This is compatible with the RI-MPR Phase 1 design intent to provide incentives to follow real-time decremental dispatch instructions.

Figure 5-2: Simplified example of current day ahead MEAF and proposed modified day ahead MEAF in the case of a decremental real-time dispatch



$$\text{Current DA MEAF} = (50 - 20) / (100 - 20) = 0.375$$

$$\text{Modified DA MEAF} = \min [1, \text{abs}((50-20) / (\min(50, 100) - 20))] = 1$$

The original FERC order for MRTU addressing day-ahead bid cost recovery specified that the ISO should not pay bid cost recovery for day-ahead energy that was not delivered in real-time. Previously this was accomplished through the day-ahead MEAF. Under the modified day ahead MEAF, undelivered day ahead energy will not receive bid cost recovery if the ISO did not issue a decremental instruction to not deliver the day ahead scheduled energy in real-time. However, the modified day ahead MEAF will not reduce day-ahead bid cost recovery payments if, in real-time, the ISO dispatches the unit down below its day-ahead scheduled energy and the unit delivers the dispatched energy. (It will also not affect bid cost recovery payments if a resource is dispatched upward in the real-time market.) This is to accomplish the over-arching goal of encouraging decremental energy bids in the real-time market. Market participants will have stronger incentives to submit real-time bids if being dispatched downward in real-time does not reduce day-ahead bid cost recovery payments. The ISO believes that this balances the intent of the original FERC order with today's increasing need for real-time dispatch responsiveness.

The day-ahead minimum load costs, start-up costs and multi-stage generators' transition costs will be still subject to the same rules as today. The modified day-ahead MEAF will not impact these costs.

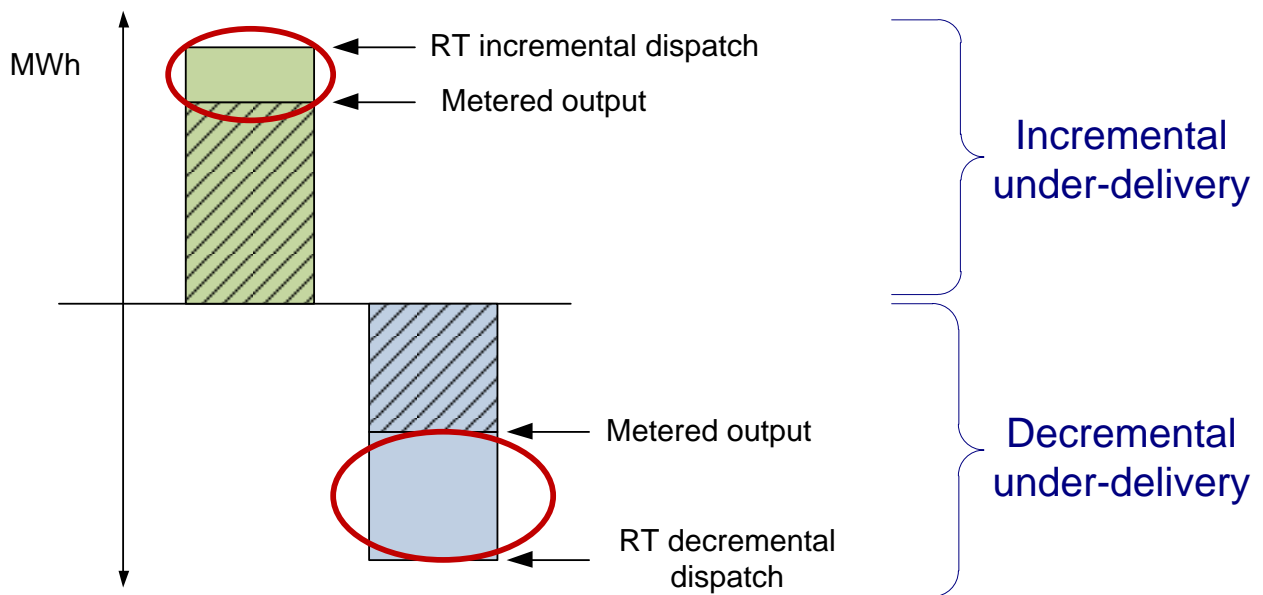
In comments on the ISO’s draft final proposal, CDWR-SWP, Calpine, GenOn, NRG, PG&E, and Six Cities expressed support for the proposed modified day-ahead MEAF. SCE expressed support for the intent of the modified day-ahead MEAF. Calpine made a few points of clarification regarding implementation of the modified day-ahead MEAF which the ISO will address these through the implementation process.

As suggested in SCE’s comments on the second revised draft final proposal, the ISO proposes to use a tolerance band when applying the modified day-ahead metered energy adjustment factor. We propose to use the same tolerance band and additional ramping tolerance amount used for the real-time performance metric, as detailed in section 6.1. This will avoid reducing day-ahead bid cost recovery when the ISO dispatches a resource down in the real-time market and the resource slightly under-generates in relation to its real-time dispatch. Without the addition of a tolerance band, there could be an especially large reduction in day-ahead bid cost recovery for a small amount of under-generation if the real-time dispatch is to near a resource’s minimum output level.

6 Real-time performance metric

The ISO proposed in its straw proposal for this initiative to apply a real-time performance metric that would reduce real-time market bid cost recovery payments in instances of energy under delivery and over delivery. Based on further analysis and stakeholder feedback to the revised straw proposal, the ISO modified its proposal such that the performance metric will be applied in only the case that a resource under-delivers on its real-time ISO instruction. Note, though, that this applies to instances in which incremental energy is under-delivered and to cases in which decremental energy is under-delivered. These circumstances are pictured in the figure below. The areas in red designate undelivered incremental or decremental energy for which the performance metric will apply.

Figure 6-1: Incremental and decremental under delivery



This change to the ISO's proposal was based on stakeholder feedback that, because resources are not eligible for bid cost recovery for over-delivered energy that is settled as uninstructed imbalance energy, reducing bid cost recovery for over-delivery was not justified as a bid cost recovery mitigation measure. Calpine, GenOn, and NRG pointed out this measure seemed more broadly targeted at uninstructed deviations in general.

SCE disagreed with this premise and stated that “[t]hrough uninstructed deviations are not eligible for bid cost recovery, they may have a material impact on reliability, which will become increasingly important with the integration of additional variable energy resources (VERs).” The ISO agrees that uninstructed deviations may be an increasingly important issue as responsive generation is crucial to balancing load and generation as more variable energy resources come online. However, the ISO maintains that scaling bid cost recovery payments for over-delivery of energy, when the over-delivered energy is not itself potentially eligible for bid cost recovery, is inconsistent with cost causation. In addition, it is not an effective methodology to disincent uninstructed deviations because a resource may not even be potentially eligible for bid cost recovery in a dispatch interval.

The proposed real-time performance metric is distinct from the current real-time MEAF in the following two ways:

1. The real-time performance metric applies to residual unit commitment or real-time minimum load costs in addition to the energy portion of the real-time bid cost recovery calculation.
2. A tolerance band, described in the following section, is applied around the real-time performance metric.

The ISO is proposing that the real-time performance metric (PM) be calculated for each resource in each settlement interval in the following manner:

$$Performance\ Metric = \min \left\{ 1, \left| \frac{Metered\ Energy - DA\ Energy - Regulation\ Energy}{Total\ Expected\ Energy - DA\ Energy} \right| \right\}$$

Note 1: Regulation energy is “deemed delivered” since it is provided by a resource under the ISO’s control via direct electronic signal. For this reason, regulation energy is excluded in the performance metric calculation. Furthermore, and for the same reason, regulation energy is not included in the calculation of total expected energy. And so, by subtracting regulation energy from metered energy in the performance metric formula, it is ensured that the numerator and denominator are capturing like terms.

Note 2: The performance metric will only be applied to the incremental or decremental real-time schedule. It is for this reason that, in the above formula for the real-time performance metric, the day ahead market scheduled energy is subtracted out of both the numerator and denominator.

Note 3: There are circumstances not captured by the simple formula above. However, the logic of the policy is unchanged in these circumstances. For examples,

- If an incremental instruction is issued, and the resource deviates downward from its day-ahead schedule, the PM would equal 0. The same would be true in the

opposite case in which a resource issues a decremental instruction deviated to a level above its day ahead schedule.

- If the metered energy were equal to the day-ahead schedule and the total expected energy, the performance metric would equal 1.
- If either metered energy was equal to the day ahead schedule, or total expected energy were equal to the day ahead schedule, then the performance metric would equal 0.

The following table shows the quantity, either costs, revenues or both depending on the signs of their values to be adjusted under the real-time bid cost recovery performance metric approach. Because negative revenues are essentially like costs in that they can contribute to a shortfall which could result in a cost recovery uplift payment, the performance metric will be applied to those as well. Likewise, negative costs can contribute to a shortfall and so, in the event of a shortfall in this situation, the real-time performance metric will be applied to revenues in that settlement interval. Note that when the performance metric describes the portion of the output that is instructed. When the real-time performance metric is applied to the bid cost recovery calculation components below, these quantities are multiplied by performance metric.

Figure 6-2: Application of the real-time performance metric

Costs *	Revenues	Apply PM to...
+	+	Costs
+	-	Costs & Revenues
-	+	n/a
-	-	Revenues

* In the case of the real-time performance metric, “Costs” refer to real-time market energy bid costs, and RUC/real-time market minimum load costs. The real-time performance metric is also applied to day ahead market minimum load cost only in the case that a resource is committed by the ISO in day ahead and de-committed by the ISO in real-time as noted above. “Revenues” refers to the real-time energy market revenues including those for minimum load energy. The ISO proposes that the real-time performance metric also be applied to pumped storage and demand response resources.

The current 3%/5 MWh tolerance band performance measurement that compares a resource’s metered output with its Pmin (resource-level or multi-stage generator configuration) will remain in the day ahead market bid cost recovery calculations for commitments made by the day ahead market. An exception will be in the in the event that a resource is de-committed in the real-time market that was originally committed in the day ahead market. Under the 3%/ 5MWh tolerance band performance measurement, a resource is not eligible to have minimum load, startup, or multi-stage generator transition costs included in the bid cost recovery calculations, if the resource does not operate within the tolerance band of its Pmin. However, the ISO proposes not to apply this standard 3%/5 MWh tolerance band performance measurement to the

minimum load cost used in the day-ahead market bid cost recovery calculations, in the case a unit is committed in the day-ahead market but de-committed in the real-time market. In this case, the ISO proposes to instead apply the real-time bid cost recovery performance metric to the day-ahead market minimum load cost. The rationale for this is the 3%/5MWh tolerance band performance measurement could provide incentives not to follow ISO dispatch instructions to shut-down or stay off-line. Instead, by applying the real-time BCR performance metric to the day-ahead market minimum load costs, elements of the bid cost recovery calculation will be scaled back if the resource were to disregard the ISO instruction to shut-down in real-time. In addition, it is equitable to include minimum load costs in the day-ahead market bid cost recovery calculations in the event a resource is de-committed in real-time because the resource’s savings in avoiding these costs is included in the real-time market bid cost recovery calculations.

The ISO has proposed that, in the case of an exceptional dispatch, a generating resource is paid based on rules specific to those circumstances. Bid cost recovery, and thus the real-time performance metric, is not applicable in such circumstances. In comments on the draft final proposal, GenOn expressed the concern that the proposal “inadequately explains how a resource that is committed by exceptional dispatch after the day ahead Market is protected from the application of the performance metric.” The ISO clarifies that the performance metric will not impact exceptional dispatch energy because exceptional dispatch energy is not subject to bid cost recovery.

GenOn also contended that the proposal “appears to unduly discriminate against a resource that is committed through RUC,” and requests that the ISO clarify whether or not “minimum load energy associated with a RUC start-up instruction will be exempt from the performance metric.” The ISO clarifies that minimum load energy associated with residual unit commitment is included in real-time bid cost recovery and is subject to the real-time performance metric. The reason for this is that, when a resource is committed in the residual unit commitment process, the minimum load energy is part of the bid cost recovery calculations for the real-time market, and real-time market bid cost recovery is subject to the real-time performance metric. The rationale for grouping the residual unit commitment process and real-time together, which was discussed as part of the RI-MPR Phase 1 stakeholder initiative, is that residual unit commitments are made based on forecasted real-time conditions; the two are thus linked in a fundamental way.

PG&E supported the real-time performance metric as proposed with minor implementation clarifications.

6.1 Tolerance band for the real-time performance metric and the modified day-ahead metered energy adjustment factor

The ISO proposes the following real-time performance metric tolerance band to not reduce real-time market bid cost recovery payments for small deviations from dispatch that may legitimately be due to ramping constraints or other such operational constraints.

$$\begin{aligned}
 & \sim \text{if} \sim \\
 & |Metered\ Energy - Regulation\ Energy - Total\ Expected\ Energy| \leq \\
 & \max\left\{\frac{5\ MWh}{6}, \frac{(0.03 * pmax)}{6}\right\} + Ramping\ Tolerance \\
 & \sim \text{where} \sim
 \end{aligned}$$

$$\begin{aligned} & \text{Ramping Tolerance} \\ & = | \text{Total Expected Energy based on Dispatch Operating Point} \\ & \quad - \text{Total Expected Energy based on Dispatch Operating Target} | \end{aligned}$$

~ then ~

Performance Metric is not Applied

The reason for dividing the elements of the maximum function in the criteria above by 6 is that the performance metric is applied by settlement interval. Therefore, the MWh values should likewise be consistent with those 10-minute intervals.

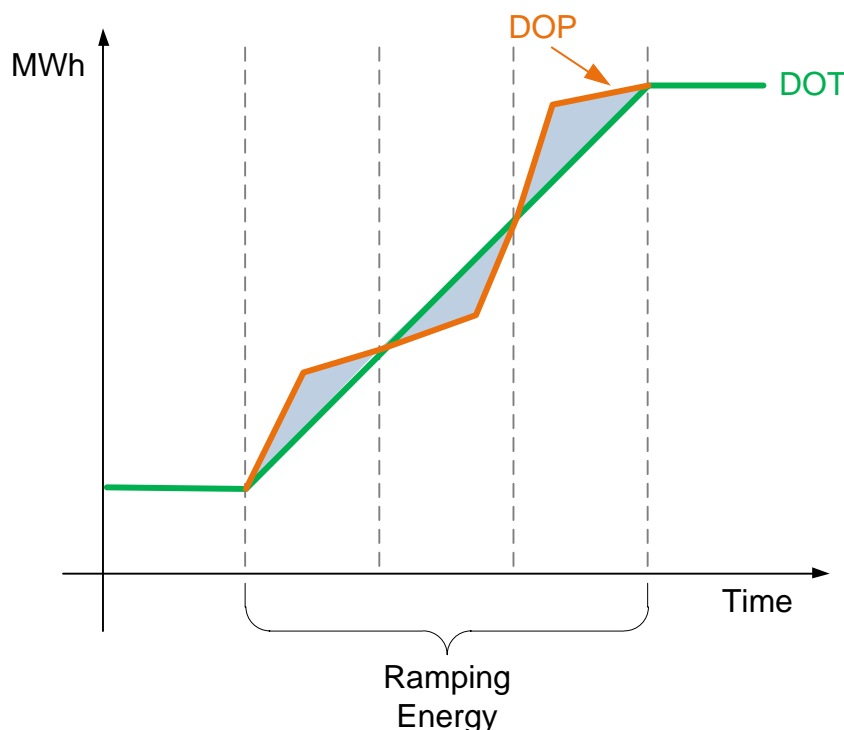
As noted in the straw proposal, the ISO proposes that this boundary is based on the maximum of 3% of the resource pmax (instead of being based on a calculated performance metric of 3%) and 5 MWh. Calpine, GenOn, and PG&E expressed support for this element of the proposal.

The threshold values of 5 MWh and 3% are consistent with our current market performance and our experience with realistic and justifiable deviation around dispatch and the ISO has employed the “5 MWh or 3%” thresholds even prior to the launch of the LMP market in April 2009. The ISO has used these thresholds for other operating performance by a generating resource such as when the plant-level or configuration-level minimum operating level has been achieved. These values also reflect justifiable deviations that result from the modeling of resource ramp rates as four-segment “curves” rather than as continuous or smooth curves as they are in actuality.

In addition to the threshold value, the performance metric will not be calculated during the startup, shutdown, MSG transition periods, or during crossing periods over a forbidden operating region as long as the resource is in fact in the instructed operation. This is out of recognition that the output of a resource cannot be controlled exactly during these events. Calpine expressed support for this element of the proposal.

The ISO considers the time periods that the market uses in instructing those events. As long as the unit follows the instruction, there is no performance metric applied in these cases. The current rules for early or late shut-up, shut-down, and transition still apply.

As part of the performance metric threshold, the ISO further proposes increase the real-time performance metric threshold by an additional ramping tolerance amount. The ramping tolerance criterion is designed to accommodate instances in which the resource’s ramp rate can change over the course of the interval. When the ISO issues an instruction for a generator to ramp to a different output level, the expected energy based on the new target output level – the dispatch operating target (DOT) – can differ from the expected energy based on the dispatch operating point (DOP) which reflects the generator’s actual expected incremental movements minute-by-minute toward the target output level. This difference will exist whenever there is a ramp-rate change within the 5-minute interval window. A stylized depiction of a difference between expected energy based on the dispatch operating point and that based on the dispatch operating target is shown in the diagram below.

Figure 6.1-2: Ramping Tolerance

$$\text{Ramping Tolerance} = | \text{TEE based on DOP} - \text{TEE based on DOT} |$$

In the above diagram, the green line shows the ISO instruction from current output to the dispatch operating target while the orange line shows the resources incremental output levels calculated as part of the expected energy calculations used for energy settlement as it moves toward the dispatch operating target. The area under the green line is total expected energy (TEE) based on the dispatch operating target, and the total expected energy as calculated for use in energy settlement based on DOP would be the area under the orange line. The differences between these two calculations of expected energy are related to the physical operation of the generating resource and so the ISO proposes to increase the real-time performance metric threshold by the amount of this ramping tolerance. That is, by the amount of the blue shaded areas as depicted in the above diagram.

GenOn expressed support for this element of the proposal.

7 Cost and revenue basis for energy cost recovery

The bid cost recovery settlement provisions and the residual imbalance energy settlement provisions are the two mechanisms in the ISO market that guarantee resources recover costs for energy above minimum load. As previously described, the bid cost recovery settlement provisions ensure a resource recovers its bid costs if revenues are less than bid costs as calculated over an entire day. Residual imbalance energy provides for a resource to be paid its cost for ramping as a result of a bid dispatched in an adjacent hour. It is not currently included in the calculations of daily bid cost recovery.

In response to the potential that residual imbalance energy payments could be inflated by high-priced bids associated with over-generation under the then current market design, the ISO filed with FERC on August 28, 2012 to change the settlement of residual imbalance energy. A similar potential remains to inflate bid cost recovery payments by persistently over-generating. However, under the current market design, this potential to inflate bid cost recovery payments is somewhat limited because real-time market revenue shortfalls are currently netted against day-ahead surpluses, meaning profits from the strategy would not flow directly to the resource.

The potential to inflate bid cost recovery through real-time deviations will increase once the bid cost recovery calculations no longer net the day-ahead and real-time markets together as part of the RI-MPR Phase 1 changes. The ISO is therefore proposing to calculate real-time bid cost recovery based on the minimum of a resource's default energy bid and the LMP ***in the case that the resource exceeds the thresholds for deviations from its real-time dispatch.***

7.1 Cost Basis for Bid Cost Recovery

As part of this second revised draft final proposal the ISO proposes a change from the revised draft final proposal in which the ISO proposed to use the maximum of the default energy bid or the LMP for the extra-marginal bid segments in the bid cost recovery calculation for both the real-time and day-ahead markets. The ISO has significantly revised this element of the proposal based on feedback from stakeholders and from the ISO's Market Surveillance Committee. The concerns of these parties were that the ISO's proposal would mitigate bids that may not be involved with deviations that inflated bid cost recovery, and that it could instead deter bidding into the ISO's real-time market because a resource's actual bid costs would not always be recovered. Further, there were concerns expressed that while default energy bids generally capture costs, there may be a number of instances in which they may not do so. These additional costs include opportunity costs and other costs that may change frequently for which it would be impractical to include in default energy bids under the negotiated bid option. In addition, the point was made by several parties that economic bids are developed to capture risks and benefits of market participation. The expectation, absent incentives for adverse market behavior, is that these bids are representative of the cost of supplying energy to the market and as such those are the appropriate costs to consider when determining bid cost recovery for resources not involved with deviations to increase bid cost recovery. Because the potential for a resource to inflate bid cost recovery payments by over-generating is somewhat limited under the current market design under which the day-ahead and real-time bid cost recovery calculations are netted together, the ISO proposes to implement the threshold for deviations from real-time dispatch that would inflate bid cost recovery payments and the resulting settlement consequence only after the day-ahead and real-time markets are no longer netted together for bid cost recovery, the ISO is prepared to act sooner should it observe the adverse behavior occurring.

The following sections provide background and discussion of the ISO's proposal to adjust the bid basis for real-time cost recovery in the case of deviation from real-time dispatch instructions.

7.2 Summary of the August 28, 2012 emergency filing

Residual imbalance energy (RIE) is a real-time market settlement provision that settles energy attributable to ramping down from a dispatched bid at the end of a previous hour or ramping up to a bid dispatched at the beginning of an upcoming hour. In other words, RIE is ramping energy going into or out of an hour. RIE had been settled at the bid that a resource is being ramped down from or up to the adjacent hour's dispatch level (this bid is referred to as the "reference hour bid").

As described in the background section of this paper, the ISO submitted a tariff amendment to FERC on August 28, 2012 that FERC accepted that included a change to the settlement of residual imbalance energy.¹⁰ As a result residual imbalance energy is now settled as follows:

- Incremental residual imbalance energy (i.e., above day-ahead scheduled energy) will be settled at the greater of (1) the dispatch-interval LMP, or (2) the lesser of (a) the resource's default energy bid price or (b) its reference hour bid price.
- Decremental residual imbalance energy (i.e., below day-ahead scheduled energy) will be settled at the lesser of (1) the dispatch-interval LMP, or (2) the greater of (a) the resource's default energy bid price or (b) its reference hour bid price.
- These changes were prompted by the potential for resources to inflate residual imbalance energy payments by over-generating and to make residual imbalance energy settlement consistent with the pricing methodology for mitigated exceptional dispatches. Prior to the rule changes resulting from the August 28 filing, when a resource was exceptionally dispatched, the associated residual imbalance energy was settled at the unmitigated bid price even if the exceptional dispatch itself was mitigated.
- In its October 26 Order, FERC accepted the ISO's proposal but encouraged the ISO to work with stakeholders to develop a long-term solution for the settlement of residual imbalance energy.

7.3 Persistent deviation metric

As described above, when a resource deviates from its dispatch in a manner that inflates real-time bid cost recovery or residual imbalance energy settlement, the ISO proposes to use the lesser of a resource's default energy bid or the LMP, rather than its submitted bid, as its bid basis for the purpose of real-time bid cost recovery and residual imbalance energy. A resource can inflate its real-time bid cost recovery or residual imbalance energy payments by over-generating in real-time when it is above its day-ahead schedule. Similarly, it can increase its real-time bid cost recovery payments or decrease the amount it has to pay for negative residual imbalance energy by under-generating when it is under its day-ahead schedule.

In conjunction with the approach outlined in this second revised straw proposal that for the most part bases the bid cost recovery and residual imbalance energy calculations on a resource's submitted energy bid, the ISO will use a metric to determine the extent to which a resource has deviated from its real-time dispatch in a manner that would inflate these payments. The ISO would adjust the bid costs used in the bid cost recovery and residual imbalance energy calculations if this metric exceeded evaluation criteria. The ISO would do this as follows:

- A persistent deviation metric will evaluate each resource's response to dispatch in each 10-minute settlement interval. It will flag each interval in which a resource deviated from a dispatch down (or dispatch up, as applicable) by more than a threshold value. The persistent deviation metric is described in more detail below.
- The persistent deviation metric evaluation criteria will be based on the number of intervals within a rolling two-hour window that are flagged. If a resource exceeds the

¹⁰ <http://www.caiso.com/Documents/August282012ExceptionalDispatch-ResidualImbalanceEnergyMitigationTariffAmendment-DocketNoER12-2539-000.pdf>

evaluation criteria for a given period, the ISO will adjust the bid basis for the resource's real-time cost recovery and residual imbalance energy settlement. The performance metric evaluation criteria are described in more detail below.

- In the case a resource exceeds the persistent deviation metric evaluation criteria, the ISO will adjust the bid basis for real-time bid cost recovery and residual imbalance energy as follows:

Incremental energy: the minimum of (a) the default energy bid, (b) the bid price, or (c) the LMP.

Decremental energy: the maximum of (a) the default energy bid, (b) the bid price, or (c) the LMP

Note that, although dynamic system resources are not subject to local market power mitigation, they will be allowed to negotiate default energy bids to be used if they trigger the persistent deviation metric.

Persistent Deviation Metric

The persistent deviation metric will evaluate a resource's change in output between settlement intervals relative to the amount the ISO dispatched it down between settlement intervals. The persistent deviation metric will be as follows, where t indicates the settlement interval being evaluated:

Persistent Deviation Metric =

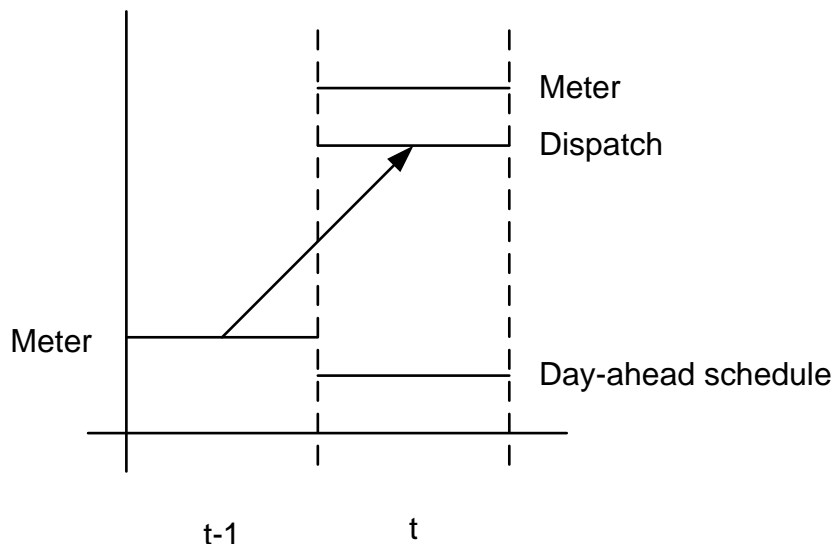
$$\frac{\text{Metered Energy}(t - 1) - \text{Metered Energy}(t)}{\text{Metered Energy}(t - 1) - \text{Total Expected Energy}(t) - \text{Regulation Energy}(t)}$$

The ISO will calculate this persistent deviation metric for each resource for each settlement interval. The ISO will flag a settlement interval if the deviation is in a direction that would inflate bid cost recovery or residual imbalance energy and the metric exceeds a threshold, consisting of the following two conditions:

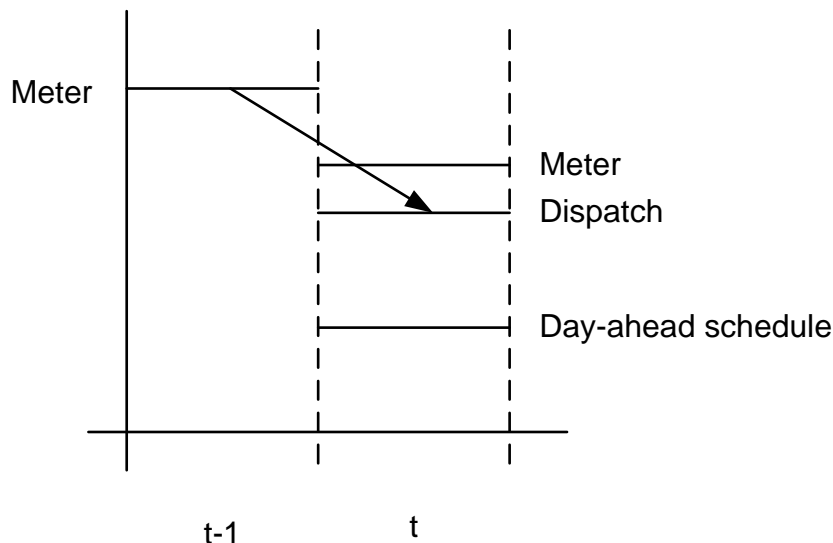
1. A resource can't deviate from its dispatched change in output level by more than 10% of the dispatched change in output level. For example, if a resource is dispatched to decrease its output by 50 MW in a settlement interval, the settlement interval would be flagged if the resource did not reduce its output by at least 45 MW.
2. The deviation is greater than 10% of its ramp capability over the 10-minute interval. For example, a resource that has a 5 MW/min ramp rate and can ramp 50 MW over a 10-minute settlement interval will not have settlement intervals flagged for deviations 5 MW or less (50 MW * 10%). This will avoid triggering the persistent deviation metric for small deviations from small dispatched changes to output level.

The following four diagrams depict the cases in which the persistent deviation metric would be evaluated. In each of these diagrams, the meter for interval t is illustrated in the direction that would result in the ISO flagging a settlement interval if the metric exceeded the threshold.

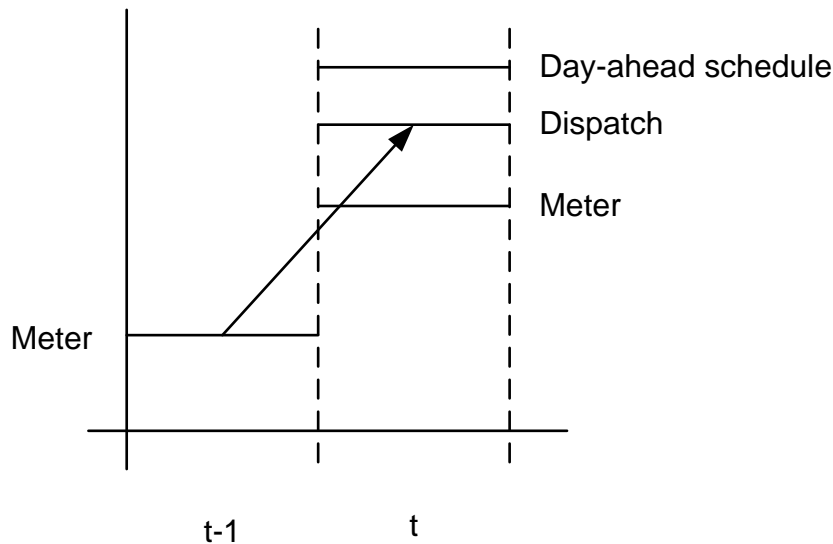
Case 1 – The resource is dispatched up in real time and is operating above its day-ahead schedule. In this case, interval t is flagged if the deviation is greater than 10% of the resource’s 10-minute ramp capability and the persistent deviation metric is calculated to be greater than 110%.



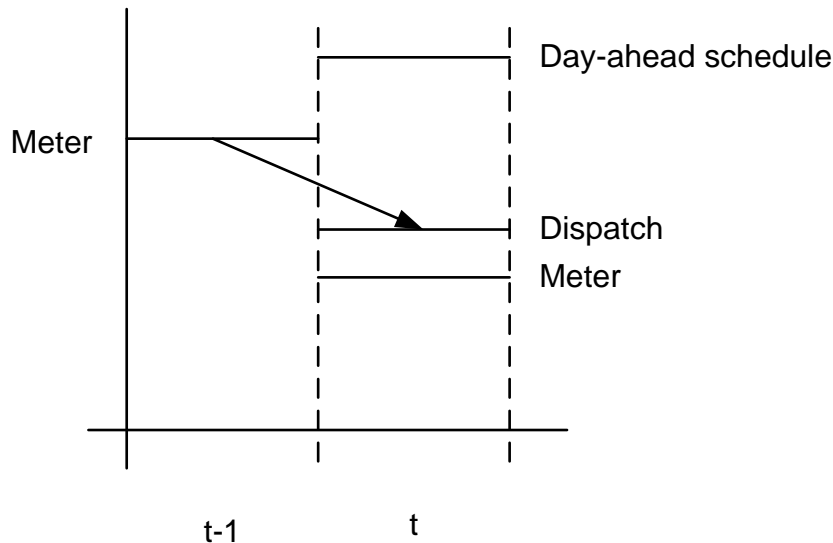
Case 2 – The resource is dispatched down in real time and is operating above its day-ahead schedule. In this case, interval t is flagged if the deviation is greater than 10% of the resource’s 10-minute ramp capability and the persistent deviation metric is calculated to be less than 90%.



Case 3 – The resource is dispatched up in real time and is operating below its day-ahead schedule. In this case, interval t is flagged if the deviation is greater than 10% of the resource’s 10-minute ramp capability and the persistent deviation metric is calculated to be less than 90%.



Case 4 – The resource is dispatched down in real time and is operating below its day-ahead schedule. In this case, interval t is flagged if the deviation is greater than 10% of the resource’s 10-minute ramp capability and the persistent deviation metric is calculated to be greater than 110%.



Persistent deviation metric evaluation criteria

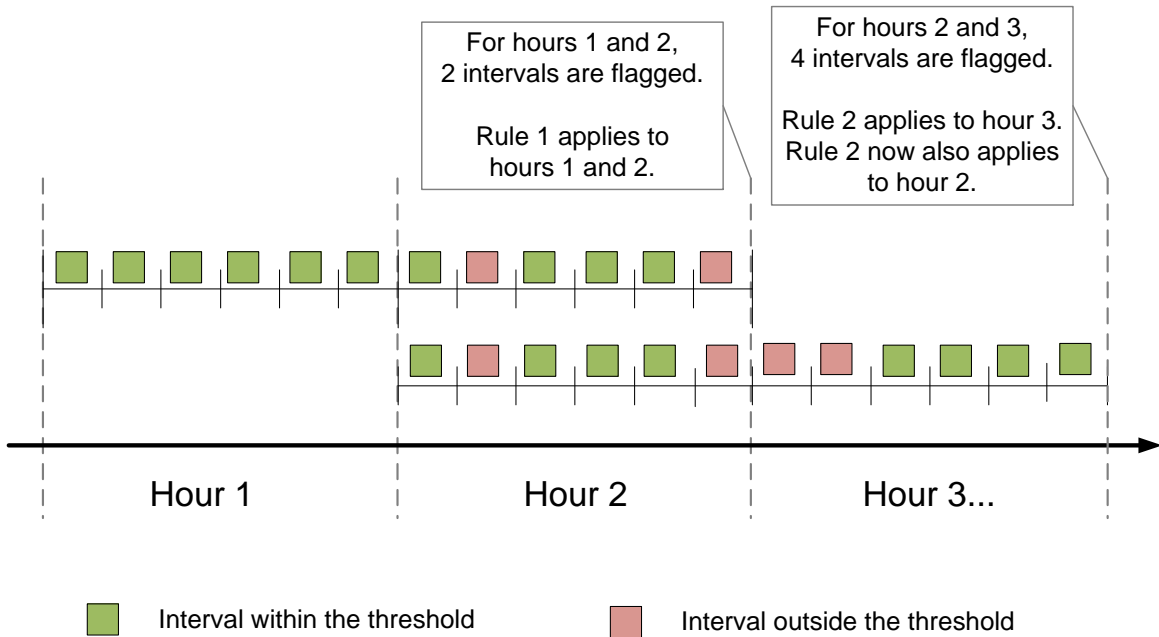
The ISO will employ the following persistent metric evaluation criteria to determine whether a resource has persistently deviated in a manner that inflated bid cost recovery or residual imbalance energy payments. If a resource exceeds the persistent metric evaluation criteria, the

ISO will adjust the resource's bid bases used in the bid cost recovery or residual imbalance energy settlement calculations.

Each hour, the ISO will look at the persistent deviation metric for the twelve ten-minute settlement intervals that comprise the previous two hours. Thus, the evaluation window is a rolling two hours, incrementing in hourly intervals.

- Rule 1: If 3 or fewer intervals out of the previous 12 intervals are flagged as exceeding the persistent deviation metric threshold,
 - The bid basis for optimal energy for real-time BCR is the economic energy bid.
 - The bid basis for residual imbalance energy is the reference hour bid.
- ~~Rule 2: If 3 or 4 intervals of the previous 12 intervals are flagged as exceeding the persistent deviation metric threshold, then for those intervals in the directly previous 12 intervals, and for the flagged intervals only,~~
 - ~~The bid basis for optimal energy for real-time BCR is $\min\{\text{DEB}, \text{bid}, \text{LMP}\}$.~~
 - ~~The bid basis for residual energy will be $\min\{\text{DEB}, \text{Bid}, \text{LMP}\}$.~~
- Rule 2: If 4 or more intervals of the previous 12 intervals are flagged as exceeding the persistent deviation metric threshold, then for all the previous 12 in the window,
 - The bid basis for optimal energy for real-time bid cost recovery is:
 - $\text{Min}\{\text{DEB}, \text{bid}, \text{LMP}\}$ for incremental energy (i.e. above day-ahead schedule)
 - $\text{Max}\{\text{DEB}, \text{bid}, \text{LMP}\}$ for decremental energy (i.e. below day-ahead schedule)
 - The bid basis for residual imbalance energy is:
 - $\text{Min}\{\text{DEB}, \text{Bid}, \text{LMP}\}$ for incremental energy (i.e. above day-ahead schedule).
 - $\text{Max}\{\text{DEB}, \text{bid}, \text{LMP}\}$ for decremental energy (i.e. below day-ahead schedule)
- Rule 3: Once an interval is flagged as exceeding the persistent deviation metric threshold, it remains so when it is considered in the evaluation of the following evaluation window.
- Rule 5: Once an interval's bid basis has been determined by Rule 2, its bid base will not change in later evaluation. However, if an interval's bid base is determined by Rule 1 in a previous evaluation, it can be re-determined by Rule 2 in the next evaluation.

REVISED Figure 7.2.1-1: Flagging of intervals in a two-hour rolling window based on the persistent deviation metric



The ISO is proposing this change for the following reasons:

- It will eliminate the incentive for resources to persistently deviate from dispatch instructions as part of a strategy to inflate bid cost recovery payments or residual imbalance energy payments. Under the proposed change, these payments will be reduced when deviations from ISO dispatch are persistent and would inflate these payments. The implementation of the persistent deviation metric will minimize the potential to inflate these payments by deviating from ISO dispatch. At the same time, it allows for payment based on a resource's submitted bid if no deviations exist, in contrast to the ISO's previous proposal and recent tariff changes that base payment on default energy bids.
- The change to the number of allowable flagged intervals in the two-hour rolling window from the second revised draft final proposal is made out of recognition of the potential for adverse market behavior under that proposal that was described in the comments of the Department of Market Monitoring and SCE.

The ISO has estimated the effect of the application of the persistent deviation metric using market data for September 2012. These preliminary results are shown in the table below. Because of the complexity of modeling the rolling two-hour rolling window, this analysis instead yields the distribution of resource-hours according to the number of flagged intervals within an hour. The resource-hours included are limited to hours in which a resource was dispatched up or down. This analysis includes only a very conservative (that is, low) approximation of the minimum deviation threshold based on the resource's 10-minute ramping capability. Recall that this ramping capability is considered in order to avoid catching very small deviations that would

reasonably be considered inadvertent. In other words, this analysis likely captures small deviations that would not be caught under the actual application of these rules.

The results of this analysis can be interpreted by looking at the proportion of resource-hours with no flagged settlement intervals. This shows that 97.5% of resource-hours had 3 or fewer flagged settlement intervals. Note that, when a rolling two-hour window is considered, it may be that some of the instances in which one hour has three or fewer intervals flagged, and it is adjacent to an hour with flagged intervals that push the two-hour window over threshold.

Number of flagged settlement intervals in an hour	Number of resource-hours	Percentage of resource-hours
3 or fewer	91,738	97.5%
More than 3	2,333	2.5%

7.4 Cost recovery for residual imbalance energy

As described above, the ISO made an emergency filing on August 28 to change the settlement of residual imbalance energy in response to observed adverse market behavior. Below are described several further refinements to the modifications approved in that filing.

7.4.1 Payment of residual imbalance energy

The ISO proposes to pay residual imbalance energy based on its bid in the reference hour as long as the resource is not deviating from its dispatch outside the threshold. If the resource is outside of the deviation threshold, then it will be paid as specified in the ISO's August 28 FERC filing. The ISO did propose this solution as part of the August 28 filing because the changes proposed in that filing were readily implementable, and were effective in addressing the residual imbalance energy issues that were described. With additional time and stakeholder input, the ISO recommends that the proposal be refined to continue paying residual imbalance energy based on its reference bid so long as the resource is not deviating beyond the threshold described above.

In the case that a resource does deviate beyond the deviation threshold, the ISO proposes that residual imbalance energy be settled at the minimum of (a) the reference hour LMP, (b) the reference hour bid, and (c) the default energy bid.

7.4.2 ~~DELETED~~: Residual imbalance energy and bid cost recovery calculations

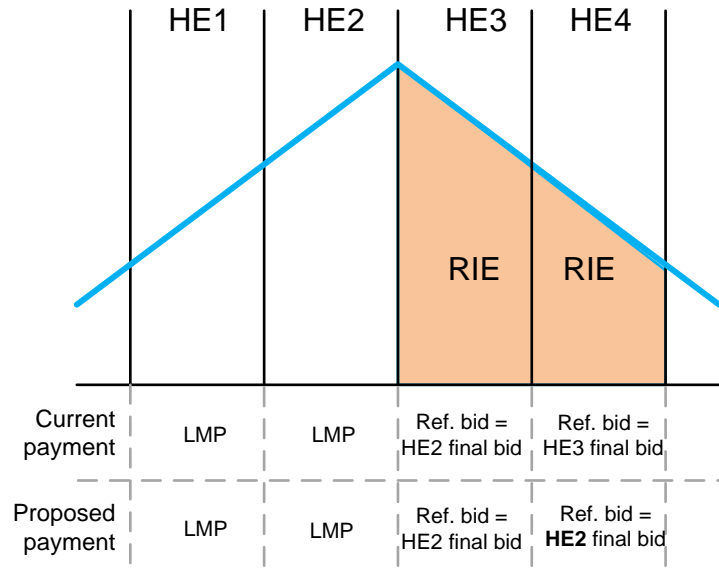
~~The ISO proposes to include residual imbalance energy payments in the calculation of whether a resource has a daily revenue shortfall and is consequently eligible for bid cost recovery for the real-time market. Note that payment of residual imbalance energy is not contingent on the resource having a net shortfall over the day. However, surpluses from residual imbalance energy will be counted as revenues in the real-time bid cost recovery calculation.~~

7.4.3 Residual imbalance energy and full downward ramp

Low bids leading the RT market to dispatch a resource up followed by high bids leading the market to dispatch the resource down at full ramp can inflate RIE payments after the first hour of RIE. The ISO proposes to pay RIE at the bid price for the interval from which the resource is being dispatched down at full ramp.

The stylized example below depicts four hours. The blue line is the ISO dispatch based on the bids shown below each hour. The orange area is residual imbalance energy. RIE in the third hour would be paid its reference bid from the previous hour, hour ending 2. Currently, the fourth hour would be paid the resource's reference bid from the third hour. The ISO proposes that, because it is the bid in hour ending 2 that led to the dispatch up, that bid is actually the appropriate reference bid for RIE settlement for all the intervals all full downward ramp.

Figure 7.3.3-1: RIE caused by a full downward ramp from a market dispatch



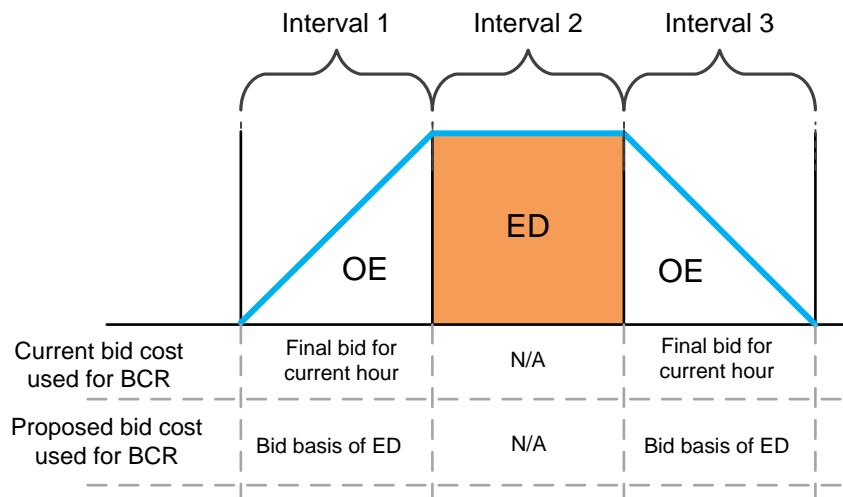
8 Ramping up to or down from an unmitigated exceptional dispatch

There currently are provisions to mitigate the price paid to resources dispatched through exceptional dispatch if the ISO makes the exceptional dispatch under certain non-competitive conditions. This element of the proposal has been added in an effort to align the settlement of exceptional dispatch and the ramping energy going into and out of that exceptional dispatch. This alignment is important because, under the current settlement provisions, a resource that received an exceptional dispatch to increase output could receive bid cost recovery or RIE payments at an unmitigated price when the resource is ramping back down after the exceptional dispatch has ended. (Whether the resource is paid RIE or through bid cost recovery depends on if the ramp crosses an hourly boundary.) The ISO’s proposal to address this is described in the following two sections.

8.1 Bid cost recovery when ramping up to or down from an exceptional dispatch

The ISO proposes that energy during the ramp-down intervals have the same bid cost used in the bid cost recovery calculation as is used for the exceptional dispatch. This effectively treats the ramping energy the same as exceptional dispatch energy. The “bid basis” means that the bid used for the RIE payment in the current ramping interval is the same bid used in the calculation of the ED payment for the reference ED interval.

Table 8.1-1: Bid cost recovery for energy ramping up to or down from an exceptional dispatch



Current ED bid basis used in excess cost payments for incremental ED energy

IF ED PAYMENT IS MITIGATED
 Bid basis = min{DEB, final bid}

IF ED PAYMENT IS NOT MITIGATED
 Bid basis = final bid

The *final bid* is the bid after the LMPM process
 (It may have been mitigated or it may be the clean bid, depending on whether or not the bid was mitigated by LMPM.)

8.2 Settlement of residual imbalance energy ramping up to or down from an exceptional dispatch

We do not propose any changes to the approved proposal from the August 28 filing with respect to RIE and exceptional dispatch. In summary, the ISO proposes to settle RIE in the ramp-down intervals on the same bid basis as the exceptional dispatch is paid, which effectively treats this energy the same as exceptional dispatch energy. The “bid basis” means that the bid used for the RIE payment in the current ramping interval is the same bid used in the calculation of the ED payment for the reference ED interval.

For example, if the ED payment was based on the unit’s DEB, then the RIE associated with that ED would also be paid the resource’s DEB. It is important to note that exceptional dispatches

can be paid in several ways depending on circumstances. These circumstances are described in section 34.9 of the ISO tariff.¹¹

9 Ramping up to our down from a minimum load re-rate

This element of the proposal has been added in an effort to align the settlement of minimum load with the ramping energy going into and out of a minimum load re-rate. Without such alignment, a resource can provide the market with a high RT bids leading the resource to be ramped down. This can lead to large payments for RIE, and – if the re-rate ends mid-hour – it can also lead to large bid costs being included in bid cost recovery calculations.

The ISO's proposal to address these two issues is described in the following sections.

9.1 Bid cost recovery and minimum load re-rate

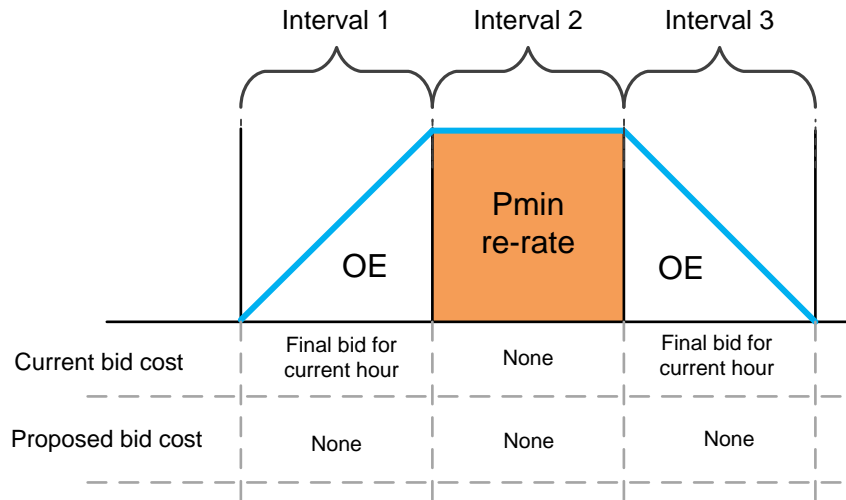
The ISO proposes to use the LMP in this case rather than using the reference bid for the optimal energy. In so doing, a resource is a price-taker for the energy ramping up to its temporary minimum load level, and then back out of that level after the re-rate has ended. The proposal aligns bid cost recovery payments between the period of the minimum load re-rate and the energy ramping up to and down from that re-rate.

Making bid cost recovery calculations consistent across such intervals mitigates a potential incentive for adverse market behavior.

The stylized example below depicts three intervals. The blue line is the ISO dispatch based on the bids shown below each hour. The orange area is minimum load energy under the minimum load re-rate.

¹¹ Tariff section 34.9 is available on the ISO website at the following link:
http://www.caiso.com/Documents/Sections25-35_2012-04-18.pdf

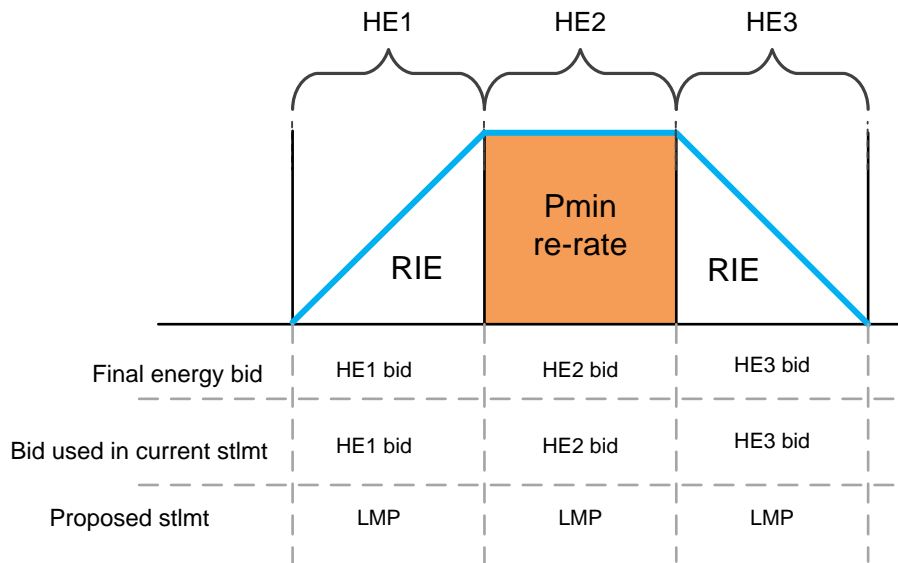
Table 9.1-1: Bid cost recovery for energy ramping up to or down from a minimum load re-rate



9.2 Residual imbalance energy and minimum load re-rate

The ISO proposes that, when the re-rate ends at the end of an hour, the RIE during the ramp-down period be paid at the LMP. The ISO further proposes that the RIE in the subsequent hour be paid at the LMP because this energy is caused by a SLIC de-rate or re-rate which is currently settled based on the LMP.

Table 9.2-1: Settlement of residual imbalance energy ramping up to or down from a minimum load re-rate



10 Minimum load cost recovery and start-up and shut-down instructions

As noted by Calpine, we previously said that we anticipated that there would be a low benefit in detecting this behavior. This statement was made out of the expectation that a resource could not earn excessive profits from staying online because it would only recover its minimum load costs by not shutting down. After further consideration, however, and based on input from our Department of Market Monitoring, we've determined that there is in fact the potential for adverse behavior that involves deviations to incur minimum load costs, and that such adverse behavior which would impose unnecessary costs on the market. Consequently, we propose the following modifications.

10.1 Uninstructed energy to avoid a shut-down instruction

A resource could potentially generate at a level above real-time dispatch instructions to avoid a shut-down instruction by the ISO and thereby recover minimum load cost when otherwise the real-time market would have shut the unit down. Specifically, a generator could position itself consistently at a MW level from which it takes more than one real-time pre-dispatch (RTPD) interval to ramp down the minimum load level for shutdown. By doing so, the generator would be able to avoid a binding shutdown instruction issued through real-time pre-dispatch dispatch (RTPD) and would continue to be online at level above the minimum load.

In response to this concern, the ISO proposes the measures outlined below. Although the ISO is proposing to implement these measures when the day-ahead and real-time markets are no longer netted together for bid cost recovery, the ISO is prepared to act sooner should it observe adverse behavior occurring.

Communication of advisory schedules from real-time pre-dispatch

Currently, the ISO sends four 15-minute real-time pre-dispatch (RTPD) advisory schedules for the HASP trading hour via the CAISO Market Results Interface (CMRI) from the hour-ahead scheduling process (HASP) run. The ISO proposes to convey all additional advisory schedules for all RTPD runs via CMRI.

Shutdown instruction state variable

The ISO proposes to calculate a shutdown instruction state variable. This state variable will keep track of positive uninstructed imbalance energy once an advisory shutdown instruction is issued. In so doing, the shutdown instruction state variable will yield the MW level had the generator followed the instruction.

This shutdown state variable will begin accumulating uninstructed imbalance energy as soon as the advisory schedule has a zero MW dispatch within the real-time dispatch horizon. The state variable continues to accumulate the uninstructed imbalance energy as long as the most recent real-time pre-dispatch has a zero MW schedule within the real-time dispatch horizon.

Once a resource is issued an advisory schedule of zero MW dispatch, the real-time dispatch will dispatch the generator within a limited range consistent with the advisory shutdown instruction. Should the generator not follow the RTD downward dispatch instruction, this state variable will continue to grow until the dispatch operating point minus the value (in MW) of the state variable is equal to or less than the Pmin. When the dispatch operating point minus the state variable is less than or equal to the Pmin, this indicates that the generator could have followed a binding shutdown instruction issued in ADS by this time. From that point forward, minimum load cost will be disqualified from the bid cost recovery calculation. Specifically, minimum load costs will be disqualified (that is, not included) in the day ahead bid cost recovery calculation if the

resource was committed in the day ahead, and minimum load costs will be excluded from the real-time bid cost recovery calculation.

The state variable will be reset to zero when the most recent RTPD run no longer has a zero MW dispatch within the RTD horizon or the generator is offline.

10.2 Real-time dispatch binding shutdown instruction

In addition to the issue described in which a resource deviates to avoid a shutdown instruction, there are potential situations in which a resource could receive a binding shutdown instruction through ADS, not follow the instruction, yet continue to be eligible to receive minimum load costs through bid cost recovery. To address this, the ISO proposes that, in the event that ADS issues a binding shutdown instruction, a resource not be eligible for recovery of minimum load costs from the point of the shut-down instruction forward for the maximum of the duration of the resource's registered minimum down time. This is in addition to the current rules detailed in the Market Operations BPM.¹² In addition, the ISO proposes that, if a resource ignores the binding shutdown issued by ADSRTD and it has a day-ahead schedule, that it not be eligible for minimum load cost recovery in the day-ahead bid cost recovery calculation for the minimum of 1) the resource's minimum down time, and 2) the day ahead commitment period.

Several market participants sought clarification of this policy in circumstances in which an ISO operator issues a shut-down instruction, or indicates that a resource should stay on despite receiving a shutdown instruction through ADSRTD. The ISO clarifies that an instruction issued by an ISO operator are always considered the final, binding instruction.

10.3 Uninstructed start-up

The ISO proposes to clarify that a period in which a resource starts up without an ISO instruction to do so will not be considered an ISO commitment period, and thus the resource will not be eligible for cost recovery. This change is proposed in order to forestall a market participant from starting up a resource and running at minimum load in order to receive minimum load cost recovery. Only the time period in which the ISO has committed the resource economically will be considered an ISO commitment period.

Calpine requested the clarification that "if a unit starts before it received a start instruction, it will receive SUC, but not be eligible for MMLC BCR until the start notice is issued." The ISO clarifies that this is the case.

¹² The Market Operations BPM is available at the following link. <https://bpm.caiso.com/bpm/bpm/version/000000000000175>. In particular, note rules detailed in Appendix D of the BPM.

11 Schedule

Date	Event
February 22, 2012	Straw proposal posted
March 7	On-site stakeholder meeting
March 20	Stakeholder comments due *
April 6	Draft final proposal posted
March 30	Market Surveillance Committee meeting
April 12	Stakeholder conference call
April 19	Stakeholder comments due *
April 27	Addendum posted
May 3	Stakeholder conference call
May 8	Stakeholder comments due *
September 4	Revised draft final proposal posted
September 11	Stakeholder conference call
September 27	Stakeholder comments due *
October 19	Market Surveillance Committee meeting
October 31	Second revised draft final proposal posted
November 6	Stakeholder conference call
November 13	Stakeholder comments due *
<u>November 30</u>	<u>Stakeholder conference call</u>
December 13-14	ISO Board of Governors meeting

* Please submit written comments to BCRMitigation@caiso.com

12 Conclusion

The ISO will conduct a stakeholder conference call to review this second revised draft final proposal on November 30.