Settlements and Billing

Configuration Guide: Real Time Imbalance Energy Offset

CC 6477

 Version 5.11

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# Purpose of Document

The purpose of this document is to capture the requirements and design specification for a Charge Code in one document.

# Introduction

## Background

The CAISO calculates and accounts for Imbalance Energy for each Dispatch Interval and settles Imbalance Energy for each Settlement Interval for each resource within the EIM Area and all System Resources Dispatched in Real-Time.

Imbalance Energy consists of following:

* IIE – instructed imbalance energy
	+ FMM Instructed Imbalance Energy Settlement (CC 6460)
	+ FMM Instructed Imbalance Energy EIM Settlement (CC 64600)
	+ RTD Instructed Imbalance Energy Settlement (CC 6470)
	+ RTD Instructed Imbalance Energy EIM Settlement (CC 64700)
* UIE – Uninstructed Imbalance Energy
	+ Real Time Uninstructed Imbalance Energy Settlement (CC 6475)
	+ Real Time Uninstructed Imbalance Energy EIM Settlement (CC 64750)
* UFE – Unaccounted for Energy
	+ Real Time Unaccounted for Energy Settlement (CC 6474)
	+ Real Time Unaccounted for Energy EIM Settlement (CC 64740)

To the extent that the sum of the Settlement Amounts for IIE, UIE, and UFE does not equal zero within the CAISO Balancing Authority Area, the CAISO will assess Charges or make Payments in Real Time Imbalance Energy Offset (CC 6477) and in Real Time Imbalance Energy Offset EIM (CC 64770) for the resulting differences to all Scheduling Coordinators based on a pro rata share of their Measured Demand for the relevant Settlement Interval. To the extent that the sum of the Settlement Amounts for IIE, UIE, UFE does not equal zero within the EIM Balancing Authority Area, the CAISO will assess Charges or make Payments in Real Time Imbalance Energy Offset EIM (CC 64770) for the resulting differences to EIM Entity Scheduling Coordinator ID, respectively.

In the Real-Time Market, the negative and positive Congestion Charges associated with a valid post-Day-Ahead TOR and ETC schedule change (including changes submitted to the Hour-Ahead Scheduling Process and changes submitted closer to Real-Time where allowed by the contract) will be reversed in CC 6788 RTM Congestion Credit Settlement. Because Congestion Charges are implicitly collected by the CAISO in the Real-Time settlement and there are no holders of rights to receive Real-Time Congestion revenues, all charges for Real-Time Congestion will be accumulated in special and separate Balancing Authority Area neutrality accounts. The CAISO Real-Time Congestion Charges less Virtual Bid Adjustment shall be distributed back to non-ETC Control Area metered Demand and exports in Real Time Congestion Offset (CC 6774). The EIM Balancing Authority Area Real-Time Congestion Charges shall be distributed to the applicable EIM Entity Scheduling Coordinator in Real Time Congestion Offset EIM (CC 67740).

## Description

The calculation of Real-Time Imbalance Energy also includes the settlement of Real Time Virtual Awards, and Real-Time Ancillary Service Congestion revenues. Additional adjustments are calculated to subtract congestion and transmission losses, and adjust for participation in the Energy Imbalance Market.

To the extent that the sum of the Settlement Amounts for EIM Financial Transfer, IIE, UIE, and UFE, Real-Time AS Imports Congestion, and DA Virtual Award Settlements in Real-Time, less the RT Energy Congestion revenues computed within Real-Time Congestion Offset (from CC 6774) less the Real-Time Marginal Cost of Losses Offset and EIM Transfer Adjustment does not equal zero, the CAISO will assess Charges or make Payments in Real Time Imbalance Energy Offset (CC 6477) for the resulting differences to all Scheduling Coordinators based on a pro rata share of their Measured Demand excluding demand quantity for the valid and balanced portion of TOR contract self-schedules in Real-Time and Net Measured Demand of Load Following MSSs.

# Charge Code Requirements

## Business Rules

| Bus Req ID | Business Rule |
| --- | --- |
| 1.0 | This Charge Code shall be calculated and output on a 5-minute Settlement Interval basis. |
| 2.0 | The Initial Real-Time Imbalance Energy Offset for each EIM Balancing Authority Area in the EIM Area as the sum of the financial value of EIM Transfers and the Settlement amounts for FMM Instructed Imbalance Energy, RTD Instructed Imbalance Energy, Uninstructed Imbalance Energy, Unaccounted for Energy, Virtual Awards Settlement, less Real-Time Congestion Offset and less the Real-Time Marginal Cost of Losses Offset. |
| 2.1 | For CAISO Balancing Authority Area, the subtraction of RT Congestion Offset in the previous rule shall not include the net RT AS Imports congestion and the net RT congestion credits for contracts as these are specific only to CAISO and were also not included in the base calculation of the Initial Imbalance Energy Offset amount. Instead for CAISO BAA, the amount to be subtracted in place of the RT Congestion Offset is the RT Energy Congestion amount, which does not include the net RT AS Imports congestion and the net RT congestion credits for contracts. |
| 3.0 | The Financial Value of EIM Transfers shall be the product of the MWh, and the Marginal Economic Cost associated to the relevant BAA. |
| 3.1 | EIM Transfers from Base EIM Transfer System Resources that elected settlement, for both FMM and RTD (inclusive of updates after RTM schedules through e-tags) deviations with respect to their base schedules, will not be included in the computation of financial value of EIM Transfers as those are already settled RT Imbalance Energy charge code(s). |
| 3.2 | A Master File – resident flag (Yes / No) shall indicate whether (Yes) or not (No) an ETSR has elected to participate in imbalance energy settlement. |
| 4.0 | The allocation of the Real-Time Imbalance Energy Offset for the CAISO Balancing Authority Areas, to Scheduling Coordinators in the CAISO Balancing Authority Area according to their Measured Demand excluding valid and balanced TOR contract quantities. |
| 4.1 | For an MSS that have elected Load following or net Settlement, or both, the Measured Demand allocation basis shall be: for the Real Time Imbalance Energy Offset adjustment, MSS Aggregation Net Measured Demand is excluded.These values are calculated in another charge code. (Fact) |
| 4.2 | Measured Demand is defined for this Charge Code as a Scheduling Coordinator’s Measured Demand (for UDCs and MSS entities that have elected for gross settlement) plus net Demand (for net-settled MSS entities). |
| 4.3 | TOR holders, for their TOR valid and balanced contract quantities, shall not get a share of the allocation for they are excluded from the Measured Demand allocation basis. |

## Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| Measured Demand Over Control Area Pre-calculation |
| RT Energy Quantity Pre-calculation |
| CC 6460 – FMM Instructed Imbalance Energy Settlement |
| CC 6470 – Real Time Instructed Imbalance Energy Settlement (IIE) |
| CC 6475 – Real Time Uninstructed Imbalance Energy Settlement (UIE) |
| CC 6474 – Real Time Unaccounted for Energy Settlement (UFE) |
| CC 6774 – Real Time Congestion Offset |
| CC 6985 – Real Time Losses Offset |
| CC 6473 – Convergence Bidding RT Energy, Congestion, and Loss Settlement |

## Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| None |

## Inputs – External Systems

|  |  |  |
| --- | --- | --- |
| Row # | Variable Name | Description |
|  |  MSSLoadFollowingExclusionFlag B | MSS Load Following exclusion Flag for Business Associate **B**.  |
|  |  |  |
|  |  |  |
|  | ResourceETSRElectSettlementFlag rmd | Flag (1/NULL) that indicates (when = 1) that the specified BASE ESTR resource is an EIM Transfer System Resource (ETSR) that has selected to settle its ETSR IIE and OA at the real-time LMP |

## Inputs - Predecessor Charge Codes or Pre-calculations

| Row # | Variable Name | Predecessor Charge Code/ Pre-calc Configuration |
| --- | --- | --- |
| 1. 3
 | BA\_UDC\_SettlementInterval\_UnaccountedforEnergy\_SettlementAmount BuM’mdhcif | CC 6474 - Real Time Unaccounted for Energy Settlement (UFE). |
|  | SettlementIntervalUIESettlementAmount BrtuT’I’M’mdhcif | CC 6475 - Real Time Uninstructed Imbalance Energy Settlement (UIE) |
|  | CAISOSettlementIntervalTotalFMMIIEAmount mdhcif | CC 6460 – FMM Instructed Imbalance Energy Settlement |
|  | SettlementIntervalIIEAmount Brtmdhcif | CC 6470 - Real Time Instructed Imbalance Energy Settlement (IIE) |
|  | CAISOHourlyRTVirtualSupplyOrDemandAwardEnergySettlementAmount mdh | CC 6473 – Convergence Bidding RT Energy, Congestion, Loss Settlement |
|  |  |  |
|  | RTBAACongestionRevenueAmount Q’mdhcif | Real Time Congestion PC |
|  | CAISOTotalRTLossOffsetAmount mdhcif | CC 6985 – Real Time Losses Offset |
| 1. 8
 | BASettlementIntervalMeasuredDemandMinusBalancedTORDemandQuantity\_EX\_RTM\_IMBOFF Bmdhcif | Measured Demand Over Control Area Pre-calculationNote: This value is assumed negative in the current charge code.  |
|  | RTVirtualAwardNodalCongestionAmount mdhcif | Real Time Congestion PC |
| 1. `
 | RTVirtualAwardLAPCongestionAmount mdhcif | Real Time Congestion PC |
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## CAISO Formula

CAISOTotalRealTimeImbalanceEnergyOffsetAmount mdhcif

CAISOTotalRealTimeImbalanceEnergyOffsetAmount mdhcif =

****** BusinessAssociateRealTimeImbalanceEnergyOffsetAllocationAmount *Bmdhcif*

*Note: This calculation is* being performed in the hierarchy of Charge Code 6477

BusinessAssociateRealTimeImbalanceEnergyOffsetAllocationAmount *Bmdhcif*

BusinessAssociateRealTimeImbalanceEnergyOffsetAllocationAmount *Bmdhcif =* (BASettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ Bmdhcif\* RealTimeImbalanceEnergyOffsetPrice mdhcif*)*

### BASettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ Bmdhcif

IF

MSSLoadFollowingExclusionFlag B = 1

THEN

BASettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ Bmdhcif = 0

ELSE

BASettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ Bmdhcif =

BASettlementIntervalMeasuredDemandMinusBalancedTORDemandQuantity\_EX\_RTM\_IMBOFF Bmdhcif

### RealTimeImbalanceEnergyOffsetPrice mdhcif

IF

CAISOSettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ mdhcif<> 0

THEN

RealTimeImbalanceEnergyOffsetPrice mdhcif=

(-1) \* (CAISOTotalRTIEOSettlementAmount mdhcif / CAISOSettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ mdhcif)

ELSE

RealTimeImbalanceEnergyOffsetPrice mdhcif= 0

END IF

### CAISOSettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ mdhcif

CAISOSettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ mdhcif= ****BASettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ Bmdhcif

### CAISOTotalRTIEOSettlementAmount mdhcif

CAISOTotalRTIEOSettlementAmount mdhcif =

CAISOInitialRealTimeImbalanceEnergyOffsetSettlementAmount mdhcif

### CAISOInitialRealTimeImbalanceEnergyOffsetSettlementAmount mdhcif

CAISOInitialRealTimeImbalanceEnergyOffsetSettlementAmount mdhcif = CAISOTotalRealTimeIIESettlementAmount mdhcif + CAISOSettlementIntervalTotalFMMIIEAmount mdhcif + CAISOTotalRealTimeUIESettlementAmount mdhcif + CAISOTotalUFESettlementAmount *mdhcif* *-*

CAISOTotalRTEnergyCongestionAmount mdhcif-

CAISOTotalRTLossOffsetAmount *mdhcif* *+*

 [(1/12) \* CAISOHourlyRTVirtualSupplyOrDemandAwardEnergySettlementAmount mdh]

### CAISOTotalRealTimeIIESettlementAmount mdhcif

CAISOTotalRealTimeIIESettlementAmount mdhcif =

 SettlementIntervalIIEAmount Brtmdhcif

Note: This calculation is being performed in the hierarchy of Charge Code 6470

### CAISOTotalRealTimeUIESettlementAmount mdhcif

CAISOTotalRealTimeUIESettlementAmount *mdhcif* =

( SettlementIntervalUIESettlementAmount *BrtuT’I’M’mdhcif* )

Note: This calculation is being performed in the hierarchy of Charge Code 6475

### CAISOTotalUFESettlementAmount mdhcif

CAISOTotalUFESettlementAmount mdhcif =

 BA\_UDC\_SettlementInterval\_UnaccountedforEnergy\_SettlementAmount BuM’mdhcif

Note: This calculation is being performed in the hierarchy of Charge Code 6474

### CAISOTotalRTEnergyCongestionAmount mdhcif

### CAISOTotalRTEnergyCongestionAmount mdhcif = CAISORTEnergyCongestionAmount mdhcif + RTVirtualAwardNodalCongestionAmount mdhcif + RTVirtualAwardLAPCongestionAmount mdhcif

### CAISORTEnergyCongestionAmount mdhcif

CAISORTEnergyCongestionAmount mdhcif = RTBAACongestionRevenueAmount Q’mdhcif

Where Balancing Authority Area = ‘CISO’

## Outputs

| Output ID | Name | Description |
| --- | --- | --- |
|  | In addition to any outputs listed below, all inputs shall be included as outputs. |  |
|  | BusinessAssociateRealTimeImbalanceEnergyOffsetAllocationAmount *Bmdhcif*  | Total Real Time Instructed Imbalance Energy Settlement Amount for the CAISO Control Area by Business Associate ID (B). |
|  | BASettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ Bmdhcif | The billing quantity for the RT Imbalance Energy Offset for BA ID B. |
|  | RealTimeImbalanceEnergyOffsetPrice *mdhcif* | The per unit charge price to be applied to the billable quantity for the Real Time Imbalance Energy Offset ($/MWh). |
|  | CAISOSettlementIntervalCAMD\_RTImbalanceEnergyOffset\_BQ mdhcif | The billing quantity for the RT Imbalance Energy Offset for CAISO area. |
|  | CAISOTotalRTIEOSettlementAmount mdhcif | Total Real Time Imbalance Energy Settlement Amount for the CAISO Control Area. |
|  | CAISOInitialRealTimeImbalanceEnergyOffsetSettlementAmount mdhcif | Initial calculation of CAISO Real-Time Imbalance Energy Offset. |
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|  | CAISOTotalRealTimeIIESettlementAmount mdhcif  | Total Real Time Instructed Imbalance Energy Settlement Amount for the CAISO Control Area. |
|  | CAISOTotalRealTimeUIESettlementAmount *mdhcif* | Total Real Time Uninstructed Imbalance Energy Settlement Amount for the CAISO Control Area. |
|  | CAISOTotalUFESettlementAmount *mdhcif* | Total Unaccounted for Energy Settlement Amount for the CAISO Control Area. |
|  | CAISOTotalRTEnergyCongestionAmount mdhcif | Total net congestion revenue from Real Time Energy for the CAISO Control Area including Virtual Bids. |
|  | CAISORTEnergyCongestionAmount mdhcif | The CAISO Real Time Energy Congestion Amount excluding Virtual Bids  |

# Charge Code Effective Dates

| Charge Code/Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Update Type |
| --- | --- | --- | --- | --- |
| CC 6477 – Real Time Imbalance Energy Offset | 5.0 | 04/01/09 | 09/30/09 | Documentation Edits Only |
| CC 6477 – Real Time Imbalance Energy Offset | 5.1 | 10/01/09 | 10/31/09 | Configuration Change Required |
| CC 6477 – Real Time Imbalance Energy Offset | 5.2 | 11/01/09 | 01/31/11 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.3 | 02/01/11 |  04/30/14 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.4 | 05/01/14 | 9/30/14 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.5 | 10/01/14 | 9/30/14 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.6 | 10/01/14 | 11/3/15 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.7 | 11/4/15 | 4/3/18 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.8 | 4/4/18 | 10/31/18 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.9 | 11/1/18 | 7/31/19 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.10 | 8/1/19 | 4/30/26 | Configuration Impacted |
| CC 6477 – Real Time Imbalance Energy Offset | 5.11 | 5/1/26 | Open | Configuration Impacted |