Redesign of the Real-Time Imbalance Energy Offset

Revised Straw Proposal and Options for an Intermediate Term Solution

May 18, 2011

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1 Introduction

The Real-Time Imbalance Energy Offset as defined in the ISO tariff is a neutrality account through which the ISO allocates surpluses or deficits through payments or charges, respectively, on a pro rata basis to metered load and exports. Since January 2010, the offset has resulted in an average charge to metered load and exports of $11.7 million per month. During this time, the hour ahead scheduling process (HASP) price has been consistently lower than the real-time dispatch (RTD) price, which contributes to the offset. With the implementation of convergence bidding in February 2011, market participants are able to take offsetting positions, by submitting internal virtual demand bids that are equal to the physical/virtual import positions, based on the price differential between HASP and RTD that has further impacted the offset.

The ISO has been working on operational improvements to address the HASP and RTD price differential. These efforts have resulted in a significant reduction in real-time imbalance energy offset costs. As a result, the ISO believes it is prudent to take additional time to develop a more comprehensive intermediate term solution instead of moving forward with the proposed short-term settlement rule. However, the volume of balanced positions remains high and can have a significant impact on the Real-Time Imbalance Energy Offset. Therefore, the ISO is establishing a threshold to trigger an emergency filing to implement the short-term settlement rule while the intermediate solution is developed and implemented in the event that the offset costs rise to an unacceptable level. In the straw proposal, the ISO proposed a settlement rule that would reverse any gains attributable to the differential between the HASP and RTD price in instances where a scheduling coordinator (SC) submits balanced and offsetting internal virtual demand and physical/virtual import positions. The intermediate term solution now being contemplated will address the different timing for establishing the binding prices for imports/exports and internal demand/generation in the real-time market and evaluate additional changes to the allocation methodology.

The longer term solution to address the real time imbalance energy offset, which includes the redesign of the real-time market (HASP and RTD), will continue to being addressed in the Renewable Integration: Market and Product Review Phase 2 stakeholder initiative.

2 Plan for Stakeholder Engagement

Item	Date
Post Issue Revised Straw Proposal	May 18, 2011
Stakeholder Conference Call	May 25, 2011
Stakeholder Comments Due	June 1, 2011
Post Issue Revised Straw Proposal	June 14, 2011
Stakeholder Meeting	June 17, 2011
Stakeholder Comments Due	June 24, 2011
Post Draft Final Proposal	July 1, 2011
Stakeholder Conference Call	July 14, 2011
Stakeholder Comments Due	July 21, 2011
Board Meeting	August 24-25, 2011

3 Background

The Real-Time Imbalance Energy Offset (CC 6477) is a neutrality account through which the ISO tracks the settlement dollar values for the following charge codes: Real-Time Instructed Imbalance Energy (CC 6470), Real-Time Uninstructed Imbalance Energy (CC 6475), Real-Time Unaccounted for Energy (CC 6474), and the HASP Energy, Congestion and Loss Pre-Dispatch (CC 6051), less the Real-Time Congestion Offset (CC 6774). The offset is allocated to all SCs based upon a pro rata share of their measured demand (i.e., metered load and exports) excluding the demand quantity for the valid and balanced portion of self-schedules related to transmission ownership rights in real-time and net measured demand of load following metered subsystems.[1] This may result in a payment or charge to SCs depending on the whether there is a surplus or deficit.

In 2009, the ISO conducted a stakeholder process to determine whether modifications to the current design of the allocation of the Real-Time Imbalance Energy Offset were appropriate and necessary. At that time, no clear alternative could be identified because causal attribution to specific market activity was not clear. At the conclusion of the stakeholder process, the ISO did not change fundamentally the allocation to measured demand, but clarified that for SCs for MSS Operators that have elected Load following, the ISO will not assess any charges or make payments for the resulting non-zero differences recovered through the offset. The ISO, however, committed to, and has since continued to work on, operational enhancements that would assist in the convergence of the HASP and RTD prices. The ISO also committed to revisit its prior conclusion if the dollar volume in the Real-Time Energy Offset Account increased substantially.[2]

As Figure 1 illustrates, from January 2010 through April 2011 the average monthly Real-Time Imbalance Energy Offset has been $11.7M. The offset peaked in June/July 2010 at over $20M and returned to levels consistent with the first half of 2010 in September 2010. Since September 2010 the offset has trended higher.

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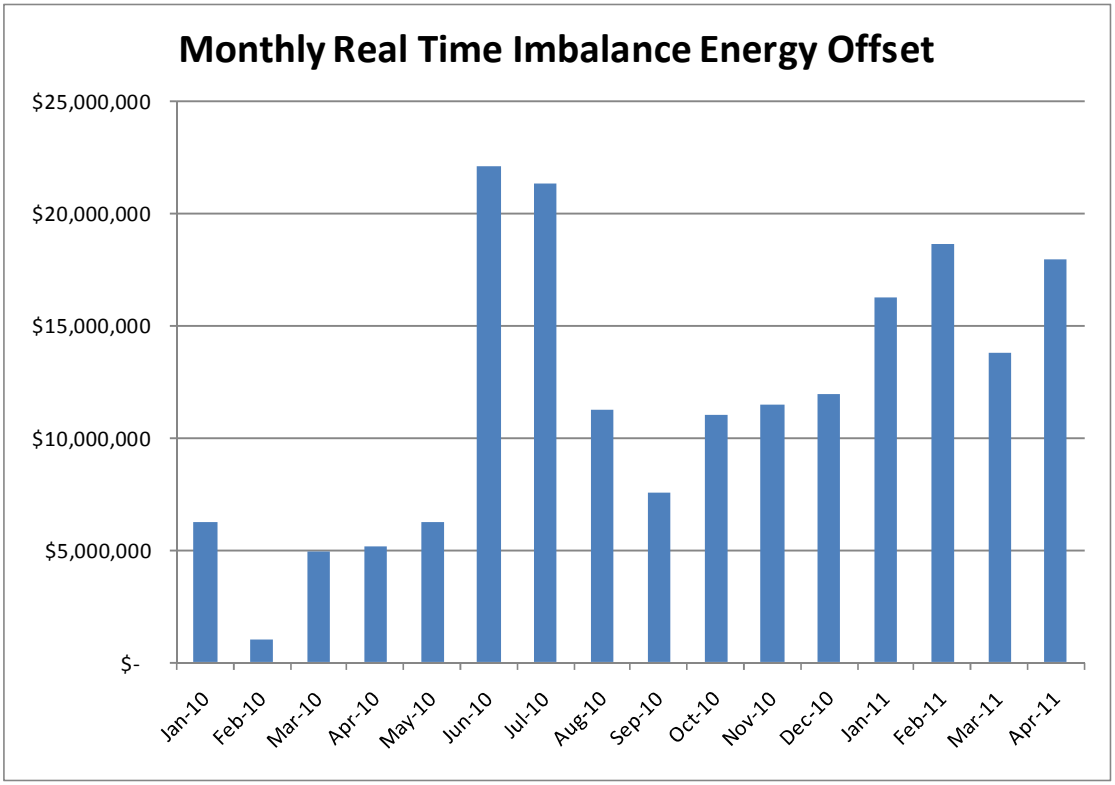
1 Additional documentation can be found in the Settlements & Billing BPM Configuration Guide available at https://bpm.caiso.com/bpm/bpm/version/000000000000085

2 Additional information on the prior stakeholder process is available at http://www.caiso.com/2406/2406e2a640420.html

Figure 1 – Monthly Real Time Imbalance Energy offset January 2010 through March 2011



Since July 2010, the ISO has implemented several market rules changes that impact the offset. First, as required by the ISO tariff, in April 2010, the energy bid cap was raised from $500/MWh to $750/MWh and in April of 2011, it was raised to $1000/MWh. Because certain pricing parameters are tied to the energy bid cap, this has increased the level prices can reach in the real-time market when there are short-term imbalances in which the pricing parameters set the market clearing prices. The higher RTD prices impact the Real-Time Imbalance Energy Offset when the ISO is constrained to procure additional energy in RTD at the higher prices. The offset is the mechanism for settling the additional imbalances for energy that are not already allocated to instructed and uninstructed deviations from resources day-ahead schedules. Depending on the condition, the Real-Time Imbalance Energy Offset can increase or decrease. However, because the bid floor remained unchanged at negative $30.00 combined with the lower frequency of negative prices, the relative impact of potential reductions in the offset when negative prices caused by over-generation situations occur (*e.g.,* when the HASP price is greater than RTD) is not symmetric and does not balance the effect of the real-time offset when RTD prices are higher than the HASP price.

Another important market rule change was the ISO's implementation of convergence bidding in February 2011, which allows market participants to take virtual supply and virtual demand positions in the day-ahead market at interties, load aggregation points, trading hubs and individual pricing nodes. With the introduction of convergence bidding, market participants are able to hedge price differences between the day-ahead and real-time market. Virtual positions at the intertie are liquidated and settled at the relevant HASP LMP in the same way as any changes in physical intertie schedules in HASP are settled based on the relevant HASP LMP. Virtual positions on eligible pricing locations internal to the ISO are liquidated and settled at the real-time relevant LMP. Therefore any differences in the HASP and RTD price affecting the

offsetting volume of virtual position on interties and internal locations will affect the real-time energy offset.

Since the start of the ISO LMP-based market in 2009, prices set in the HASP have historically been lower than those observed in RTD.[3] While there are several potential reasons for this, the difference is often driven by modeled and forecasted imbalance condition differences as well as having small quantities of short-term ramping capability available to accommodate such changes in imbalance conditions.

The persistent average price differential between HASP and RTD described above has encouraged the use of internal virtual demand bids, which has corresponded with an increase in the Real-Time Imbalance Energy Offset. Prior to implementation of convergence bidding, market participants could not bid to arbitrage price differentials between HASP and RTD caused by market participants that were not allocated the Real-Time Imbalance Energy Offset because only load serving entities (LSE) could bid internal demand, and virtual demand bids were non-existent. With the commencement of convergence bidding, market participants that do not serve load now can combine an internal virtual demand bid and an intertie physical/virtual supply bid at the same price and quantity, which in essence allows the market participant to arbitrage the lower HASP price relative to the RTD price. In the IFM, excluding congestion and losses, the market participant is therefore able to supply (sell) and clear virtual demand (buy) at the same price. In real-time, excluding congestion and losses, the market participant is then able to liquidate (sell) virtual demand at the RTD price, while the intertie supply is liquidated (bought) at the HASP price. This apparent arbitrage activity results in the ISO net payment for energy MWh quantity bought by the ISO in RTD multiplied by the difference between the HASP price and the RTD price. The price at which the intertie supply is liquidated in HASP does not impact the successful arbitrage of the price differential. The successful implementation of the apparent arbitrage activity is only dependent on a RTD price higher than the HASP price, which has been common. See the table below for a numeric example.

Table 1 – Numeric Example of Bidding Strategy to Arbitrage HASP Price > RTD Price

	Day Ahead Market			HASP			Real Time Market		
	MW	Price	Revenue	MW	Price	Revenue	MW	Price	Revenue
Intertie Virtual Supply	100	$ 35.00	$ 3,500	100	$ (40.00)	$ (4,000)	N/A	N/A	N/A
Internal Virtual Demand	100	$ (35.00)	$ (3,500)	N/A	N/A	N/A	100	$ 45.00	$ 4,500
Total by Market			$ -			$ (4,000)			$ 4,500
Total for Bidding Strategy			$ 500						

However, this bidding pattern does not contribute to any physical commitment nor do they contribute to the convergence of conditions and prices between the day-ahead and real-time market. Rather these balanced and offsetting virtual positions contribute to economic inefficiencies depending on the HASP and RTD price differentials. The ISO continues to take measures to reduce the amount of price difference between HASP and RTD prices by addressing the conditions that results differences. While these efforts are expected to improve,

[3] Additional information and analysis can be found in Department of Market Monitoring (DMM) quarterly and annual reports, Market Performance and Planning Forum reports, and various presentations to stakeholders.

it is unreasonable to expect that HASP and RTD differences will be eliminated and therefore additional measures to address the economic incentives for the apparent arbitrage of HASP and RTD price differentials must be addressed.

The cost impact of this bidding pattern to the Real-Time Energy Offset peaked in early April 2011 and has been steadily declining since. Figure 2 shows the relative impact of the balanced supply/demand position by individual SCs and the impact of offsetting virtual supply/demand position remaining in the market. The columns in the graph represent the 30 day cumulative dollar impact for each bucket. The impact of the balanced supply/demand position by individual SCs increased steadily until mid April and has then fallen significantly to approximately zero impact. The impact of offsetting virtual supply/demand positions remaining in the market has also followed a similar trend. Given the recent reduction in the impact, due to other ISO activities to address the systemic price divergence between HASP and RTD, the ISO believes it is prudent to take additional time and focus on an intermediate term solution to the problem of HASP-RTD price divergence.

Figure 2 – Impact of Bidding Strategy on Real-Time Energy Offset since March 2011

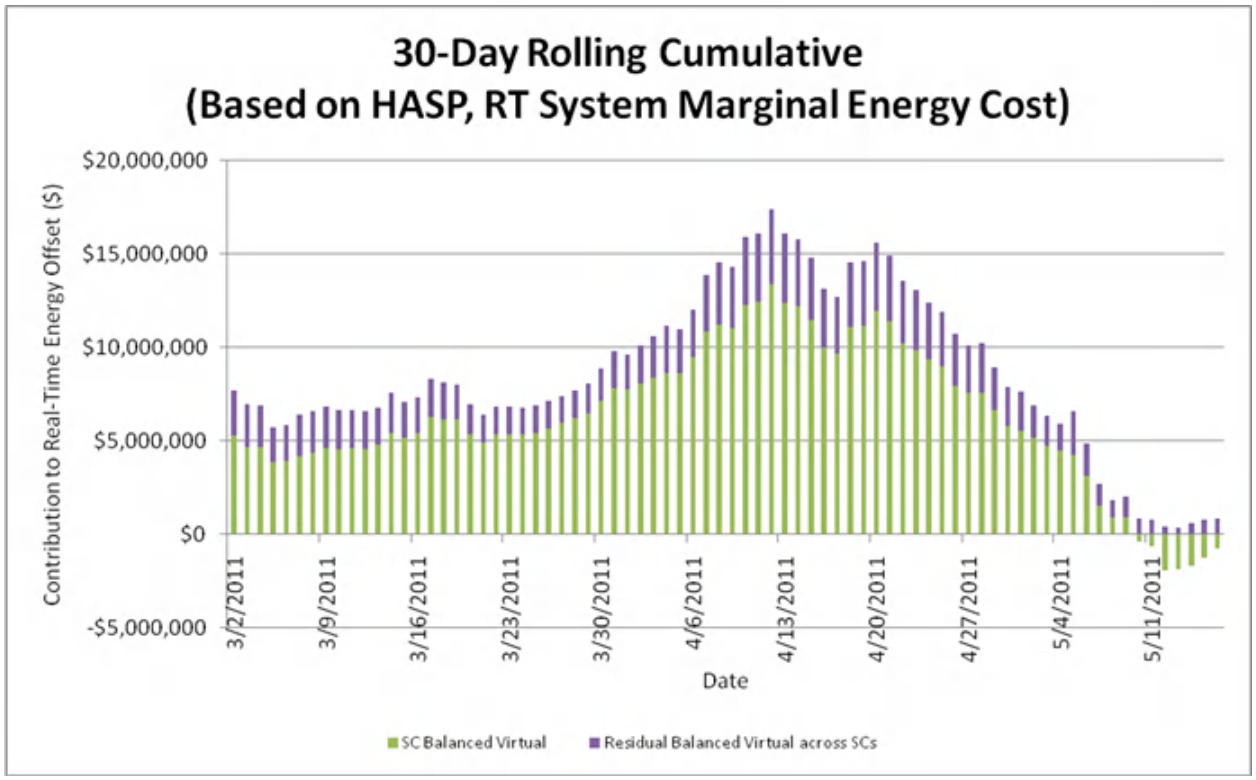
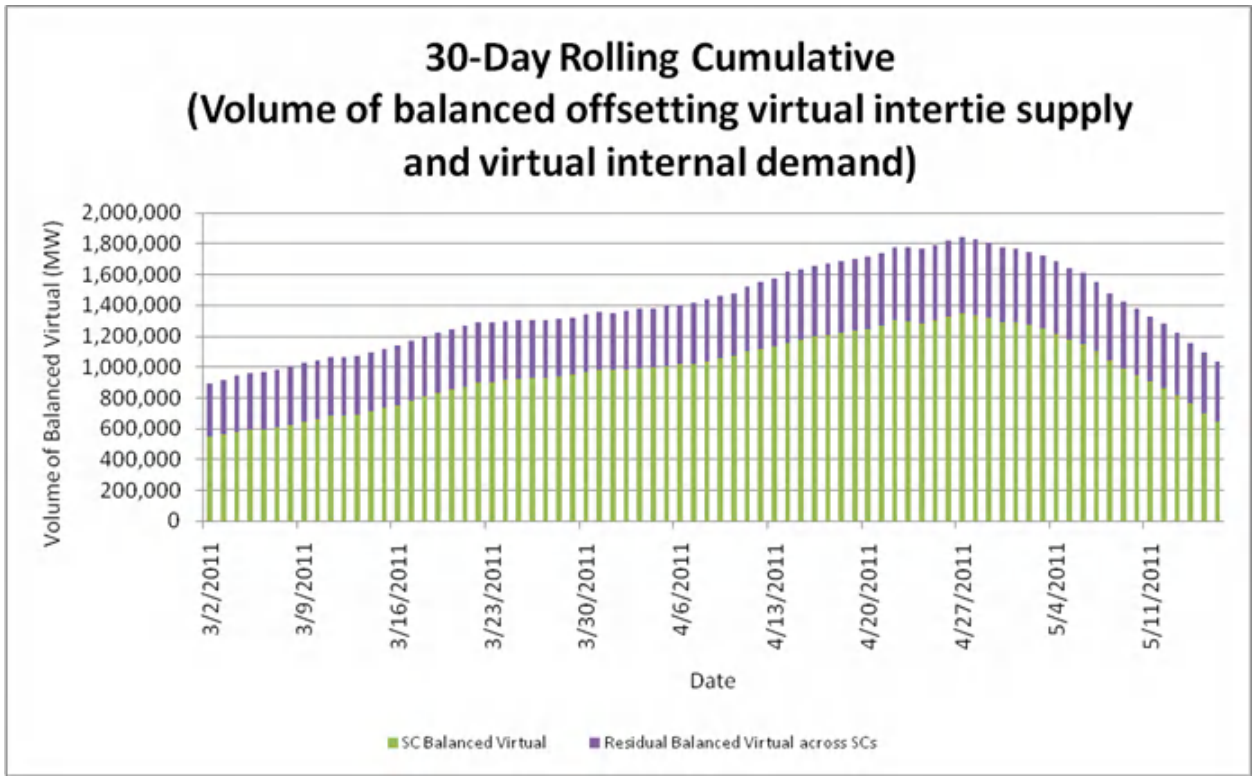


Figure 3 tracks the 30-day cumulative MWh of the bidding pattern. Since March 2011, the cumulative MWh balanced by a single SC rose steadily until late April and has declined since, but the decline has not been as significant as the dollar impact shown in Figure 2. Assuming price divergence returns to the levels seen in March and early April, the significant volume from the apparent attempts to price arbitrage will increase charges allocated through the Real-Time Imbalance Energy Offset. Thus while the ISO believes it is prudent to develop an intermediate solution, given the significant volumes of balanced positions remaining, the ISO believes it is

important to provide market participants with a threshold amount that would result in an emergency filing of the proposed settlement rule.

Figure 3 – MWh Quantity of Cleared Balanced Virtual Scheduling Coordinators



The proposed settlement rule addresses the systematic arbitrage price differentials between HASP and RTD. While the ISO has historically experienced higher prices in RTD relative to HASP, the ISO is proposing a settlement rule which eliminates price arbitrage when the HASP price is less than the RTD price and when the RTD price is greater than the HASP price. The settlement rule can result in a charge or credit which results in any difference between HASP and RTD netting to zero for a SC with a balanced position.

4 Proposal to Address HASP-RT Price Arbitrage Activity under Convergence Bidding

4.1 Threshold for Emergency Filing

Since the impact of virtual bidding on the real-time imbalance energy offset has recently been reduced due to better HASP and RTD price convergence and broad stakeholder support for an intermediate term solution, the ISO is extending the stakeholder process and will seek Board approval in August to implement a solution that results in a single price for HASP and RTD. However, if during the stakeholder initiative to develop an intermediate solution, the impact of virtual bidding strategy returns to significant levels, the ISO will make an emergency filing to implement the settlement rule as proposed in section 4.2.

As seen in Figure 2, the ISO has developed internal metrics to determine the impact of the arbitrage bidding activity outlined in Table 1. The ISO will establish the threshold for an emergency filing if the 30-day rolling cumulative quantity real-time imbalance energy offset attributable to balancing and offsetting virtual intertie positions and virtual internal positions exceeds $20 million based on the differential of the system marginal energy component of the HASP and RTD prices. Therefore, if the sum of the SC Balance Virtual and the Residual Balance Virtual across SCs in Figure 2 reaches $20 million, the threshold would trigger an emergency action.

4.2 Settlement Rule

If the threshold described in the previous section is reached, the ISO will make an emergency filing at FERC to implement the settlement rule proposed in the straw proposal and described below. For each SC, the settlement rule would result in a charge or credit based upon the difference between the System Marginal Energy Cost (SMEC) in HASP and RTD for the SC's balanced supply/demand position at the interties and internal to the ISO. When the RTD price is greater than the HASP price, the balanced position will be based upon internal virtual demand and imports. When the HASP price is greater than the RTD price, the balanced position will be based upon internal virtual supply and exports.

The calculation of the settlement rule is as follows:

Equation 1 calculates the internal net position: Pint = Vd – Vs

Equation 2 calculates the external net position: Ptie = Vs + Ri – Vd – Re

Equation 3 determines the balanced MW quantity:

If Pint * Ptie > 0

Then If Pint > 0

Then Q = MIN (Pint, Ptie)

Else Q = MAX (Pint, Ptie)

Else Q = 0

Equation 4 calculates the settlement amount: S = Q * (RTD SMEC – HASP SMEC)

Where:

Pint is the net position internal to the ISO

Ptie is the net position at the interties

Vd is virtual demand

Vs is virtual supply

Ri is the quantity of day ahead physical imports which have been reduced in HASP

Re is the quantity of day ahead physical exports which have been reduced in HASP

Q is the quantity of MW of the balanced internal/external supply and demand

S is the settlement amount charged/credited to Scheduling Coordinator

The following are numeric examples:

Table 2 – Settlement Rule for Balanced Position to Exploit HASP < RTD

HASP < RTD Strategy	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8	Example 9	Example 10
HASP SEMC	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 35.00	$ 35.00	$ 35.00	$ 35.00	$ 35.00
RTD SEMC	$ 35.00	$ 35.00	$ 35.00	$ 35.00	$ 35.00	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 30.00
Internal Virtual Demand (MW)	100	100	100	100	100	100	100	100	100	100
Intertie Virtual Supply (MW)	50	100	50	100	150	50	100	50	100	150
DA Import - HASP Import (MW)	0	0	50	50	50	0	0	50	50	50
Balanced Amount (MW)	50	100	100	100	100	50	100	100	100	100
Charge (Credit) to Entity	$ 250.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ (250.00)	$ (500.00)	$ (500.00)	$ (500.00)	$ (500.00)

Table 3 – Settlement Rule for Balanced Position to Exploit HASP > RTD

HASP > RTD Strategy	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8	Example 9	Example 10
HASP SEMC	$ 35.00	$ 35.00	$ 35.00	$ 35.00	$ 35.00	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 30.00
RTD SEMC	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 35.00	$ 35.00	$ 35.00	$ 35.00	$ 35.00
Internal Virtual Supply (MW)	100	100	100	100	100	100	100	100	100	100
Intertie Virtual Demand (MW)	50	100	50	100	150	50	100	50	100	150
DA Export - HASP Export (MW)	0	0	50	50	50	0	0	50	50	50
Balanced Amount (MW)	50	100	100	100	100	50	100	100	100	100
Charge (Credit) to Entity	$ 250.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ (250.00)	$ (500.00)	$ (500.00)	$ (500.00)	$ (500.00)

The charge/credit from the proposed settlement rule will be applied to the Real-Time Imbalance Energy Offset. The allocation of the Real-Time Imbalance Energy Offset to Measured Demand will remain unchanged.

5 Intermediate term Options to Align HASP-RTD Pricing

If imports/exports and internal demand/generation were cleared in the same market, the divergence between HASP pricing and RTD pricing would not result in real-time imbalance energy offset uplift costs. A comprehensive redesign of the real-time market, a longer term solution, is currently being addressed in the Renewable Integration: Market and Product Review Phase 2 stakeholder initiative. However, stakeholders broadly support developing an intermediate term solution that addresses the different timing for establishing the prices for imports/exports and internal demand/generation. The intermediate term options include modifying the existing market design to address the uplift created by HASP-RTD spreads and potential changes to the allocation of the remaining Real-Time Imbalance Energy Offset.

5.1 Settlement of Import/Exports based upon RTD

5.1.1 Pay as Bid

Under the Pay as Bid option, HASP timelines and bidding processes would remain unchanged; however, the HASP settlement for physical intertie transactions and liquidation of intertie virtual demand/supply would be eliminated. All intertie virtual demand/supply will be liquidated at the RTD price. The HASP process would determine indicative prices used to select which HASP intertie transactions that are accepted. Bids to export or reduce day-ahead imports would be

accepted if the bid is below the indicative HASP price. Bids to export or reduce day-ahead imports would not be accepted if the bid is above the indicative HASP price. For incremental imports and reductions in day-ahead exports, the bids would be accepted if lower than the indicative price. The accepted physical transactions would be paid their bid price and difference between the bid price and the actual RTD price would be included as a credit/debit to the Real-Time Imbalance Energy Offset. See Table 4 and 5 for examples of the rule and impact to the offset.

5.1.2 Pay as Bid or Better

Under the Pay as Bid or Better option, HASP timelines and bidding processes would remain unchanged; however, the HASP settlement for physical intertie transactions and liquidation of intertie virtual demand/supply would be eliminated. All intertie virtual demand/supply would be liquidated at the RTD price. The HASP process would determine indicative prices used to select the HASP intertie transactions that are accepted. Bids to export or reduce day-ahead imports would be accepted if the bid is below the indicative HASP price. Bids to export or reduce day-ahead imports would not be accepted if the bid is above the indicative HASP price. For incremental imports and reductions in day-ahead exports, the bids would be accepted if lower than the indicative price. The accepted physical exports would pay the lower of their bid price or actual RTD price. The accepted physical imports would receive the higher of their bid price or actual RTD price. The difference between the bid price and the actual RTD price would be included as a charge to the Real-Time Imbalance Energy Offset. See Table 4 and 5 for examples of the rule and impact to the offset.

Table 4 - Pay as Bid and Bid or Better Settlement HASP Price < RTD Price

HASP Price	$ 60.00
RTD Price	$ 80.00

	Bid	Award	As Bid	RTIEO	Bid or Better	RTIEO
Import A	$ 40.00	Y	$ 40.00	$ (40.00)	$ 80.00	$ -
Import B	$ 60.00	Y	$ 60.00	$ -	$ 80.00	$ -
Import C	$ 80.00	N	N/A	N/A	N/A	N/A
Import D	$ 100.00	N	N/A	N/A	N/A	N/A
Export A	$ 100.00	Y	$ 100.00	$ (20.00)	$ 80.00	$ -
Export B	$ 80.00	Y	$ 80.00	$ -	$ 80.00	$ -
Export C	$ 60.00	Y	$ 60.00	$ 20.00	$ 60.00	$ 20.00
Export D	$ 40.00	N	N/A	N/A	N/A	N/A

* A negative Real-Time Imbalance Energy Offset (RTIEO) amount is a credit to the offset, positive is a charge to the offset

Table 5 – Pay as Bid and Bid or Better Settlement HASP Price > RTD Price

HASP Price	$ 80.00
RTD Price	$ 60.00

	Bid	Award	As Bid	RTIEO	Bid or Better	RTIEO
Import A	$ 40.00	Y	$ 40.00	$ (20.00)	$ 60.00	$ -
Import B	$ 60.00	Y	$ 60.00	$ -	$ 60.00	$ -
Import C	$ 80.00	Y	$ 80.00	$ 20.00	$ 80.00	$ 20.00
Import D	$ 100.00	N	N/A	N/A	N/A	N/A
Export A	$ 100.00	Y	$ 100.00	$ (40.00)	$ 60.00	$ -
Export B	$ 80.00	Y	$ 80.00	$ (20.00)	$ 60.00	$ -
Export C	$ 60.00	N	N/A	N/A	N/A	N/A
Export D	$ 40.00	N	N/A	N/A	N/A	N/A

* A negative RTIEO amount is a credit to the offset, positive is a charge to the offset

Some stakeholders suggested that providing Bid Cost Recovery for HASP exports would have less liquidity impact on intertie transactions than the Bid or Better option; however, the ISO believes that additional data is needed to support this view and develop further as an option.

5.1.3 Negative Deviations to HASP Imports

In stakeholder comments, Powerex identified a concern with the treatment of HASP deviations. An intertie resource that sells energy in HASP, but fails to deliver is not subject to imbalance charges at the RTD price. Instead, failure to deliver on HASP commitments results only in (a) non-payment of the HASP price (up to 10% of the participant's total HASP respective supply and demand volume per month); or (b) modest formula-based penalties for volumes beyond the first 10%. A non-performing HASP sale results in the ISO purchasing that energy from internal resources in the RTD. Failure to perform on HASP awards should be charged the RTD price, independent of the magnitude, frequency or reason for such failure.

5.2 Changes to the Allocation of Offset

The offset is currently allocated to all SCs based upon a pro rata share of their measured demand (i.e., metered load and exports) excluding the demand quantity for the valid and balanced portion of self-schedules related to transmission ownership rights in real-time and net measured demand of load following metered subsystems. In 2009, the ISO conducted a stakeholder process to determine whether modifications to the current design of the allocation of the Real-Time Imbalance Energy Offset were appropriate and necessary. At that time, no clear alternative could be identified because causal attribution to specific market activity was not clear. At the conclusion of the stakeholder process, the ISO did not change fundamentally the allocation to measured demand, but clarified that for SCs for MSS Operators that have elected Load following, the ISO will not assess any charges or make payments for the resulting non-zero differences recovered through the offset.

The proposed emergency filing settlement rule, highlighted to stakeholders that the impact of deviations to IFM schedules could be used to allocate the Real-Time Imbalance Energy Offset more broadly than Measured Demand. For example, the delta in the system marginal energy cost between HASP and RTD could be applied to both virtual and physical deviations made in

HASP. Another potential option is to distribute the offset costs to all market participants: internal generation, load, imports, exports and convergence bidding because all of these groups will contribute to Real-Time Imbalance Energy Offset at some point in time during a year. This could result in a charge similar to a per MWh Grid Management Charge which would be more predictable for market participants than applying only to times when the resource has deviations from their day-ahead schedule.

5.3 Enable Convergence Bidding to converge HASP-RTD Prices

Currently, internal and intertie virtual bids are liquidated in HASP which results in balanced internal virtual demand/supply and external virtual supply/demand. These bids do nothing to converge HASP and RTD prices. However, if internal virtual demand/supply were treated as self schedules in HASP and liquidated in the subsequent RTD runs, then the internal convergence bids would be aligned with the pricing of internal generation/demand. Intertie virtual demand/supply would be liquidated at the HASP price and aligned with binding HASP physical import/export awards. Since virtual bids and physical bids are settled at the same time (HASP for external, RTD for internal), prices should converge across IFM, HASP and RTD based upon market participant bidding strategies.

Additional discussion of the proposal can be found in Powerex's comments to the Issue Paper and Straw Proposal at http://www.caiso.com/2b7c/2b7c82444d660.pdf.

6 Next Steps

The ISO will discuss the options discussed above for the intermediate term solution with stakeholders during a teleconference to be held on May 25, 2011. The ISO is seeking comments on the proposed emergency settlement rule and intermediate options to align pricing. Stakeholders should submit written comments by June 1, 2011 to RToffset@caiso.com.