

**Addendum to the Draft Final Proposal for the Design of**

**Convergence Bidding**

**October 2, 2009**

Document revised on May 20, 2010 to reflect corrections in bid cost recovery equations. Corrections made on pages 25& 27 to be consistent with corrections reflected in the *Convergence Bidding External BRS*.

Addendum to Sept 14 Draft Final Proposal on the Design of Convergence Bidding

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# Introduction

This addendum expands upon, clarifies, and revises information included in the September 14 *Draft Final Proposal for the Design of Convergence Bidding*. Revisions were made to the following sections of the *Draft Final Proposal*: The sections below refer the original section numbers in the September 14 proposal.

* Section 2.2 – Position Limits
* Section 2.3 - Bid Volume Limits
* Section 3 – Convergence Bidding at the Interties
* Section 4.1 and 4.2 – Proposed Modifications to Day-Ahead Market Process
* Section 6.2 – Credit Checking for Virtual Bids – Clarifications only, no changes to policy
* Section 7.2 – Transaction Fees for Convergence Bids
* Section 7.4.1 & 7.4.2 – Correction to equations on page 39, 40, 41 and 42, no change to policy

The ISO Department of Market Monitoring (DMM) has also posted a revision to Attachment B which describes the proposal for the CRR Settlement Rule. This revised document is posted at:

http://www.caiso.com/1807/1807996f7020.html

Revisions to policy described in this addendum will be discussed with stakeholders at a meeting scheduled for October 9. The ISO is requesting final comments from stakeholders on the *Draft Final Proposal for Convergence Bidding* by close of business October 14 to [mmiller@caiso.com](mailto:mmiller@caiso.com).

# Design Features of Convergence Bids

*This section has been modified to reflect an additional year of position limits set at 100%.*

## Position Limits

The ISO seeks the capability to impose limits on the MWh quantities of virtual demand and virtual supply bids that could be submitted by an individual Scheduling Coordinator (and its affiliates) at individual nodes. The key reason for maintaining the ability to establish position limits is to mitigate the potential exercise of market power at a specific node especially under an immature market. The general concept is to be able to limit virtual bidding by each Scheduling Coordinator (SC) to a percentage of a certain MW amount for a PNode or APNode. The ISO proposes initial position limits be set at 10% for each SC at each node for virtual bids.

All position evaluation will be done based on the highest MW point submitted in the energy bid curve. This valuation will be done upon initial submission in SIBR as part of the validation process.

1. For nodes associated with generators, the position limits for each SC could be tied directly to the capacity of that generator. For example, if PNode X is the injection point for a generator with a PMax of 100 MWs, the position limit at PNode X would be a specific percentage of 100 MWs. If the position limits were 10%, then virtual bids would be limited to 10 MWhs per SC at that node.
2. For nodes associated with demand, a firm MW amount could be determined by the maximum MW amount that flows over that node over a period of time, or by the MWh volume of the peak withdrawal at each node, of which a 10% would establish the position limits for each SC at each node.
3. For PNodes or APNodes that both inject and withdraw power, the larger of the maximum demand and the maximum capacity MW value could provide the basis for the application of position limits for each SC. The maximum of these two values would serve at the basis for a 10% position limit for both virtual supply and virtual demand bids for each SC.
4. For intertie points the MW value would be based on 5% rather than of the rated capacity of the intertie.

Position limits were originally suggested by the Market Surveillance Committee (MSC) as a means for the ISO to pursue nodal convergence bidding and suggested they be lifted as market confidence increased. The Department of Market Monitoring (DMM) also recommended position limits in their November 2007 recommendation for Convergence Bidding[[1]](#footnote-1) with an initial setting of 10% if the ISO is to pursue nodal convergence bidding. DMM submitted comments to the July 2 Straw Proposal that support the ISO position to implement convergence bidding at the nodal level with initial 10% position limits.

The ISO proposes the following schedule for increasing position limits (based on February 2011 implementation) over a 24 month period;

* Initial implementation through eight months after implementation – 10% limit
* Month nine through twelve – 50% limit
* Month 13 through 24 – 100% position limits
* 25 months after implementation – no position limits

The increase of position limits would occur automatically on the specified dates unless the ISO makes a filing with the Commission specifying reasons for the existing position limit to remain in place. The position limit timeline for the 10% limit is extended from six to eight months as compared to what was described in the Straw Proposal to avoid increasing position limits during the summer months. Smaller position limits are proposed for convergence bids on the interties and are described in Section 3.3 below.

Market participants’ comments to the July 2 Straw Proposal did not support the inclusion of position limits. Some parties commented that the 10% position limits would result in the need to do dirty hedges and force market participants to submit multiple bids at multiple nodes to hedge the outage of a generator to work around the 10% limitation. Other market participants commented that position limits were unfounded and were not in practice at any other ISO in the country. Others commented that the position limits were too high to mitigate risk and that the ISO should implement LAP level virtual bidding.

The ISO supports implementing nodal virtual bidding cautiously and believes that a 10% limit is a reasonable starting point.

## Bid Volume Limits

The solution described in the September 14 Draft Final Proposal to address bid volume limits was problematic for a number of reasons. Since bids were reallocated to scheduling coordinators that were over bid limits at the close of the market, it created uncertainty for market participants in regards to the number of bids they would ultimately have the ability to submit into the ISO Day-Ahead Market. Some market participants commented that they were concerned they would not have the ability to submit the necessary number of convergence bids to appropriately hedge their risks at the various nodes.

The ISO considered feedback from market participants and developed a revised methodology to address the bid volume concerns that will eliminate the need to set a system wide bid limit and allocate a set number of bids to each scheduling coordinator. Instead of setting bid limits the ISO will enhance the existing Day-Ahead market software to aggregate all of the virtual bids at each location, node, LAP or trading hub to create one aggregate composite bid curve. One aggregate bid curve will be created for virtual supply and one aggregate curve for virtual demand at each location. T

The Day-Ahead market software will perform the following steps to aggregate and then disaggregate the virtual bids at each location:

* Step 1: At the close of the Day-Ahead Market (approximately 10:00 a.m.) the DA applications develop a "pre aggregation" process to “aggregate” the bids on each node, LAP or trading hub to create one “aggregate” virtual supply bid and one “aggregate” virtual demand bid (the bid can contain many more segments beyond 10);
  + With step 1, we will guarantee the number of “aggregated” convergence bids to be no more than 3500 X 2 (3500 being roughly the number of pnodes/apnodes).
* Step 2: Have MPM/RRD - IFM - RUC run with the physical bids and “aggregated” virtual bids. For the “aggregated” virtual bids, it should generate “aggregated” virtual bid results per pnode and supply/demand.
* Step 3: Use a post RUC process to "de-aggregate" the “aggregated” virtual results into the individual cleared virtual bid results.
* Step 4: Publish day-ahead market results, including virtual bid results.

This proposal eliminates concerns over bid limits for market participants. The ISO does not anticipate any software performance concerns based on initial discussions with our software vendor.

The ISO proposes a $.005 per bid segment transaction fee be charged to virtual bids to manage bid volume economically and deter submission of a large number of bid segments likely to be uneconomic (bid fishing). If left unchecked, bid fishing could lead to potential software performance issues.  The total revenues from the bid segment transaction fee will offset the convergence bidding GMC costs that are estimated to be between $.065 and $.085 per gross cleared MWh. As a result, competitive Convergence Bids will not pay higher fees, though Convergence Bids that are not in the money will pay higher fees.

# Convergence Bidding at the Interties

*There are no changes to Section 3.1 which describes the proposal for convergence bidding at the interties. Section 3.2 and 3.3 are new and provide additional information and a new proposal for position limits at the interties.*

## Proposal for Convergence Bidding at the Interties

The ISO proposes that convergence bidding be enabled at the intertie points between the ISO’s control area and external or embedded control areas. The rationale for this proposal is two-fold. Convergence bidding at the interties will enable Market Participants to arbitrage differences between the Day Ahead and HASP prices thus facilitating price convergence. In addition, by providing a mechanism for market participants to engage in virtual bidding at the interties the proposal will eliminate the incentive for parties to engage in implicit virtual bidding, which can negatively impact reliable operation.

The proposed design of this functionality is based on two underlying principles. The first principle is that net physical schedules at the interties must be within established scheduling limits. NERC and WECC standards are clear on the point that physical schedules cannot violate the scheduling limits on the interties coming out of the Day Ahead market. Moreover, given the extent to which California is highly dependent on imported power to meet load-serving requirements, enforcing the inter-tie scheduling limits with respect to physical schedules gives ISO operators a high level of confidence that these physical schedules will be deliverable. The second principle employed in this proposal is that, just as is the case for internal schedules, virtual and physical schedules on the interties must be co-determined based on their economic bid prices and must have a shared congestion price in order for the virtual transactions to be meaningful. Virtual bids need to be able to create congestion as well as to provide counter-flows to mitigate congestion.

In summary and as explained in more detail below, the ISO proposes to adhere to both principles by adding one additional constraint for each inter-tie scheduling point in the scheduling run of the IFM that will not be enforced in the pricing run. Specifically, the ISO proposes to enforce in the scheduling run a constraint that requires the net physical schedules across each scheduling point, ignoring the accepted virtual schedules, to be within the established scheduling limit for that scheduling point. A comparable constraint that applies to the combined net physical and virtual schedule across the scheduling point would be enforced in both the scheduling run and the pricing run.

The ISO has researched how the eastern ISOs have addressed these concerns with regard to virtual bidding on their interties. The solutions run the whole gamut. Most importantly, these other ISOs do not enforce inter-tie scheduling limits comparable to those used by the CAISO under the WECC requirements, hence the examples of the other ISOs are not directly applicable to the California context.

* NYISO does not allow CB at their tie-points at present, though it has not ruled this out as a potential future enhancement.
* PJM allows CB at their interties, and does not enforce scheduling limits on physical schedules analogous to those in the west. PJM does require reservation of transmission, however, and this effectively limits physical transactions to be within applicable limitations.
* ISO-NE also allows convergence bidding at their interties, and enforces a constraint that the cleared transactions – physical and virtual combined – cannot exceed the applicable line limit.
* MISO enables virtual bids at their interchanges, and has a transmission reservation requirement prior to the close of their Day Ahead market. This requirement ensures that physical bids do not exceed their scheduling or line limits.

To understand the ISO’s current proposal as summarized above, it is useful to recall the general process by which the IFM clears, and also how this will be different under convergence bidding at internal pricing nodes. In the ISO’s new market structure, the IFM employs two passes, a scheduling run and a pricing run, to determine market-clearing schedules and prices. The Scheduling Run employs penalty prices to make sure that priorities among schedules are maintained. The prices from the scheduling run are therefore are not meaningful market prices. The schedules determined in the Scheduling Run are meaningful, however, and are passed to the Pricing Run in which valid market clearing prices are determined using participants’ submitted bids. Under convergence bidding and in the case of internal pricing nodes, virtual and physical bids will be commingled in the IFM clearing process. They will be treated equally in the Scheduling and Pricing runs, will clear against each other and will receive the same price at any given pricing node. Virtual schedules can create congestion, mitigate congestion, and can displace physical generation and/or load. However, participants who submit virtual bids have financial incentives that act to converge IFM and Real Time prices. In other words, virtual bidding that is aimed at trying to create greater divergence between IFM and RTM prices would typically be a losing proposition for the bidder.

Despite the discipline provided by the market incentives just described, there is an important reason to include an additional mechanism with respect to convergence bidding at the interties. The concern is that virtual counter-flows could allow a set of physical intertie schedules to clear the IFM that would violate established scheduling limits for one or more inter-ties, which would in turn violate NERC and WECC reliability standards. Moreover, given California’s dependence on imported power, failure to observe the scheduling limits with respect to physical imports and exports in the IFM could result in the IFM accepting a set of import schedules that may not be fully deliverable in real time. To avoid such problems the ISO proposes that the design of convergence bidding at the interties include the enforcement of a constraint within the IFM optimization that will ensure that physical intertie schedules are within the required limits.

The CAISO is not proposing to limit physical imports and exports via a transmission reservation requirement mechanism similar to the PJM and MISO requirements. Although this approach is working for other ISOs, we propose instead to enforce the applicable scheduling limit on physical IFM schedules as a constraint within the market software. This approach has the advantage of keeping the scheduling of physical resources in the market rather than first subjecting them to a “first come, first serve” transmission reservation. Having the constraint enforced in the market enables physical imports and exports to net against each other. This enables more physical scheduling of imports and exports in the Day Ahead market because bid-in imports and exports can net against each other. Not only does this serve to make sure that NERC and WECC reliability standards are upheld, but it also gives the CAISO operational staff confidence that the intertie energy on which California heavily relies can be reliably delivered.

The enforcement of the scheduling limits on physical IFM interchange schedules clearly addresses the concerns underlying the first design principle, and is the element of the ISO’s proposal that distinguishes the treatment of interchange bids from bids elsewhere on the ISO grid. In order to adhere to the second principle that virtual and physical bids clear together in the IFM, we propose to enforce an additional constraint such that the net of virtual and physical imports and exports also be less than or equal to the applicable scheduling limit. This second constraint is no different to the way physical and virtual bids are treated in the IFM with respect to all other constraints within the ISO system. For purposes of establishing IFM prices, the shadow price of the second constraint will determine the congestion components of intertie prices. Again, this is no different to how IFM prices are determined throughout the ISO grid, based on constraints applied to the combined physical and virtual bids submitted to the market. Because of the addition of the physical-only constraint, however, we have two constraints being applied to the establishment of IFM inter-tie schedules, and we need to consider how they will interact.

Constraint [1] – The Physical Constraint: Physical imports net of physical exports must be less than or equal to the scheduling limit at the relevant scheduling point in the applicable direction.

Constraint [2] – The Physical + Virtual Constraint: Physical and virtual imports net of physical and virtual exports must be less than or equal to the scheduling limit at the relevant scheduling point in the applicable direction.

To see how the enforcement of these constraints plays out between the Scheduling and Pricing runs of the IFM, four cases are analyzed below.

Case A – Neither [1] or [2] is binding:

Recall that constraint [1] is the physical constraint which keeps intertie schedules from exceeding scheduling limits. Constraint [2] is the constraint that physical + virtual schedules also be within the applicable scheduling limit. Physical and virtual schedules are co-determined in the scheduling run, and are subject to both these constraints.

The physical values, which net out to clear under the scheduling limit, are passed to the pricing run. In the pricing run, these physical values are enforced as constraints. Only the physical + virtual constraint impacts prices, and this is consistent with the design principle with which we started. Namely, that the congestion component of interties prices be based on the enforcement of virtuals and physicals mixed together. The physicals are co-determined with virtuals in the scheduling run, but then fixed in the pricing run in order to ensure that schedules do not exceed the intertie scheduling limits.

Since neither of the constraints is binding, the congestion component of intertie prices in this case is zero.

Case B – Both [1] and [2] are binding:

In the case that both constraints are binding, we know that virtual imports exactly equal virtual exports. The constraints are redundant in that the enforcement of them both will not yield a different solution than the enforcement of either one of them alone. That shadow value on the physical + virtual constraint will be the congestion component of prices that are yielded by the pricing run.

Case C – [1] is not binding, but [2] is binding:

This is a mixed case in that there is no congestion created by the physical bids, but the virtuals do create congestion. Because [2] is binding, it is clear that the virtual schedules that come out of the scheduling run create virtual congestion on the intertie where there was none created by the physical schedules. The pricing run will enforce the physical + virtual constraint, and the price at that intertie will have a congestion component reflective of the shadow value of constraint [2].

In this instance, the price to which all cleared bids at this intertie are subject, both physical and virtual, indicate congestion. While this is consistent with the design principle that virtuals and physicals determine prices by clearing together, this can lead to a disadvantageous situation for physical intertie schedules. In particular, there could a situation in which a physical resource is not dispatched due to the virtual congestion. There may also be a situation in which a physical schedule could clear at a higher price than they would without the inclusion of the virtuals in the market. However, that lost “opportunity cost” can also work in the opposite direction so that physicals enjoy a “windfall” due to the influence of virtuals.

As we generally see with convergence bidding, the market will self-correct in such instances. Congestion in the IFM that will not be there in the HASP will cause the Day Ahead price to be higher than the HASP price. The virtuals that created the virtual congestion in the prevailing direction will be liquidated at the lower HASP price, and will therefore lose money. Additionally, it is reasonable to expect that other Market Participants, including those playing in the physical intertie market, will jump on that price divergence in order to make money by arbitraging that difference and to hedge their other market positions.

Case D– [1] is binding, but [2] is not binding:

In this second mixed case, the physical constraint is binding, but the physical + virtual constraint is not. By enforcing constraint [1] in the scheduling run, we ensure an intertie schedule that is within applicable scheduling limits. Also in the scheduling run, we see that the virtuals, which are co-determined with the physicals, mitigate the congestion so that the physical + virtual constraint is not binding. The physical import and export values are passed to the pricing run, and the pricing outcome reflects the fact that there is no congestion due to the cleared virtuals.

The potentially disadvantageous result of this case is that physical schedules that are relieving physical congestion do not receive any congestion payment because the virtual schedules have rendered the intertie un-congested. However, just as in the last case, the potentially disadvantageous could have been advantageous in other circumstances. Also as in Case C, prices will discipline the market to prevent such an outcome from persisting. Once the virtual schedules from the IFM are gone, congestion will be evident in the HASP that was masked by those virtuals in the IFM. This will cause the HASP price to be higher than the Day Ahead price. The virtuals that relieved the physical congestion in the prevailing direction will be liquidated at the higher HASP price, and will therefore lose money. As noted previously, it is reasonable to expect that other Market Participants, including those playing in the physical intertie market, will jump on that price divergence in order to make money by arbitraging that difference and to hedge their other market positions.

In both Case C and Case D, there can be inconsistencies between prices and physical dispatches. These inconsistencies can be to the advance or to the detriment of the market participant with the physical schedule. These inconsistencies are entirely a by-product of enforcing the physical constraint, Constraint [1], in the scheduling run, and passing the resulting physical intertie schedules on to the Pricing Run as fixed values. The ISO is mindful of these potential inconsistencies, but does not propose to develop a “make whole” payment for lost opportunity costs, nor do we propose a “claw back” for “windfall” profits. This is consistent with existent ISO policy, and also reflects appreciation for the fact that market prices will discipline circumstances that generate these outcomes.

Reliability Concerns and Residual Unit Commitment (RUC):

In the IFM, physical and virtual imports will clear against physical and virtual exports. Once those schedules are determined, the physicals alone are passed to the Residual Unit Commitment (RUC) run which evaluates the extent to which those physical schedules can meet forecasted load levels. The RUC run can commit System Resources with RA contracts as well as internal generation in order to meet the needs of forecasted load. This relieves the reliability concern that virtuals could displace physical bids in the Day Ahead market, and that the needed physical flows would not be available in the HASP or Real Time time-frames. The RUC run, which occurs directly after the IFM, will commit additional resources as necessary to meet load requirements.

It is important to point out once again that, just as is the case with virtual bidding within the CAISO control area, the prices on the interties that would result in the case that virtuals drastically displace physical bids would be highly disadvantageous to the market participants who placed those virtual bids. Virtual bids that provide additional or better information about physical conditions to the market, and that thereby serve to converge prices are the winning transactions.

Potential Tagging Requirement:

The ISO will undertake a stakeholder process to consider formal tagging requirements or some other mechanism to deter not tagging physical intertie schedules will be developed.[[2]](#footnote-2) Although it is expected that any party currently engaging in implicit virtual bidding on the interties would simply use virtual bids to achieve the objectives of those transactions once convergence bidding is implemented, incentives to implicitly virtually bid on the interties may still exist. Specifically, there is the possibility that participants could submit bids labeled as physical, receive a physical schedule, and then wait to make a decision about tagging that scheduled energy in order to preserve the option of liquidating the transaction in Real Time. This would have the impact of causing divergence between Day Ahead and HASP/Real Time prices which we would not expect to occur frequently, nor would we expect this to persist. Although prices will discipline this behavior, having physical bids upon which we cannot fully rely will negatively impact operational reliability. As mentioned previously in the Convergence Bidding stakeholder process, the ISO will be undertaking a separate initiative on tagging requirements, and the policy with respect to convergence bidding on the interties will certainly be a part of that discussion.

## Identified Issues with CB at the Ties

The issues described in this section have been identified by the ISO as issues that are directly related to convergence bidding on the interties or issues that could potentially be exasperated by convergence bidding at the interties and need further analysis. Work on some of these issues is already underway and the ISO will begin stakeholder processes to address some of the other concerns over the next year prior to implementing convergence bidding.

The issues that require further consideration are as follows:

1. The potential unintended consequences of adding a constraint on physical intertie schedules that is not reflected in prices

To ensure that IFM schedules comply with WECC scheduling rules regarding the scheduling limits on interties, as described above, the current proposal for convergence bidding at the interties involves the use of two constraints in the IFM for each intertie.

Constraint [1] – The Physical Constraint: Physical imports net of physical exports must be less than or equal to the scheduling limit at the relevant scheduling point in the applicable direction. This constraint is needed to ensure that IFM schedules comply with WECC scheduling rules and is enforced in the scheduling run only. As a result this constraint does not figure into the calculation of IFM prices.

Constraint [2] – The Physical + Virtual Constraint: Physical and virtual imports net of physical and virtual exports must be less than or equal to the scheduling limit at the relevant scheduling point in the applicable direction. This constraint is needed to allow the IFM to clear and establish schedules and prices based on both the virtual and the physical submitted bids at the inter-ties, just as it does throughout the rest of the ISO grid, so that physical and virtual IFM schedules are settled at the same prices. This constraint is therefore enforced in both the scheduling and the pricing run, and congestion on this constraint will figure directly into prices at the interties.

Constraint [2] is fully consistent with the other constraints enforced in the IFM under convergence bidding, in the sense that the constraint applies to physical and virtual bids without distinction. The enforcement of the additional scheduling run constraint for physical bids only and the omission of this constraint from the pricing run can create inconsistencies between IFM prices and schedules on the interties. In particular, physical bids that are not accepted due to constraint [1] may turn out to be economic with respect to the prices generated by constraint [2]. (Note that the ISO did consider the alternative of including both constraints in the pricing run as well as the scheduling run, but rejected this as inferior to the proposed approach because it would cause divergence of congestion prices for physical and virtual bids on congested interties.)

One potential result of such inconsistencies is that they may create incentives for parties to identify physical bids as virtual or vice versa when submitting their day-ahead bids. The two-constraint proposal rests on the ability of the market to distinguish accurately between physical and virtual bids. This means there should not be incentives for parties to engage in implicit virtual bidding (labeling IFM bids as physical when they intend to liquidate their positions in the real-time market), and conversely there should not be incentives for parties who actually intend to export or import power to flag their IFM bids as virtual. It may be possible to address this concern effectively through additional requirements to validate physical schedules, such as a day-ahead tagging requirement, such an enhancement will need to be considered separately from the convergence bidding design process. The ISO will begin a stakeholder process to explore a possible tagging requirement or some other mechanism to distinguish physical intertie schedules in late October 2009.

* The need to resolve current discrepancies between HASP and RTD prices

Since April 2009 the ISO has observed and has been investigating cases where HASP prices have been significantly lower than both IFM and real-time dispatch (RTD) prices. The ISO has identified certain causal factors including overscheduling in the IFM and operator biasing of the load forecast in HASP or in RTD in order to bring market schedules into better alignment with actual load.

One impact of the combination of lowered HASP relative to RTD prices along with significant quantities of net HASP import or export schedules has been the need to recover substantial amounts of money through the Real-Time Imbalance Energy Offset charge. At present the ISO is conducting a stakeholder process to discuss the drivers behind these costs and to consider creating a two-tier allocation of the offset charge. The ISO intends to conclude this stakeholder process in time to bring a proposal for approval to the October Board of Governors meeting if the process determines that a tariff change is needed.

Although the ISO has made a lot of progress in understanding these price inconsistencies, there is still more work to do to fully assess the root causes and determine the optimal solution. While these issues are not directly related to convergence bidding at the interties, the ISO remains concerned that adding more volume to the HASP market could further exacerbate the magnitude of the real-time offset charge.

* Potential crowding out of physical imports by virtual imports in IFM

A third concern is that virtual imports could crowd out a significant amount of physical imports in IFM – particularly non-RA imports – leaving the ISO short of normal import supplies and dependent on HASP to fill the gap. The eastern ISOs do not try to address this problem, but they are far less dependent on imported energy than the ISO is day-to-day. There are at least two reasons why RUC cannot effectively address this issue. First, as a capacity procurement mechanism RUC does not procure energy (beyond the minimum load energy of generators it commits). Thus when RUC procures imports it essentially procures an obligation for those imports to bid energy into HASP. But RUC does not reserve transmission capacity for those imports, and because it does not award them energy schedules the import suppliers may not reserve external transmission to deliver energy to the ISO to be able to respond to a HASP schedule. RUC was simply not designed to procure energy from imports if those imports do not clear the IFM. Second, currently the only import supplies that can participate in RUC are those that provide Resource Adequacy capacity. Although the argument just stated also applies to some extent to RA imports, an important distinction is that import suppliers of RA capacity are expected to manage their RUC participation obligations so as to ensure their ability to deliver in HASP if they are given a RUC schedule. The ISO has been exploring options for opening up RUC participation to include non-RA imports, but for the reasons mentioned above this change in itself may not be sufficient to guarantee the availability of non-RA imports in HASP if they do not have an IFM energy schedule.

## Position Limit for Convergence Bids on the Interties

Based on the concerns identified in the prior section, the ISO proposes that virtual bidding at the ties begin with a smaller limit (50%) of the position limits proposed for the internal nodes. Position limits will begin at 5% and be automatically increased on the same schedule as described in Section 2.1. These smaller limits will more slowly introduce virtual volume on the ties and give the ISO the opportunity to observe the market and determine how virtual volume on the ties may impact RUC, and potential uplift costs associated with increased volume in the HASP market.

Therefore the schedule for increasing position limits for the interties will be:

* Initial implementation through eight months after implementation – 5% limit
* Month nine through twelve – 25% limit
* Month 13 through 24 – 50% position limits
* 25 months to 36 months – 100 % position limits
* 36 months after implementation – no position limits

# Proposed Modifications to the Day Ahead Market Process

*This section is updated to reflect a new proposal for LMPM*

## Summary

The ISO Department of Market Monitoring (DMM) as well as some market participants provided examples of how nodal level convergence bidding can create the potential to undermine the Local Market Power Mitigation (LMPM) provisions applied in the ISO’s “pre-IFM” process. The ISO’s prior proposal described in the *Draft Final Proposal* dated September 14,proposed that the Competitive Constraint (CC) and All Constraint (AC) runs of the ISO’s LMPM process should be run using both physical and virtual bids. This approach relies on a deep and liquid virtual market to ensure an ample supply of virtual supply bids within a constrained area to ensure local market power mitigation is not undermined by high priced virtual demand or virtual supply bids within these constrained areas.

To address this concern the ISO now proposes and DMM also recommends that the LMPM process remain the same as it is today and mitigate physical supply only in both the CC run and the AC run based on forecasted demand. The existing process will provide an adequate level of protection against the ways that convergence bidding could undermine the LMPM and does not require the ISO to rely on the existence of a deep and liquid virtual market.

DMM’s recommendation and a description of the pros and cons of all the options considered to address the LMPM concern are described in DMM’s white paper *Local Power Mitigation Options for Convergence Bidding* posted at:

<http://www.caiso.com/1807/1807996f7020.html>

The ISO is under FERC order to use submitted bids (“bid-in demand”) rather than forecasted Demand in the MPM/RRD run (which analyzes and mitigates market power of generator bids and dispatches Reliability Must Run units within three years of MRTU start-up. The ISO will need to evaluate additional enhancements to the LMPM process in the future to meet this FERC requirement.

## Pre-IFM process for Market Power Mitigation

This section is deleted as it is no longer relevant based on the new proposal.

# Proposed Credit Policy for Convergence Bidding

*The entire section is provided for context but only subsection 5.2 was edited for clarity. There is no change to policy.*

The ISO’s Credit BPM states “CAISO intends to maintain the confidence of Market Participants in the CAISO Markets and to sustain CAISO’s mission of ensuring an adequate supply of power at a reasonable cost, by equitably, consistently and strictly enforcing these credit procedures. CAISO recognizes that Market Participants want credit-related practices that are appropriate and transparent.” The ISO aims to achieve these objectives in designing credit policies for convergence bidding, and specifically aims to:

* Ensure participants in the convergence bidding market are creditworthy, or post sufficient collateral to support their bids to avoid exposure other market participants to undue credit risk.
* Design credit requirements for convergence bidding that are no more onerous than necessary to meet the above objective. An excessively conservative credit policy would discourage the convergence bidding and the price convergence benefits this provides.

The ISO’s proposed credit requirements for convergence bidding fit in the same framework as for other transaction types and market participants. In brief, a market participant must maintain an Aggregate Credit Limit (consisting of an Unsecured Credit Limit, if any, and Posted Collateral, if any) in excess of their Estimated Aggregate Liability (EAL, outstanding and unpaid obligations to the ISO) at all times. The ISO monitors these amounts and requests additional collateral from the market participant as necessary. Liabilities or amounts due to a market participant are included in their EAL, and virtual bids will become a component of the EAL.**[[3]](#footnote-3)**

The ISO surveyed peer ISO/RTOs and published an initial proposed credit policy for convergence bidding, and based on stakeholder feedback, the ISO has revised and enhanced that proposal. Like ISO’s CRR valuation approach which uses a 95th percentile value regarding potential variation between auction prices and CRR payment obligations, the convergence bidding proposal will use a 95th percentile value in setting reference prices as the differentials between day-ahead and real-time market prices.

By using the most current information available about a market participant’s convergence bidding exposure, the ISO will appropriately balance the above concerns. The ISO proposes to use dynamic information about the value of virtual bids, rather than a static per MWh bid limit. CAISO thus aims to provide for a credit process for convergence bidding that:

* is a dynamic process. Rather than use fixed MW limits, the ISO will compare the value of virtual bids against the market participant’s Available Credit Limit in dollars;
* seeks to assess the actual risk at every point, including using granular reference prices that are adjusted seasonally and which are specific to each Pricing Node, and revalues the virtual bids when actual price data is available;
* mirrors and in some ways improves upon convergence bidding credit practices in other ISOs.

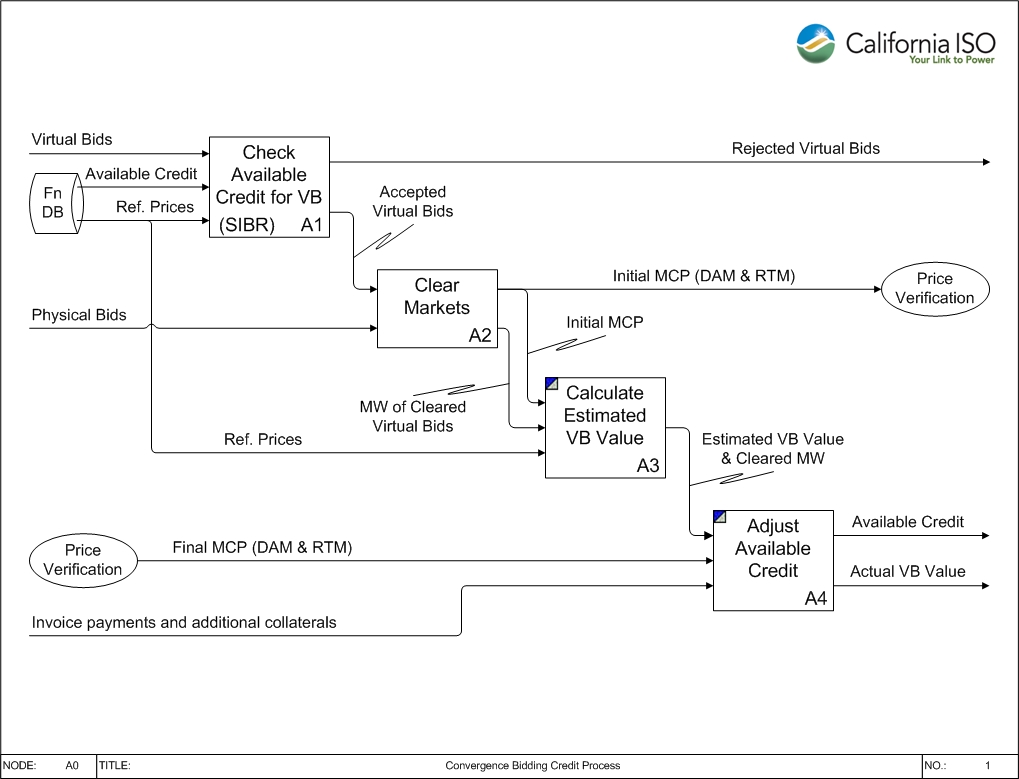
This section describes the proposal for the design of the credit policy for convergence bidding.

## Overview of the Convergence Bidding Credit Process

The convergence bidding credit checking and valuation process consists of several steps involving multiple departments within the ISO. The process is illustrated, at a high level, in Figure 1. Each step is discussed in detail later in section 1.2 through 1.4.

## Figure 1. Convergence Bidding Credit Process

All virtual bids submitted by each market participant will be compared to the Available Credit Limit (Aggregate Credit Limit less Estimated Aggregate Liability) of this market participant (Step A1 in Figure 1). The virtual bids passed the credit checking will be fed into the market clearing process. At the same time, the value of the virtual bids, based on historical reference prices, will be added the EAL of the participant. The virtual bids failing the credit check will be rejected based on timestamp as described in more detail in section 1.2 below.



After the close of day-ahead market, but before the close of real-time market, the virtual bid component of EAL will be adjusted based on the cleared MW of the virtual bids.

After the close of real-time market, the ISO will calculate the estimated value of the cleared virtual bids using initial Market Clearing Prices (MCPs). The EAL of the market participant will be adjusted accordingly (Step A3 in Figure 1). The initial MCPs are subject to validation and correction before becoming final.

If the MCPs are corrected in the validation process, the ISO will adjust the virtual bid component of EAL of all market participants for the last time. (Step A4 in Figure 1).

## Credit Checking for Virtual Bids

When a market participant submits virtual bids in the day-ahead market, the value of the virtual bids will be compared to the market participant’s Available Credit Limit. The value of the virtual bids is the sum of the product of a reference price and the MWs of each Virtual Bid. The criterion of credit checking is defined as the following:



where,

Reference Price ($/MWh) is an estimate of the value of a virtual bid in one MW volume. For virtual supply, the Reference Price is the 95th percentile value of the price difference between the real-time and day-ahead markets.[[4]](#footnote-4) For virtual demand, the Reference Price is the 95th percentile value of price difference between the day-ahead and real-time energy markets. The CAISO will calculate the two reference prices for each of the CAISO Pricing Nodes. The reference prices are calculated for every three-month period (Jan-Mar, Apr-Jun, Jul-Sep, and Oct-Dec) of each year using the hourly actual LMPs of the same period of the previous year.

The absolute value of the MWs of all virtual bids (virtual supply and virtual demand) will be counted for credit checking. The only exception is when a market participant submits both virtual supply and virtual demand at the same location for the same trading hour. Then the greater of the dollar value of the virtual supply (the absolute value of the bid-in virtual supply MW times the reference price of virtual supply at the location) and the dollar value of the virtual demand will be used for credit checking.

*Available Credit Limit* is updated daily or more frequently.

The virtual bids passed the credit checking will be fed into the market clearing process. The value of the virtual bids will be added the EAL of the participant as credit reservation for the virtual bids.

If virtual bids fail the credit check as noted above, the bids will be rejected based on timestamp on a last in, first out basis. If a market participant submits a batch collection of virtual bids at the same time to SIBR (Scheduling Infrastructure Business Rules) through the web services or graphical user interface all bids received in that batch will be rejected if the Available Credit Limit is exceeded. Since this collection of bids will contain the same timestamp, the SIBR software will validate this group of bids simultaneously and will not be able to apply the last in first out methodology. The ISO would have no basis for selecting which bids should be accepted or rejected. However, if virtual bids are submitted in multiple batches, the virtual bids in the batches submitted before the batch that fails the credit check may be accepted. All virtual bids submitted in and after the failed batch will be rejected. The market participant may submit revised virtual bids after failing the credit check, subject to the ISO’s bidding timelines.

## Calculation of Estimated Value of Virtual Bids

After the day-ahead market is closed, but before the real-time market is closed, the ISO will adjust the credit reservation for the virtual bids in the EAL based on the cleared MW of the virtual bids. That is,



After the clearing of the real-time markets, the ISO will calculate the estimated values of all cleared virtual bids using the initial MCPs. The estimated value of the cleared virtual bids of a market participant is calculated as:



where,



that is the difference between the MCPs of the day-ahead and real-time markets. The MCP is the LMP of the Pricing Node that matches with the geographic specification of the virtual bid.

The Cleared VBMW has a negative sign for virtual demand bids and positive sign for virtual supply bids.

The EAL of the market participant will be adjusted based on the estimated value of cleared virtual bids. The adjusted Available Credit Limit is then ready for next day’s credit checking of virtual bids (Step A3 in Figure 1).

## Adjustment of Value of Virtual Bids

After the close of Real-Time markets, the CAISO will verify the initial MCPs and make corrections if necessary. If the MCPs are corrected, the values of the cleared virtual bids will then be re-calculated using the final MCPs (Step A4 in Figure 1). The EAL of each market participant will be adjusted accordingly.

## General Credit Policy Issues

1. **Maximum amount of credit that may be used**

Currently, entities participating in the ISO markets must maintain an Aggregate Credit Limit in excess of the EAL at all times. The ISO will request more collateral when the EAL exceeds 90% of the Aggregate Credit Limit. The ISO Tariff allows 100% usage before rejection of bids. The ISO proposes to apply the same rule to convergence bidding, that is 100% Available Credit Limit can be used for submitting virtual bids.

1. **Treatment of defaults from Virtual Bidding**

A payment default from Virtual Bidding will be treated as other market defaults by a Scheduling Coordinator. When it occurs, the net creditors in the month of the default may be short-paid. As the counterparties for the convergence bids are buyers and sellers in the real-time energy market, payments related to convergence bids will settle at the same time as for payments related to the real-time energy market. Accordingly, providing for a different allocation of losses in the event of a default is not considered feasible or warranted.

# Proposed Cost Allocation for Convergence Bids

*The table in 6.1 and Section 6.2 was updated to reflect the addition of a transaction fee. Minor corrections were made to the cost allocations equations but there was no change to policy on the proposal to allocate IFM Tier 1 and RUC Tier 1 Uplift to convergence bids. Corrections to equations are highlighted in yellow.*

## Grid Management Charge to Convergence Bidders

The costs recovered through the Grid Management Charge are allocated to eight service charges. The service charges are described in detail in Appendix F, Schedule 1, Parts A and F of the ISO tariff. Since convergence bidding is solely a financial transaction not all service charges apply to convergence bidding under the cost causation principle. The following service charges will be applied to convergence bidding: Forward Scheduling Charge, Market Usage (Day Ahead) Charge, and Settlements, Metering and Client Relations Charge.

The Settlements, Metering and Client Relations (SMCR) Charge will be fixed at $1000.00 per month, per Scheduling Coordinator ID Code (SCID) with an invoice value other than $0.00 in the current Trading month. New market participants entering solely for convergence bidding will be charge the SMCR if the market participant decides to become a scheduling coordinator. For existing market participants who will use their existing SCID for convergence bidding there will be no additional cost.

During the stakeholder process, it was determined that the current billing determinants for the Forward Scheduling Charge and Market Usage (Day Ahead) Charge were poorly aligned with the goals of convergence bidding. The Forward Scheduling Charge is based upon a billing determinant of $ per schedule. The Market Usage (Day Ahead) Charge is based upon a billing determinant of $ per cleared net MWh. As a result, the recommendation was made to create a new service charge exclusively for convergence bidding. The revenue generated from the Convergence Bidding Charge will be applied to the existing Forward Scheduling Charge and Market Usage (Day Ahead) Charge.

The new Convergence Bidding Charge will have a billing determinant of $ per cleared gross MWh. The rate is estimated to be between $0.065 and $0.085 per cleared gross MWh. The rate is consistent with the rate other ISOs charge for convergence bidding. The exact rate will be established in the 2011 GMC Extension stakeholder process beginning January 2010.

If Convergence Bidding is implemented in late 2010, the billing rate will be established during a separate stakeholder process to be held starting in February 2010.  The rate is estimated to be between $0.065 and $0.085 per cleared gross MWh.

The table below shows how the proposed CAISO costs to virtual bids compare with other ISOs.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Min**  **Max** | **Admin Fees** | **Transaction Fees** | **BCR Uplift Fees** | **Bid Limitations** |
| **PJM** | .01 | Yes  $.045 per cleared bid | $.06 per bid segment | Yes to virtual demand and virtual supply | 1. Ability to impose SC Daily Limit 3000 bid/offer segments 2. Credit limits 3. Apply location based MW limits as necessary to achieve AC solution |
| **NYISO** | 1 MW for first bid segment .01 for subsequent segments | Yes | $.10 per submitted virtual bid regardless of segments  $.05 for cleared bids (credited 50%)  Sliding scale based on SCUC performance (min .03 – max $1.00) | Yes to virtual supply only | 1. Total Volume 2X Generation Capacity (plus/minus) at Location 2. Soft Bid Volume Cap 3. Credit Limits |
| **MISO** | 0.1MW | Yes  .85 per cleared bid | No transaction fees | Yes to virtual demand and virtual supply | 1. Daily Virtual MW Limit can be imposed 2. 2. Credit Limits |
| **ISO-NE** | 1 MW | Yes  $.06 per cleared bid | $.005 per bid segment | Yes to virtual demand and virtual supply | 1. Bid limits unknown 2. Credit Limits |
| **CAISO** | 1 MW | Yes  .065 to .085 per cleared gross MWh | $.005 per bid segment | Yes to virtual demand and virtual supply | 1. Credit Limits 2. Bid volume limits 3. Ability to apply location based MW limits when necessary to achieve AC solution |

## Transaction Fees for Submitted Bids

A transactions fee of $.005 per bid segment will be charged to submitted convergence bids. The total revenues from the bid segment transaction fee will offset the convergence bidding GMC costs that are estimated to be between $.065 and $.085 per gross cleared MWh.

Other provisions of the design should also deter excessive bid volumes.

Those provisions are:

* Limit of one virtual demand bid and one virtual supply bid per location
* 1 MW minimum
* Credit check against submitted virtual bids

## Allocation of IFM and RUC Tier 1 Costs

In developing a full conceptual proposal for assessing costs on virtual transactions, the ISO has followed the principle that virtual bids should be charged costs for which they have caused, similarly to physical bids. This means that virtual (and physical) demand bids should be subject to uplift costs related to the increased unit commitment within the Integrated Forward Market (IFM) of the Day Ahead process, and that virtual supply bids and underscheduled load should be subject to uplift charges related to the increased unit commitment within the Residual Unit Commitment (RUC) of the Day Ahead process.

In the July 2 Straw Proposal the ISO proposed the following:

For the allocation of IFM Tier 1 BCR Uplift to virtual demand -

* If virtual demand plus physical demand is greater than the ISO Forecast then SCs with a virtual demand obligation will pay a portion of the IFM Tier 1 Uplift Costs. In this case virtual demand resulted in IFM clearing above the ISO Forecast resulting in additional commitment costs in the IFM. The costs allocated to virtual bidders would be based on the quantity the virtual demand resulted in the ISO clearing above its forecast. Costs will be allocated to SCs based on gross virtual demand that cleared the IFM.

For the allocation of RUC Tier 1 BCR Uplift to virtual supply -

* If the quantity of total virtual supply cleared in the IFM is greater than the total virtual demand that cleared the IFM than the difference between these quantities will equal the amount in MW that the ISO must procure in the RUC process as a result of virtual supply clearing the IFM instead of physical supply. In this case SCs with Virtual Supply will be allotted a portion of RUC Tier 1 Uplift costs based on their net virtual supply that cleared the IFM

Some stakeholder commented that the ISO should include the net effect of virtual supply when determining whether virtuals put the ISO over its forecast, i.e. physical demand plus virtual demand minus virtual supply > than the ISO forecast and that allocations to individual SCs for IFM and RUC Uplift should be based on their net portfolios.

Other stakeholders commented that they were opposed to the threshold tests to determine whether costs for IFM and RUC Tier 1 Uplift should apply to virtual bidders and that the ISO proposal did not reflect cost causation. Some stakeholders also commented that allowing netting of virtual bids system wide did not reflect cost causation.

The ISO discussed revision to the cost allocation proposal contained in the July 2 Straw Proposal with stakeholders on the August 13 stakeholder conference call where the ISO proposed the following revisions:

For the allocation of IFM Tier 1 BCR Uplift to virtual demand -

* If virtual demand plus physical demand minus virtual supply is greater than the ISO forecast of demand then SCs with a virtual demand obligation will pay a portion of the IFM Tier 1 Uplift Costs. The virtual demand obligation is equal to the sum of each SCs net virtual demand. Costs would be allocated to SCs with a positive net virtual demand position.

For the allocation of RUC Tier 1 BCR Uplift to virtual supply -

If virtual demand plus physical demand minus virtual supply is less than the ISO forecast of demand then SCs with a virtual supply obligation will pay RUC Tier 1 Uplift. The virtual supply obligation is equal to the sum of each SCs net virtual supply. Cost would be allocated to SCs with a positive net virtual supply position.

Several stakeholders submitted comments to the proposal discussed on the August 13 call.

Some stakeholders commented that a nodal virtual demand bid in one location is not offset by a virtual supply bid in another location and that the cost allocation for virtual bids should be more granular, possibly at the DLAP level. Some stakeholders also commented that the threshold tests to determine whether or not virtual bids should pay IFM and RUC Tier 1 Uplift costs are arbitrary and should be eliminated. Other stakeholder commented that while the ISO has recognized the fact that virtual demand can offset virtual supply, the algorithms for both the IFM allocation (to net virtual demand) and the RUC cost allocation (to net virtual supply) has a methodological weakness in that they reflect cost being caused by virtual bids when there may not be any net impact from the sum total of all virtual transactions market-wide. The CAISO proposal does not count the benefit of reduced DA commitment cost driven by virtual supply, or the benefit of reduced RUC commitment cost driven by virtual demand. As a result, virtual transactions as a whole pay more than the share they are causing.

## Revised Cost Allocation Proposal

The ISO has taken into account stakeholder comments and has made an effort to create a proposal based on cost causation that is fair and reasonable. Short of a separate market run and a subsequent settlement to determine market outcomes both with virtual bids and without virtual bids the ISO can not determine exactly what additional BCR uplift costs virtual bids may create. Even this approach is arguable in that just pulling virtual bids out of the market run and re-running the market may not reflect bidding behavior and market outcomes that would have occurred in the complete absence of virtual bids.

The ISO proposes the following changes to the cost allocation proposal presented to stakeholders on August 13, 2009

### Virtual Demand Obligation to Pay IFM Tier 1 Uplift

The ISO proposes the following revised methodology to determine the virtual demand obligation to pay IFM Tier 1 Uplift. SCs with a net virtual demand position in their portfolio will be charged for IFM Tier 1 uplift if virtual demand system wide is positive. The obligation will be based on how much additional unit commitment was driven by net virtual demand that resulted in IFM clearing above what was needed to satisfy measured demand (load plus exports). If physical demand plus virtual demand minus virtual supply is equal to or less than measured demand (load + exports) SCs will not be charged for IFM Tier 1 Uplift. If physical demand plus virtual demand minus virtual supply is greater than measured demand the obligation for SCs with net virtual demand will increase proportionately based on the quantity net virtual demand put the IFM above measured demand. The maximum obligation would equal the system wide net of virtual demand minus virtual supply when net virtual demand system wide is positive. The minimum obligation is equal to 0.

For a given hour let:

IFM Demandi = Individual SC cleared Day-Ahead Load + Exports

SS Supplyi = Individual SC cleared Day-Ahead Self-Scheduled Generation + Self Scheduled imports

VDsw = System wide cleared virtual demand

VSsw = System wide cleared virtual supply

PDsw = System Wide Physical Demand

CAISO Forecast of Demand = LF

Actual Demand = AD

The obligation for virtual demand to pay IFM Tier 1 Uplift will be based on the following equation:

*The right parenthesis was corrected in the following two equations.*

MAX(0,VDsw - VSsw + Min(0, PDsw - AD))

Virtual Demand

Obligation

=

The Tier 1 rate for IFM Uplift would be calculated as follows:

IFM BCR Tier 1 Rate

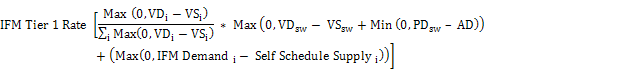
=

$ IFM Uplift

∑i (Max (0, IFM Demandi – SS Supplyi)) + MAX(0,VDsw - VSsw + Min(0, PDsw - AD))

Each SCs obligation to pay IFM Tier 1 Uplift will be calculated as:

This formula for the virtual demand obligation was corrected to include the Min(0, PDsw – AD)) which was left out of the equation in error. Reversed terms in equation also corrected.



An example of how the IFM Tier 1 obligation is calculated for virtual demand is included as Example 1 in *Appendix A* – Cost Allocation examples posted to the ISO Website at: [http://www.caiso.com/1807/1807996f7020.html](http://www.caiso.com/1807/1807996f7020.html%20)

**Physical Load Obligation to pay IFM Tier 1 Uplift**

The obligation for physical load to pay IFM Tier 1 Uplift will be determined by the quantity of IFM Scheduled Demand (Load plus Exports) in excess of their IFM Self-Scheduled Generation and IFM Imports, adjusted by any applicable Inter-SC Trades of IFM Load Uplift. The obligation for each SC is then multiplied by the IFM Uplift Rate.

* Physical load and virtual demand will pay the same IFM Uplift Rate.
* There are no changes to allocations of IFM Tier 1 BCR to physical load resulting from this proposal

### Virtual Supply Obligation to Pay RUC Tier 1 Uplift

The ISO proposes the following revised allocation of costs for RUC Tier 1 Uplift for underscheduled load and virtual supply.

To the extent that the CAISO forecast of demand is less than or equal to measured demand costs will be allocated to net virtual supply and underscheduled load.

To the extent that the CAISO forecast is greater than measured demand costs will be allocated to measured demand by ratio share.

Some stakeholders commented that virtual supply should not pay for RUC procured beyond what was needed for actual load since they are they are not the cause of these additional costs nor are they the benefactor of these costs. The ISO agrees with stakeholder on this point but also agrees that underscheduled load is neither the cause nor the benefactor of RUC procured beyond what is needed to cover measured demand when the ISO forecast is higher than measured demand. The ISO proposes that these costs be allocated to RUC Tier 2 and be paid for by measured demand since they are the benefactors of these additional costs due to reliability.

The obligation for virtual supply will be determined by the net of the total cleared virtual demand and the total cleared virtual supply when the result is a positive net virtual supply.

In addition, the ISO is proposing to allocate a portion of BCR uplift currently recovered through the Real-Time Uplift BCR charge code 6678 to virtual supply and under scheduled load through the RUC BCR Uplift charge.

Since virtual supply displaces physical generation in RUC and short-start units with RUC schedules are not started up until Real-Time, virtual supply as well as under scheduled load could contribute to the need to start-up these units in Real-Time therefore contributing to the BCR uplift. Since these short-start units are started up in real-time as a result of a decision made in the RUC process the ISO believe it makes more sense for the uplift for these units to be recovered through the RUC BCR charge than the Real-Time BCR charge.

For a given hour let:

ULi= Individual SC net negative demand deviation

VDsw = System wide cleared virtual demand

VSsw = System wide cleared virtual supply

CAISO Forecast of Demand = LF

Actual Demand = AD

**The obligation for virtual supply to pay RUC Tier 1 Uplift is calculated as:**

Virtual Supply Obligation

=

MAX(0, VSsw - VDsw )

**The rate for Tier 1 RUC Uplift will be calculated as follows:**

*Corrected formula to reflect defined term ULi and added “Tier 1” to numerator for clarification.*

RUC Tier 1 Uplift Rate

∑i  ((Max (0, ULi)) + MAX(0, VSsw - VDsw )

=

$ RUC Uplift Tier 1

**The dollars to be allocated through RUC tier 1 will be calculated as follows:**

$ of RUC Tier 2 Uplift

$Total RUC Uplift

=

\*

Max (0, LF – AD)

Total RUC Capacity

*Clarified formula*

$RUC Tier 2 Uplift

-

$Total RUC Uplift

=

$ of RUC Tier 1 Uplift

Each SCs obligation to pay RUC Tier 1 Uplift will be calculated as:

*Corrected formulas to reflect Max (0… for both the virtual supply obligation and physical load obligation*

\*

Max (0,ULi )

+

Max (0,VSsw – VDsw)

=

RUC Tier 1 Charge i

Max (0,VSi – VDi)

RUC Tier 1 Rate

∑ max (0, VSi – VDi)

i

\*

**Physical Load Obligation to pay RUC Tier 1 Uplift**

* Physical load’s obligation to pay RUC Tier 1 Uplift will be determined by each SCs Net Negative Demand deviation. The obligation for each SC will then be multiplied by the RUC Tier 1 Rate.
* Both virtual supply and physical load will pay the same RUC Uplift Tier 1 Rate.
* Additional uplift costs related to start-up of short start units started in the real-time market as a result of a RUC schedule would now be included in the dollars to be recovered through RUC BCR Uplift and allocated to under scheduled load.

An example of how the RUC Tier 1 obligation is calculated for virtual supply is included in Example 2 in *Appendix A* – Cost Allocation examples posted to the ISO Website at: [http://www.caiso.com/1807/1807996f7020.html](http://www.caiso.com/1807/1807996f7020.html%20)

# Next Steps

The market design elements that have policy changes described in this addendum will be discussed at a stakeholder meeting schedule on October 9, 2009. Final stakeholder comments The ISO is requesting final written comments from stakeholders by Wednesday, October 14, 2009 to [mmiller@caiso.com](mailto:mmiller@caiso.com). Conference calls for the Convergence Bidding implementation working group are planned up to December 2009. The ISO plans to seek board approval on convergence bidding in October 2009 and to implement convergence bidding in February 2011.

1. *Convergence Bidding – Department of Market Monitoring Recommendations* is posted at: http://www.caiso.com/1c8f/1c8ff5f46c90.pdf [↑](#footnote-ref-1)
2. Note that the CAISO addresses e-tagging in the Operating Procedures Manual posted at the following link: <http://www.caiso.com/docs/2002/04/26/200204261503156164.pdf>. [↑](#footnote-ref-2)
3. The other components of the Estimated Aggregate Liability are listed in the Credit BPM, http://www.caiso.com/1c57/1c57bf8541890.doc [↑](#footnote-ref-3)
4. ISO-NE, NYISO, PJM use 97th percentile values, while MISO uses 50th percentile value. [↑](#footnote-ref-4)