



Real-Time Settlement Review

Draft Final Proposal

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Real-Time Settlement Review

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1. Executive Summary

This initiative reviews real-time settlement charge codes associated with interactions between balancing authority areas (BAAs) in the Energy Imbalance Market (EIM) to identify inappropriate cost shifting. This initiative initially proposed two settlement calculation changes:

Asymmetrical Wheeling: The California ISO (CAISO) has identified an asymmetrical settlement for energy wheeling through the EIM area when one of the EIM BAAs has a power balance constraint violation. This issue can cause inappropriate cost shifting in CAISO market settlements both within the EIM area and between EIM and non-EIM entities. This issue is exacerbated when EIM entities elect not to settle the schedule deviations of their base energy transfer system resources (ETSRs) in the CAISO market. In this initiative, the CAISO proposes to eliminate the election for EIM entities to settle their base ETSR schedule deviations bilaterally, thus requiring entities to settle deviations through the CAISO market. In addition, this initiative proposes to settle base ETSR schedule deviations at Scheduling Point-Intertie prices rather than as a ratio of the source and sink BAA's internal prices.

Unaccounted for Energy Settlement: In this initiative, the CAISO proposes to allow EIM entities who must derive their load through generation and intertie meters the option not to settle unaccounted for energy. This change is intended to accommodate EIM entities who do not have a complete set of distribution load meters with which to aggregate and calculate their load.

The CAISO proposes to move forward with the two proposals described above. In addition, the CAISO is adding a third proposed settlement calculation change to this initiative:

Bid Cost Recovery Transfers: This initiative proposes to change the calculation that adjusts the cost allocation for real-time bid cost recovery (BCR) uplift costs for EIM transfers. Currently, this adjustment considers uninstructed imbalance energy (UIE) and unaccounted for energy (UFE) in the calculation. UIE and UFE are both determined in post-market processes. However, upon further review, the CAISO believes that considering these factors in the adjustment calculation does not align with cost causation principles since the real-time market commits units for many reasons that is not necessarily to address UIE and is never to address UFE. The CAISO instead proposes to align the calculation to adjust BCR uplift based on EIM transfers with CAISO's established methodology to allocate real-time BCR uplift costs to load and exports as the beneficiaries of any real-time unit commitment or incremental dispatch in the real-time market.

This initiative also provides stakeholders insight into some of the metrics the CAISO uses to monitor the settlements process. As part of its commitment to monitor and improve the settlement process, the CAISO has implemented metrics to help identify inappropriate cost shifting in the real-time market settlement. These metrics include:

Imbalance Energy and Financial Value Settlement: Compares the imbalance energy settlement to the ETSR financial value settlement to help identify the driver of real-time neutrality.

Real-Time Congestion Comparison: Compares each BAA's marginal cost of congestion to the real-time congestion allocation to help ensure congestion costs are allocated properly.

Real-Time Offset Comparison: Compares the settlement of real-time offsets to identify which component of the locational marginal price (LMP) is driving neutrality imbalances.

The CAISO plans to publish these metrics to stakeholders as part of the CAISO's quarterly Market Planning and Performance Forum and/or the monthly Market Performance Metric Catalog.

2. Proposal Changes

The changes below consider stakeholder feedback on the straw proposal and additional cost shifting issues identified by the CAISO.

1. The CAISO considers an additional real-time settlement metric identified by stakeholders in Section 4.4.
2. The CAISO describes its commitment to publicizing the real-time settlement metrics created for this initiative in Section 4.5.
3. The CAISO expands on its example of asymmetrical wheeling in Section 5.1. The expanded example addresses stakeholder concerns about why it is necessary not to maintain the optional settlement of Base ETSR schedule deviations by clarifying how it exacerbates the asymmetrical settlement.
4. The CAISO proposes an additional settlement change in Section 5.2. The proposal is to change the calculation that adjusts the allocation of real-time bid cost recovery uplift costs to account for EIM transfers.

3. Background

During the recent *Real-Time Market Neutrality Settlement* policy initiative¹, the CAISO committed to conduct a comprehensive review of the real-time settlement charge codes associated with interactions between balancing authority areas (BAAs) in the Energy Imbalance Market (EIM). This initiative has two purposes. First, this initiative provides insight into some of the real-time settlement metrics the CAISO reviews and analyzes. Second, this initiative presents to stakeholders three proposed changes to CAISO settlement calculations. These proposed changes are a result of both on-going monitoring and working with stakeholders to improve the overall settlement solution.

The first proposed settlement change involves the application of pricing to the import and export of energy as it wheels through EIM areas. The second change gives EIM BAAs the option to settle unaccounted for energy (UFE) based on their load meter determination. The third change reformulates the calculation to determine bid cost recovery cost transfers between EIM BAAs.

¹ CAISO Real-Time Market Neutrality Settlement initiative.
<https://stakeholdercenter.caiso.com/StakeholderInitiatives/Real-time-market-neutrality-settlement>

4. Real-Time Settlement Metrics

The CAISO is committed to maintaining and improving the quality and transparency of market settlements. To support this objective, the CAISO has a process to monitor and analyze settlement charge code results and performance. The CAISO presents in this paper settlement metrics targeted to identify inappropriate cost shifting that may be occurring in the real-time market settlements process.

Similar to other market metrics the CAISO produces, the CAISO analyzes these metrics using historical data to look for spikes or anomalies that materialize. When anomalies emerge, the CAISO evaluates the cause of the spike or anomaly. If the anomaly reveals a systemic problem, the CAISO will address it through the appropriate process.

Assessment of these metrics helped identify one issue that is addressed in this stakeholder initiative (see Section 5.1). The CAISO used these metrics to identify an inappropriate cost shift between EIM BAAs. Further analysis revealed the cause was directly related to a power balance constraint violation and energy wheeling through an EIM BAA. The CAISO determined this is a systemic issue based on current market and settlement rules and hence this initiative proposes to address it.

The CAISO will continue to monitor these metrics to ensure any new market or settlement changes do not have unintentional impacts on the settlements process. The CAISO is committed to reviewing these metrics on an ongoing basis and plans to present issues to stakeholders as they arise through an appropriate forum.

The metrics the CAISO is using are described below.

4.1 Metric 1: Imbalance Energy and Financial Value Settlement

This metric compares the imbalance energy settlement against the ETSR financial value settlement. Table 1 describes the components of these calculations.

Table 1: Imbalance Energy and Financial Value Metric Components

Imbalance Energy	Financial Value²
FMM Instructed Imbalance Energy	FMM ETSR Financial Value Settlement
Real Time Instructed Imbalance Energy Settlement	RTD ETSR Financial Value Settlement
Real Time Uninstructed Imbalance Energy Settlement	GHG ETSR Financial Value Settlement
Real Time Unaccounted for Energy Settlement	
Greenhouse Gas Emission Cost Revenue	
Real Time Convergence Energy Settlement	

² ETSR financial value is calculated as the product of the transfer quantity and the system marginal energy cost for FMM and RTD.

If the settlement amounts for the components of imbalance energy do not sum to zero, the CAISO will maintain neutrality by assessing charges or making payments through the Real Time Imbalance Energy Offset (CC 6477, CC64770), the Real Time Congestion Offset (CC 6774, CC 67740), and the Real Time Marginal Losses Offset (CC 6985, CC 69850). It is important to compare imbalance energy against ETSR financial value because it provides insight into which portion of real-time market (i.e., FMM or RTD) is driving real-time neutrality. The ETSR settlement is the non-binding financial account of energy exporting from one BAA and importing into another. The financial value settlement is critical in determining drivers of neutrality. For example, if a generator in BAA 1 was dispatched to serve load in BAA 2, the real-time neutrality for both BAAs is non-zero by at least the cost of the energy transferring between the BAAs. The real-time neutrality for BAA 1 would be the payment to the generator that was dispatched because the binding settlement does not include the export ETSR cost. The real-time neutrality for BAA 2 would be the charge to load because the binding settlement does not include the import ETSR payment. Once the financial values are considered, the true BAA real-time neutrality amount becomes known.

The comparison of the real-time imbalance energy settlement to the ETSR financial values provides insight into the potential cost drivers of real-time neutrality. This comparison was recently used to identify ETSR tagging issues because the ETSR financial values settlement did not correspond with market dispatches. Further analysis revealed that some ETSRs were being double counted based on submitted tags. The CAISO settlements team was able to correct the tagging issue before publication of the specific trade dates.

The CAISO can evaluate this metric for each trade date or over a trade period, and can produce this metrics by BAA or the EIM area as a whole. The CAISO uses trade period comparisons (e.g., quarterly, yearly) to identify market trends.

4.2 Metric 2: Real-Time Congestion Comparison

This metric is designed to compare each BAA's marginal cost of congestion to the real-time congestion allocation. Real-time market congestion represents the nodal congestion revenue and cost by BAA. The real-time congestion allocation represents which BAA's congestion is being resolved. Put differently, this metric identifies which BAAs have congestion neutrality and compares that to the BAAs that are financially responsible for the congestion.

This metric has two purposes. First, the metric identifies intervals with significant congestion cost, which allows the CAISO to analyze the validity of market results. If the market results are valid, then no action is required. If the results are invalid, then mitigation measures such as price corrections are triggered. Second, this metric helps ensure congestion costs are allocated to the correct BAA. For example, if the metric indicates that the congestion costs are allocated to a non-EIM/CAISO BAA, then mitigation measures are required.

Metric 2 can be evaluated for each trade date or over a trade period, and can be produced per BAA or the EIM area as a whole.

4.3 Metric 3: Real-Time Offset Comparison

The purpose of this metric is to compare the settlement of real-time offsets. Real-time offsets are used to ensure CAISO is revenue neutral as the market operator. Offsets are calculated for each component of the locational marginal price (LMP) – energy³, congestion⁴, and losses⁵. This metric allows the CAISO to identify which component of the LMP is driving neutrality imbalances. Neutrality imbalances occur when the actual metered energy does not equal the market results.

This metric also evaluates the effectiveness of changes made in the Real-Time Market Neutrality stakeholder initiative⁶. That initiative made modifications to the calculation of the real-time offset amounts for each BAA. This comparison will show if the offset quantities are in line with what was anticipated.

4.4 Additional Metrics Identified by Stakeholders

During the CAISO's recent *Real-Time Market Neutrality* stakeholder initiative, Pacific Gas and Electric (PG&E) expressed a concern that the real-time market does not adequately compensate BAAs when unscheduled intertie flows shift energy between BAAs. PG&E submitted a theoretical paper outlining the concepts and methods of evaluating the unscheduled intertie flows across the EIM area. CAISO agrees that additional analysis is required to determine the magnitude and significance of the issue before proposing a resolution. As such, the CAISO proposes to perform an analysis of unscheduled flow and present the result to stakeholders. The CAISO will compare the total net physical intertie meter readings for each BAA against the total net e-tag schedules, including ETSR e-tags. This comparison will identify the magnitude of unscheduled flows between BAAs within the EIM.

In order to determine the significance of unscheduled flow as it relates to real-time market settlement across the EIM, the CAISO will determine the market value of unscheduled flows that cross BAAs at the relevant RTD system marginal energy cost less the relevant RTD marginal greenhouse gas cost.

After completing the cost analysis of unscheduled flow, the CAISO will present the results of the analysis at a future Market Planning and Performance Forum meeting⁷. If the impact is found to be significant, the CAISO may do further analysis or consider market changes in a potential future stakeholder initiative.

³ [BPM CG CC 64770 Real Time EIM Imbalance Energy Offset](#)

⁴ [BPM CG CC 67740 Real Time EIM Congestion Offset](#)

⁵ [BPM CG CC 69850 Real Time Marginal Losses Offset](#)

⁶ CAISO Real-Time Market Neutrality Settlement Draft Final Proposal. May 30, 2019.

<http://www.aiso.com/InitiativeDocuments/FinalDraftProposalReal-TimeMarketNeutralitySettlement.pdf>

⁷ CAISO User Groups and Recurring Meetings. Market Performance and Planning Forum.

<http://www.aiso.com/informed/Pages/MeetingsEvents/UserGroupsRecurringMeetings/Default.aspx>

4.5 Publicizing Metrics to Stakeholders

This section describes the CAISO's commitment to publishing the real-time settlement metrics developed as part of this initiative. Stakeholders requested that the CAISO make these metrics available to stakeholders.

The CAISO will publish Metric 1 (Imbalance Energy and Financial Value Settlement) and Metric 2 (Real-Time Congestion Comparison) as part of the Market Performance and Planning Forum. The Market Performance and Planning Forum is conducted quarterly with stakeholders to review market performance issues. Data from both metrics will likely be shown by BAA with monthly time granularity. However, the final format of the metric data has yet to be finalized.

The CAISO has determined that Metric 3 (Real-Time Offset Comparison) is already represented by existing metrics that are published in the Market Performance Metric Catalog⁸. The Market Performance Metric Catalog is a companion document to the monthly Market Performance Report and comprises a collection of all metrics generated for potential use in the monthly report. Stakeholders should look for Figure 173: EIM Real-Time Imbalance Energy Offset by Area and Figure 174: EIM Real-Time Congestion Imbalance Offset by Area⁹. These metrics are shown by BAA with a daily time granularity.

5. Proposed Changes

In this initiative, the CAISO proposes three changes to CAISO settlement calculations. The first proposal is a change in the application of pricing to the import and export of energy as it wheels through EIM areas. The second change gives EIM BAAs the option to settle unaccounted for energy (UFE) based on their load meter determination. The third change reformulates the calculation to determine bid cost recovery cost transfers between EIM BAAs. These proposed changes are a result of both ongoing monitoring and working with stakeholders to improve the overall settlement solution.

The CAISO believes it is desirable to address these issues quickly given the rapid expansion of the EIM in 2021-2022. Thus, the CAISO plans to bring these proposals to the December 2020 EIM Governing Body and CAISO Board meetings for approval. The asymmetrical wheeling change will be implemented by April 2021. The UFE and BCR transfer changes will be implemented in fall 2021.

5.1 Asymmetrical Wheeling Settlement

Base ETSRs represent bilateral transactions of energy between two EIM entities. Base ETSRs are not optimized by the market and are kept constant. However, EIM entities can modify their base ETSRs

⁸ CAISO Market Performance Metric Catalog.

<http://www.aiso.com/Pages/DocumentsByGroup.aspx?GroupID=AF1E04BD-C7CE-4DCB-90D2-F2ED2EE8F6E9>

⁹ The figure numbers and names in the Market Performance Metric Catalog are subject to change.

after the base schedule submission deadline of T-40. These schedule changes are referred to in this paper as “base ETSR schedule deviations”.

In the CAISO’s previous *Consolidated Energy Imbalance Market* initiatives¹⁰, the CAISO implemented an enhancement to allow EIM entities the option to settle base ETSR schedule deviations through the CAISO market instead of bilaterally¹¹. When settling base ETSR schedule deviations through the market, the market settles deviations at a ratio of the source and sink BAAs internal prices. This ratio is agreed upon by the two BAAs that share the bilateral transfer¹².

The CAISO has identified a potential settlement issue when energy wheels through multiple EIM areas and there happens to be a power balance constraint in one of the EIM BAAs. Figure 1 illustrates the issue.

Figure 1: Asymmetrical Wheeling Settlement

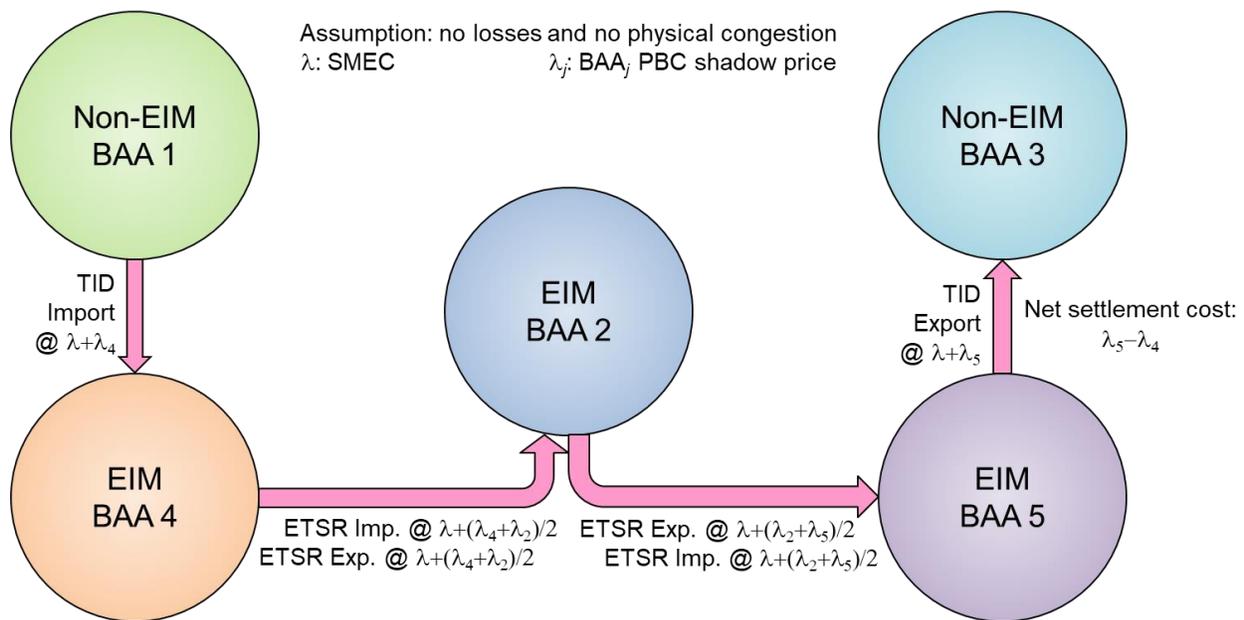


Figure 1 illustrates an example where energy from non-EIM BAA 1 is wheeling through three EIM BAAs before sinking in non-EIM BAA 3¹³. A wheeling transaction between two non-EIM BAAs that flows through multiple EIM BAAs will receive an imbalance energy settlement for the import/export

¹⁰ CAISO Consolidated Energy Imbalance Market initiatives.

<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=6097710F-BBDF-4EB8-BE56-7139453C7420>

¹¹ An Energy Transfer System Resource (ETSR) is the representation of how the EIM facilitates energy transfer from one EIM BAA to another for the purposes of tracking, tagging, and settlement. Base ETSRs are defined to represent the bilateral transactions between two EIM entities. For more information, see <https://www.westerneim.com/Documents/EIMProcessOverview-FacilitatingETSRs.pdf>

¹² A 50/50 ratio is the typical arrangement.

¹³ Figure 1 assumes there are no losses or congestion. Therefore, prices are composed of two factors – the system marginal energy cost (λ) and a power balance constraint violation penalty price (λ_j).

Transaction ID (TID) to/from the EIM area. The TID import is paid the Scheduling Point-Intertie (SP-Tie) LMP at the entry point to the EIM area¹⁴. The TID export is charged the SP-Tie LMP at the exit point from the EIM area. Meanwhile, the energy flowing between EIM areas is settled at the midpoint of the source and sink BAAs internal prices. Therefore, the price at which this wheeling energy is settling as it flows through each BAA boundary is not consistent.

The settlement of energy wheeling through an EIM BAA at different prices results in an asymmetrical settlement when there is a power balance constraint violation in one of the EIM BAAs. This issue can be described in the example below using the illustration in Figure 1.

Example: BAA2 has PBC violation. As shown in Figure 1, the net settlement cost of the import/export TID transaction is the PBC penalty price of BAA 5 minus the PBC penalty price of BAA 4. Therefore, when there are no power balance constraint violations in BAA 4 and BAA 5, the TID import is settled at the same price as the export. The ETSR settlement causes price separation when there is a power balance constraint violation in BAA 2. There is a cost shift from BAA 4 to BAA 5 because there is a price difference between the ETSR settlement and the TID import/export settlement. Table 2 shows an example of how money flows in this scenario.

Table 2: Settlement for wheeling energy when BAA 2 has a PBC violation

EIM	SMEC (λ)	PBC (λ_i)	LMP		
BAA 4	\$30	\$0	\$30		
BAA 2	\$30	\$500	\$530		
BAA 5	\$30	\$0	\$30		
Energy Flow	EIM	MW	Settlement	Congestion	RTCO
Import	BAA 4	100	\$3,000	\$-25,000	\$0
ETSR4-Export	BAA 4	-100	\$-28,000		
ETSR2-Import	BAA 2	100	\$28,000	\$0	\$0
ETSR2-Export	BAA 2	-100	\$-28,000		
ETSR5-Import	BAA 5	100	\$28,000	\$25,000	\$0
Export		-100	\$-3,000		

In this example, BAA 2 has a PBC violation. Because ETSRs currently settle as a ratio of the source and sink BAAs internal prices, BAA 4 is paid \$3,000 for the TID import and is charged \$28,000 for the ETSR export. In addition, BAA 5 is paid \$28,000 for the ETSR import and is charged \$3,000 for the TID export. From an EIM area perspective, the settlement of energy is neutral. However, from the individual BAA perspective, BAA 4 paid BAA 5 for the energy wheeling through the EIM area.

This asymmetrical settlement for wheeling transactions through the EIM area becomes more pronounced if BAA 4 or BAA 5 experienced a PBC violation. Under this condition, not only would the ETSR settlement result in cost shifting between EIM entities, but the TID import/export price would be affected as well. This means there could also be a cost shift between EIM and non-EIM entities. Table 3 shows an example of how money flows when one of the boundary BAAs has PBC violation.

¹⁴ The SP-Tie LMP is the location marginal price of energy schedules awarded at interties based upon intertie bids or base schedules.

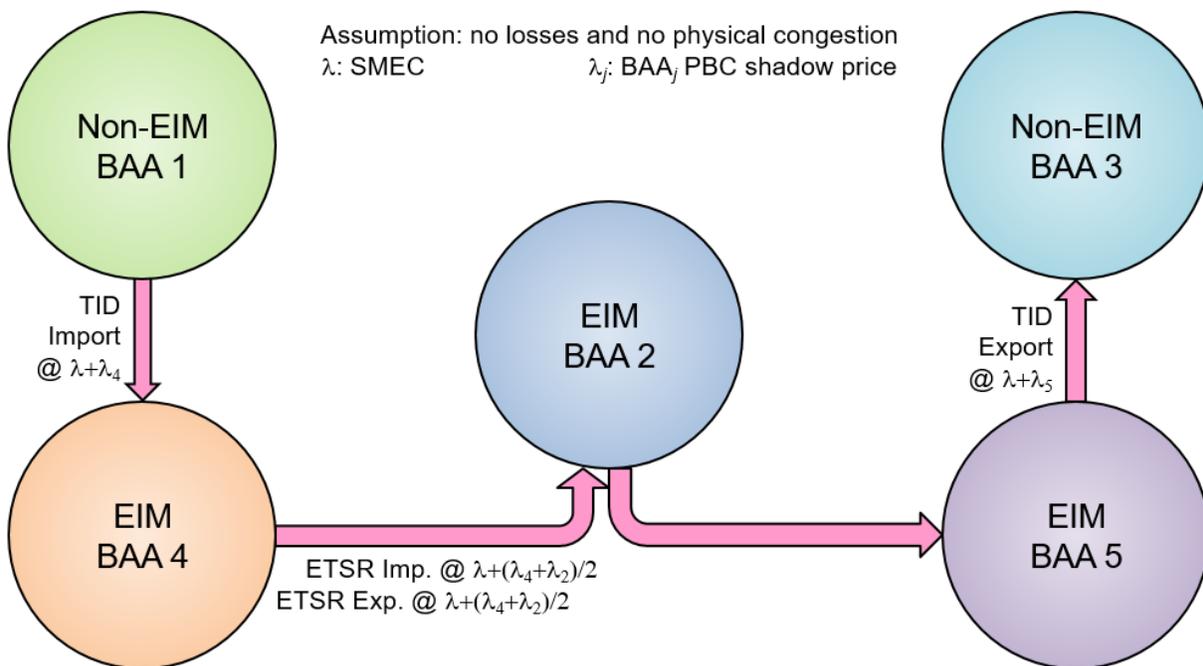
Table 3: Settlement for wheeling energy when BAA 5 has a PBC violation

EIM	SMEC (λ)	PBC (λ_j)	LMP		
BAA 4	\$30	\$0	\$30		
BAA 2	\$30	\$0	\$30		
BAA 5	\$30	\$500	\$530		
Energy Flow	EIM	MW	Settlement	Congestion	RTCO
Import	BAA 4	100	\$3,000	\$0	\$0
ETSR4-Export	BAA 4	-100	\$-3,000		
ETSR2-Import	BAA 2	100	\$3,000	\$-25,000	\$0
ETSR2-Export	BAA 2	-100	\$-28,000		
ETSR5-Import	BAA 5	100	\$28,000	\$-25,000	\$50,000
Export		-100	\$-53,000		

In this example, BAA 5 has a PBC violation. Because ETSRs currently settle as a ratio of the source and sink BAAs internal prices, BAA 2 is paid \$3,000 for the ETSR import and is charged \$28,000 for the ETSR export. BAA 5 is paid \$28,000 for the ETSR import, but because the TID export is settled at the SP-Tie price, BAA 5 is charged \$53,000. Of the \$50,000 charge to TID, \$25,000 offsets the ETSR import settlement and \$25,000 is allocated to BAA 5 through Real Time Congestion Offset. In addition, there is a \$25,000 cost shift from BAA 2 to BAA 5 through the real time congestion offset allocation of BAA 2 congestion.

As shown above, energy wheeling through an EIM BAA with a power balance constraint violation can shift costs between EIM entities and in/out of the EIM area. EIM entities also currently have the option not to settle their base ETSR schedule deviations through the market. This can exacerbate the cost shifting issues described above. Figure 2 illustrates an example where two BAAs are settling their base ETSR schedule deviations bilaterally instead of through the market.

Figure 2: Asymmetrical Wheeling Settlement with Bilateral Settlement



The example in Figure 2 is the same as in Figure 1 except that BAA 2 and BAA 5 are settling their base ETSR schedule deviations bilaterally. That is why there are no prices associated with the ETSR export from BAA 2 and the ETSR import into BAA 5. Table 4 describes the settlement for this scenario when BAA 2 has a power balance constraint violation.

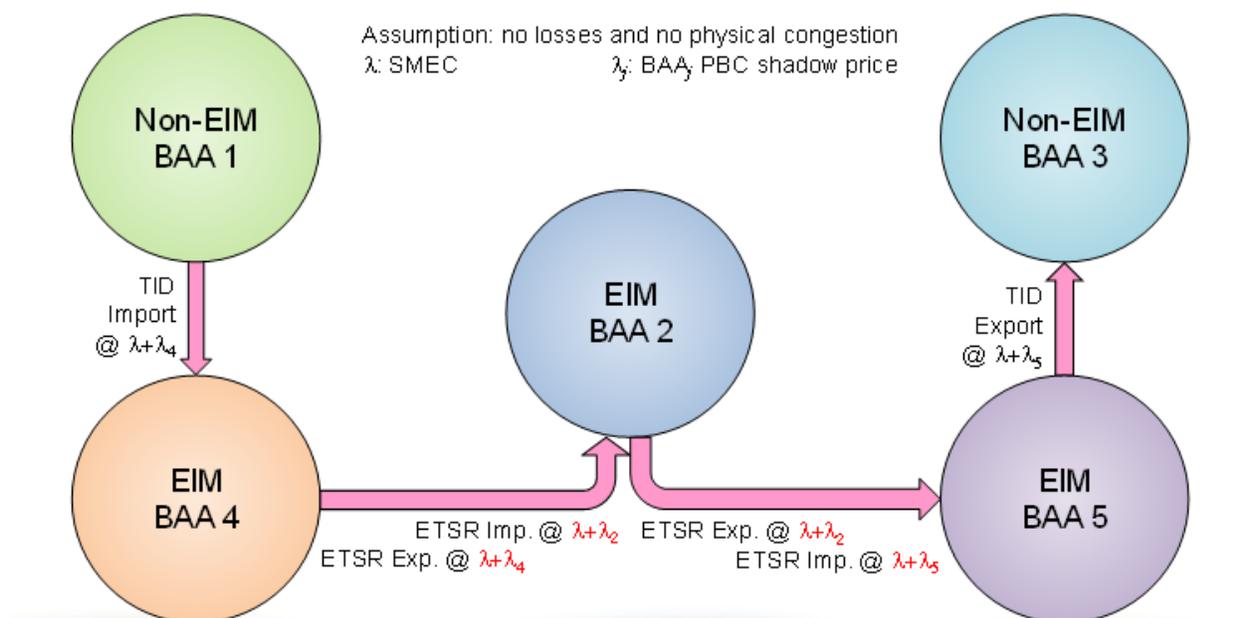
Table 4: Settlement for wheeling energy when BAA 2 and BAA 5 settle bilaterally

EIM	SMEC (λ)	PBC (λ_j)	LMP		
BAA 4	\$30	\$0	\$30		
BAA 2	\$30	\$500	\$530		
BAA 5	\$30	\$0	\$30		
Energy Flow	EIM	MW	Settlement	Congestion	RTCO
Import	BAA 4	100	\$3,000	-\$25,000	\$0
ETSR4-Export	BAA 4	-100	-\$28,000		
ETSR2-Import	BAA 2	100	\$28,000	\$28,000	-\$3,000
ETSR2-Export	BAA 2	-100			
ETSR5-Import	BAA 5	100		-\$3,000	\$3,000
Export		-100	-\$3,000		

In this example, BAA 2 has a PBC violation. BAA 4 is paid \$3,000 for the TID import and is charged \$28,000 for the ETSR export. BAA 2 is paid \$28,000 for the ETSR import and charged \$0 for the ETSR export. BAA 5 is paid \$0 for the ETSR import and is charged \$3,000 for the TID export. By not settling the base ETSR schedule deviation, this example introduces an additional \$3,000 cost shift from BAA 2 to BAA 5 when there should have been no cost shift.

In this initiative, the CAISO proposes to eliminate the option for EIM entities not to settle Base ETSRs schedule deviations. Base ETSR schedule deviations will have to be settled through the CAISO market at SP-Tie prices. This is the same price that TID schedule deviations would settle at the intertie if the BAA at the other end were a non-EIM BAA. Figure 3 illustrates the proposal.

Figure 3: Proposed Symmetrical Wheeling Settlement



In Figure 3, both legs (import and export) of a wheeling transaction through an EIM BAA are settled at the same price regardless of the type of the schedule (TID or base ETSR). This results in a symmetrical settlement where the payment for the import and the charge for the export sum to zero. When all EIM BAAs in the schedule path settle base ETSR schedule deviations at the applicable SP-Tie LMP, the imbalance energy settlements cancel out for the entire wheeling transaction from source to sink¹⁵. Furthermore, the financial value of base ETSR schedule deviations must be the settlement charge at the applicable SP-Tie LMP that is used in the settlement instead of the system marginal energy cost (SMEC), shown as the symbol λ in Figures 1-3.

Table 5: Settlement of wheeling energy under proposed solution

EIM	SMEC (λ)	PBC (λ_j)	LMP		
BAA 4	\$30	\$0	\$30		
BAA 2	\$30	\$0	\$30		
BAA 5	\$30	\$500	\$530		
Energy Flow	EIM	MW	Settlement	Congestion	RTCO
Import	BAA 4	100	\$3,000	\$0	\$0
ETSR4-Export	BAA 4	-100	\$-3,000		
ETSR2-Import	BAA 2	100	\$3,000	\$0	\$0
ETSR2-Export	BAA 2	-100	\$-3,000		
ETSR5-Import	BAA 5	100	\$53,000	\$0	\$0
Export		-100	\$-53,000		

The proposed solution settles ETSR imports and exports the same as TID imports and exports, eliminating cost shifting under a power balance constraint violation.

In order to create consistency across the EIM and align with other non-participating interchange schedules, the CAISO proposes that EIM entities only be allowed to submit base schedules on base ETSRs. The real-time market will calculate subsequent transfer imbalances that are not associated with base ETSR schedule deviations as static and dynamic ETSRs that will be settled through the market.

5.2 Unaccounted for Energy Settlement

Based on discussions with stakeholders, the CAISO proposes a market rule change to allow EIM entities to choose whether to settle unaccounted for energy for their BAA or utility distribution company (UDC) area. This option would be available based on how the EIM entity obtains their load meter values¹⁶. Unaccounted for energy is the difference between the energy delivered into a UDC service area and the total metered demand within the UDC service area, accounting for losses. This quantity is settled at the applicable locational marginal price.

¹⁵ Complete cancellation only happens when transmission losses and physical congestion are ignored, as is the case in the example.

¹⁶ This option is not available to entities within the CAISO BAA because they are required to calculate their load using a load aggregation approach, described later in the section.

Load Meter Value Determination

There are two ways for EIM entities to determine their load meter values.

- “Load aggregation” meter approach
- “Load derivation” meter approach

In the load aggregation meter approach, the EIM entity scheduling coordinator collects measurements from load meters on the distribution system (e.g., retail, residential, and/or commercial meters). These load meter values measure the true load consumption¹⁷. EIM entities using a load aggregation approach will still be required to settle UFE because it provides a more accurate accounting of energy and real-time market losses.

It is the CAISO’s preference for participants with non-participating load to use a load aggregation meter approach because the distribution meters provide a high level of accuracy of the load consumption for the measured interval. There are some instances where EIM entities do not have a complete set of load meters on the distribution system. Therefore, the CAISO made some accommodations to EIM entities that need to measure demand using a load derivation approach. In the load derivation approach, the EIM entity scheduling coordinator indirectly derives their load using measurements from internal generation and intertie meters and applying a transmission loss factor. The CAISO believes it is beneficial to offer EIM entities the option not to settle UFE when they derive their load meter values using a load derivation approach. Therefore, the CAISO proposes a market rule change that will allow an EIM entity the option not to settle UFE if they use a load derivation approach.

The CAISO proposes that an EIM Entity using a load derivation approach will have the following two options:

- **Elect to settle Unaccounted for Energy:** If the EIM entity elects to settle UFE, the UFE settlement remains the status quo. The EIM entity will provide the CAISO their OATT loss factor¹⁸. The CAISO will apply the OATT loss factor when calculating the hourly load base schedule. In addition, the EIM entity will apply the same OATT loss factor when calculating their load using the load derivation approach. The CAISO calculates the UFE settlement quantity as the product of the real-time market hourly LAP price and the sum of the generation meter readings and the intertie import meter readings less the sum of intertie export meter readings, load derivation meter calculations, and real-time market losses.
- **Elect not to settle Unaccounted for Energy:** If the EIM entity elects not to settle UFE, the EIM entity shall account for base schedule losses outside of the CAISO market. The EIM entity and CAISO settlements will not incorporate losses by assuming an OATT loss factor of zero. The CAISO will apply a zero-percent OATT loss factor when calculating the hourly load base schedule. In addition, the EIM entity will apply a zero-percent OATT loss factor when calculating their load

¹⁷ Including loop flow, inadvertent flow, excess behind the meter, and distribution system losses.

¹⁸ The Open Access Transmission Tariff (OATT) loss factor is a measurement of the losses associated with transmission service determined by the transmission provider.

using the load derivation approach. The CAISO will then exclude the EIM entity from calculation of the UFE amount¹⁹.

At the request of stakeholders, the CAISO hosted a web meeting on September 29, 2020 to walk through examples of the settlement impacts related to the choice of whether to settle UFE. The examples include demonstration of how the proposal affects over/under-scheduling and bid cost recovery transfers. Stakeholders can access the example and the video recording of the web meeting on the *Real-Time Settlement Review* initiative web page²⁰.

Calculating Bid Cost Recovery Uplift Cost Transfers

The CAISO issues bid cost recovery (BCR) payments to ensure resources scheduled in the market recover their costs when the market does not provide sufficient revenues to cover their bid-in costs. These BCR payments are funded through uplift costs that are allocated to market participants. In the real-time market, bid cost recovery payments are calculated based on the costs and market revenues of resources committed in the real-time market or dispatched incremental to their day-ahead schedules. The uplift costs associated with these real-time BCR payments are allocated to load and exports because they are the beneficiaries of any real-time unit commitment or incremental dispatch.

In the real-time market, the CAISO must consider EIM transfers to fairly allocate BCR uplift costs across BAAs. For example, if a resource in BAA 1 is committed in the real-time market to meet load changes in BAA 2, the cost any BCR uplift payments received by the generator in BAA 1 should be allocated to BAA 2 as the beneficiaries of that unit commitment. For BAAs supporting net EIM transfers out of their BAA, the CAISO currently adjusts the real-time BCR uplift (RT BCR uplift) amount using the following calculation:

$$RT\ BCR\ Uplift\ (\$) * \frac{Net\ EIM\ Transfers\ Out}{ABS(Demand\ UIE) + ABS(Supply\ UIE) + ABS(UFE) + Net\ EIM\ Transfers\ Out}$$

This calculation has the effect of reducing the total RT BCR uplift costs allocated to BAAs with net EIM transfers out. The quantity of RT BCR uplift costs reduced by this calculation is then added to the RT BCR uplift costs allocated to BAAs with net EIM transfers in.

The CAISO proposes in this initiative to make the settlement of UFE optional for EIM entities using a load derivation approach. Using the RT BCR uplift formula above, this would create an issue for determining the adjustment to the real-time BCR uplift amount to account for EIM transfers because UFE is in the denominator. As demonstrated in the September 29, 2020 stakeholder call, entities not settling UFE will have their former UFE quantity dispersed between their UIE and base schedules. This could potentially cause unintended cost shift between BAAs.

¹⁹ Note even though the EIM Entity has elected not to settle UFE, the real-time market will still run based on power flow to ensure a quality market solution.

²⁰ <https://stakeholdercenter.caiso.com/StakeholderInitiatives/Real-time-settlement-review>

This issue prompted the CAISO to rethink about the uplift cost allocation adjustment based on the cost causation principles of bid cost recovery. These principles were explored in the CAISO's recent *Bid Cost Recovery Enhancements* stakeholder initiative²¹. The initiative concluded that allocating real-time BCR uplift costs by cost causation is difficult because resources are committed in the real-time market for many reasons that cannot easily be tied to a specific scheduling coordinator (e.g., unscheduled flow, transmission outages). Furthermore, the initiative concluded that there does not appear to be a strong correlation between UIE and real-time BCR uplift. It states that real-time unit commitment is driven primarily by differences between the two market runs that conduct unit commitment, and that were not reflected in the day-ahead market, as opposed to deviations. Therefore, the CAISO believes that including UIE in the calculation to determine adjustments to BCR uplift to account for EIM transfers does not align with cost causation principles.

While not explicitly considered in the *Bid Cost Recovery Enhancements* stakeholder initiative, the CAISO also does not believe that UFE is an appropriate variable to consider in the calculation of BCR transfers. UFE is a post-market accounting of energy – the CAISO market does not commit or dispatch resources based on UFE. Therefore, the CAISO believes that UFE should also be removed from the calculation to determine adjustments to BCR uplift to account for EIM transfers.

Instead, the CAISO proposes to align the calculation to adjust BCR uplift based on EIM transfers with CAISO's established methodology to allocate real-time BCR uplift costs in its BAA. As stated above, real-time uplift costs are allocated to load and exports because they are the beneficiaries of any real-time unit commitment or incremental dispatch. The CAISO proposes to include EIM transfers as part of its consideration of exports. The proposed adjustment to the BCR uplift cost allocation would instead be:

$$RT\ BCR\ Uplift\ (\$) * \frac{Net\ EIM\ Transfers\ Out}{Load + Exports + Net\ EIM\ Transfers\ Out}$$

This change to the adjustment calculation better aligns with existing CAISO methodology and established cost causation principles of bid cost recovery cost allocation. This change would be implemented in coordination with the UFE proposal with a target implementation in fall 2021.

6. Stakeholder Engagement and Next Steps

Stakeholder input is critical for developing market design policy. The schedule proposed below allows several opportunities for stakeholder involvement and feedback.

The three changes proposed in this initiative will be brought to the EIM Governing Body and CAISO Board of Governors in December 2020.

²¹CAISO Bid Cost Recovery Enhancements stakeholder initiative.
<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=4E892DE3-5FE0-46E4-84DA-1396391CF8BE>

6.1 Schedule

Table 6 lists the planned schedule for the Real-Time Settlement Review stakeholder process. The proposed timeline is subject to change, in part based on stakeholder inputs or unforeseen complexities presented within the process. The CAISO will include the schedule and any potential revisions at each step in the process.

Table 6: Proposed schedule for the RTSR stakeholder process

Item	Date
Post draft final proposal	October 21, 2020
Stakeholder call – draft final proposal	October 28, 2020
Stakeholder comments due – draft final proposal	November 11, 2020
EIM Governing Body	December 2, 2020
ISO Board of Governors	December 16-17, 2020

The CAISO will discuss this draft final proposal during a stakeholder conference call on October 28, 2020. The CAISO requests that stakeholders submit written comments by close of business November 11, 2020 using the online commenting tool. The tariff stakeholder process will commence in late October or early November. Details will be communicated in a future notice and included in CAISO’s Daily Briefing.

6.2 EIM Governing Body Role

This initiative includes three proposals. First, the CAISO proposes to modify the settlement rules that apply when energy is wheeling through one or more EIM BAAs and there is a power balance constraint violation in one of the EIM BAAs. Second, the CAISO would provide EIM BAAs that use a top-down approach to calculating UFE the option to have CAISO calculate their UFE settlement using a top-down approach. Third, the CAISO proposes to change the calculation to determine adjustments to BCR uplift to account for EIM transfers, and remove UFE from this calculation. These three proposals are severable for purposes of approval and filing. This means that if only one of the changes were approved, the CAISO would proceed to file that change without the others.

Staff believes the EIM Governing Body should have primary authority over the approval of the first two proposed changes and an advisory role over the third. An initiative proposing to change rules of the real-time market falls within the primary authority of the EIM Governing Body if either

- The proposed new rule is EIM-specific in the sense that it applies uniquely or differently in the balancing authority areas of EIM entities, as opposed to a generally applicable rule, or
- The proposed market rules are generally applicable and “an issue that is specific to the EIM balancing authority areas is the primary driver for the proposed change.”

The proposed tariff rules to implement the first two changes would be EIM-specific. The rules to implement the first change, about settlement for wheeling energy, will apply only to EIM entities, because they concern base ETSRs. The CAISO BAA does not use base ETSRs. The rules to implement the second change also would apply only to EIM entities. Entities internal to the CAISO BAA may not use a top-down approach, and the initiative will not change this rule. Accordingly, the EIM Governing Body would primary authority over these proposed rule changes.

The tariff rules to implement the third change, however, will be generally applicable across the entire real-time market. Moreover, the primary driver for these changes is to improve the allocation of BCR generally, not to solve a problem in an EIM balancing authority area. While staff was prompted to examine this issue more closely in connection with a review of how EIM transfers affect BCR allocation, this does not make an issue specific to EIM the primary driver for the change. The proper allocation of BCR uplift charges affects and is important to the entire market. Accordingly, the EIM Governing Body should have an advisory role over the third proposed change.

We encourage stakeholders to submit comments on this proposed classification. If any stakeholder disagrees with this proposed classification, please include in your written comments a justification of which classification is more appropriate.