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|  | Settlements & Billing | |
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|  | |  |
| Configuration Guide: | | Hour-Ahead Scheduling Process Uplift Settlement |
|  | |  |
|  | | 6483 |
|  | |  |
|  | | Version 5.1 |

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# Purpose of Document

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

# Introduction

## Background

Under normal operating conditions, the CAISO clears hourly block imports and exports in the HASP and settles them at FMM prices without provisions for a make-whole payment. During very tight system conditions, the CAISO will provide bid cost make-whole payments for real-time market hourly block economic imports.

Imports eligible for a bid make-whole payment include:

* Real-time market energy that is incremental to any import amount scheduled in the day-ahead market.
* Real-time market energy that is the result of an export scheduled in the day-ahead market reduced by the real-time market.

## Description

The CAISO will calculate an hourly make-whole payment as the positive difference between a scheduling coordinator’s bid price and the hourly average FMM locational marginal price for each of the applicable hours in which the CAISO identifies tight system conditions will exist.

The CAISO proposes to define tight system conditions as hours for which:

* The CAISO issues an alert notice by 3p.m. the day before an operating day that states the CAISO anticipates an operating reserve deficiency for specified hours, or
* The CAISO issues a warning notice or emergency notice during an operating day that states the CAISO anticipates or is experiencing an operating reserve deficiency during specified hours.

Charge Code “CC 6483 – Hour-Ahead Scheduling Process Uplift Settlement” will perform the calculations necessary to implement the business rules identified in the Business Rules of the following section here below.

# 

# Charge Code Requirements

## Business Rules

| Bus Req ID | Business Rule |
| --- | --- |
|  | This Charge Code shall calculate on a daily basis per hour. |
|  | For adjustments to the Charge Code that cannot be accomplished by correction of upstream data inputs/recalculation or operator override Pass Through Bill Charge logic will be applied. |
|  | Actual Scheduling Coordinators (SCs) are referenced by Business Associate ID, and CAISO shall settle with Business Associates (BA) through these IDs. |
|  | The formulas herein adopt the convention that payments made by CAISO to BAs will be negative, while payments received by the CAISO from BAs (charges to BAs) will be positive. (In other words, the signs reflect the flow of money from the point of view of the CAISO.) |
|  | System shall provide the capability to configuration users to suspend the entire make-whole payment rule provisions during tight system conditions. |
|  | During tight system conditions (AWE date/time window), Settlements shall identify the following interties to be eligible for a bid cost make-whole payment:   * Each HASP Block Intertie Import Schedules, that bid into RTM, based upon the FMM Optimal Energy above the DA Schedule Energy. * Each HASP Block Intertie Export Schedules, that bid into RTM, based upon the FMM Optimal Energy below the DA Schedule Energy. |
|  | On daily basis, after T and before T+7, Settlements shall automatically consume the following original and corrected (if any) tight system conditions indicators:   * AWE Start Date/Time * AWE End Date/Time |
|  | During tight system conditions (AWE date/time window), Settlements shall calculate the FMM make-whole energy (MWh) for interties that are identified to be eligible for bid cost make-whole payment as defined in Business Rule 5.1. |
|  | During tight system conditions (AWE date/time window), Settlements shall calculate the make-whole RTM hourly prices for RTM incremental import and decremental export interties as the positive difference between:  HASP Block Intertie Schedule bid, and Relevant hourly average FMM LMPs for the applicable Trading Hour |
|  | |  | | --- | | During tight system conditions (AWE date/time window), and for each HASP block intertie incremental import or decremental export schedules, Settlements shall calculate make-whole payment as the multiplication of: | | * Calculated FMM Make-Whole Energy (Business Requirement 5.3) | | * Calculated Hourly Make-Whole RTM Prices (Business Requirement 5.4) | |
|  | During tight system conditions (AWE date/time window), Settlements shall exclude any import or export resources/transaction IDs from receiving make-whole payment that are subject to:   * HASP reversal rules * Intertie deviation settlement rules |
|  | As a requirement associated with the DAME EDAM initiative, EDAM BAA’s will be excluded from these equations by applying exclusionary business driver logic to the existing equation BA5MResourceHASPUpliftSettlementQuantity BrtubM’mdhcif.  This will ensure that the existing equations BA5MResourceHASPUpliftSettlementAmount Brtmdhcif and BA5MResourceTotalFMMLMPAmount Brtmdhcif and any other amounts within this charge code that these two will subsequently input to will exclude EDAM BAA’s. |

## Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| Real-Time Price Precalculation |
| Real-Time Energy Precalculation |
| CC 6460 – FMM Instructed Imbalance Energy Settlement |
| CC 6456 – Intertie Deviation Settlement |
| CC 8077 Day Ahead Imbalance Reserve Up Allocation |

## Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| CC 6484 – Hour-Ahead Scheduling Process Uplift Settlement Allocation |
| CC 4989 – Rounding Adjustment Settlement |

## 

## Inputs – External Systems

| Row # | Variable Name | Description |
| --- | --- | --- |
|  | SettlementIntervalTightSystemConditionsIndicatorFlag mdhcif | A flag (1/0) where 1 indicates that a given settlement interval is identified to have been ran under Tight System Conditions.  If the flag does not exist, the calculation will assume the flag to have a value of 0 |
|  | DailySuspendHASPUpliftSettlementFlag md | A flag (1/0) where 1 indicates that for a given trade day the CAISO has assessed that there are adverse market outcomes resulting from the Hour-Ahead Scheduling Process Uplift Settlement. In this case, CAISO will suspend the entire make-whole payment rule provisions.  If the flag does not exist, the calculation will assume the flag to have a value of 0 |
|  | PTBBAHourlyResourceChgAdjHASPUpliftSettlementAmt BrJmdh | PTB adjustment variable for this Charge Code, amount per Business Associate and Trading date. ($) |
|  | BAHourlyResourceIntertieBidOptionsFlag BrtQ’mdh | An integer-valued input that indicates the Intertie Bid Option for a the specified Balancing Authority Area, resource and Trading Hour as follows:  1 – DYNAMIC: The resource is a dynamic resource.  2 – EB15MIN: Economic bid with participation in 15-minute market.  3 – EBHB: Economic bid hourly block.  4 – EBHBCHG: Economic bid hourly block with single intra-hour economic schedule change.  5 – SSHB: Self scheduled hourly block.  6 – SSVER: Self-scheduled variable energy resource forecast. |
|  | DispatchIntervalFMMOptimalIIE BrtuT'bI'Q'M'R'W'F'S'VL'mdhcif | Represents Incremental or Decremental FMM Optimal IIE for a dispatchable resource.  Incremental IIE quantities are positive  Decremental IIE quantities are negative |
|  | DispatchIntervalTotalExpectedEnergy BrtEuT'I'Q'M'AA'VL'W'R'pF'S'mdhcif | Dispatch Interval Total IIE Energy (provided by MQS) that corresponds to the Energy under the DOP for a resource. Energy quantity can be either positive or negative value. |
|  | FMMEnergyBidPrice BrtuT'bI'M'VL'W'R'F'S'mdhcif | FMM Energy Bid Price (in $/MWh) for a given resource and Settlement Interval, based on the final Bid submittal for FMM Energy. |

## Inputs – Predecessor Charge Codes or Pre-calculations

| Row # | Variable Name | Predecessor Charge Code/ Pre-calc Configuration |
| --- | --- | --- |
| 1 | FMMIntervalLMPPrice BrtuM’mdhc | Real-Time Price Precalculation |
| 2 | BAHourlyResourceExportHASPReversalAmount BrtuT'I'M'F'S'mdh | CC 6460 - FMM Instructed Imbalance Energy Settlement |
| 3 | BAHourlyResourceImportHASPReversalAmount BrtuT'I'M'F'S'mdh | CC 6460 - FMM Instructed Imbalance Energy Settlement |
| 4 | BA5MResourceHourlyBlockIntertieDeviationSettlementAmount Brtmdhcif | CC 6456 – Intertie Deviation Settlement |
| 5 | FMMEnergyMissingBidPriceFlag BrtuT'bI'M'VL'W'R'F'S'mdhcif | Real-Time Net Amount Precalculation |
| 6 | EDAMBAAFlag Q’md | 8077 Day Ahead Imbalance Reserve Up Allocation  Flag, with a value of 1, for an EDAM BAA |

## CAISO Formula

The daily settlement of Hour-Ahead Scheduling Process Uplift Settlement for each Business Associate by Trading Day is derived according to the formulation below.

**Note:** The following calculation is listed starting with the final charge calculation and progressively detailing the intermediate calculations and Settlement input.

**BAHourlyResourceHASPUpliftSettlementAmount Brtmdh =**

Sum (c,i,f)

{

BA5MResourceHASPUpliftSettlementAmount Brtmdhcif

}

**BA5MResourceHASPUpliftSettlementAmount Brtmdhcif =**

Sum over (b,u,M’)

{

(1- DailySuspendHASPUpliftSettlementFlag md )\*

(-1) \*

(BA5MResourceHASPUpliftSettlementQuantity BrtubM’mdhcif \* BA5MResourceHASPUpliftSettlementPrice Brtbmdhcif)

}

**BA5MResourceHASPUpliftSettlementQuantity BrtubM’mdhcif =**

Sum over (T',I',Q’,R',W',F',S',V,L')

{

SettlementIntervalTightSystemConditionsIndicatorFlag mdhcif \*

IF BA5MResourceIntertieBidOptionsFilteredFlag Brtmdhcif = 3 or 4 or 5

THEN

1. BA5MResourceHASPUpliftExemptionFlagBrtmdhcif ) \*
2. BA5MResourceWheelFlag Brtmdhcif) \*

(1 - FMMEnergyMissingBidPriceFlag BrtuT'bI'M'VL'W'R'F'S'mdhcif ) \*

Max(0, DispatchIntervalFMMOptimalIIE BrtuT'bI'Q'M'R'W'F'S'VL'mdhcif)

ELSE

BA5MResourceHASPUpliftSettlementQuantity BrtubM’mdhcif = 0

Where

t = ITIE or ETIE

}

Developmental note: EDAMBAAFlag Q’md will be added as an exclusionary business driver to ensure that EDAM BAA’s will be exluded on the output

**BA5MResourceWheelFlag Brtmdhcif =**

IF

ABS(BA5MResourceWheelTotalExpectedEnergyFilteredQuantity Brtmdhcif) >= 0

THEN

BA5MResourceWheelFlag Brtmdhcif = 1

ELSE

BA5MResourceWheelFlag Brtmdhcif = 1

END IF

**BA5MResourceWheelTotalExpectedEnergyFilteredQuantity** Brtmdhcif =

Sum over (E,u,T',I',Q',M',A,A',V,L',W',R',p,F',S')

{

DispatchIntervalTotalExpectedEnergy BrtEuT'I'Q'M'AA'VL'W'R'pF'S'mdhcif

Where

t = ITIE or ETIE

And

E = WHEEL

}

**BA5MResourceHASPUpliftExemptionFlag Brtmdhcif =**

SettlementIntervalTightSystemConditionsIndicatorFlag mdhcif \*

IF (

BA5MResourceIntertieHASPReversalAmount Brtmdhcif + BA5MResourceHourlyBlockIntertieDeviationSettlementAmount Brtmdhcif <> 0

THEN

BA5MResourceHASPUpliftExemptionFlagBrtmdhcif = 1

ELSE

BA5MResourceHASPUpliftExemptionFlagBrtmdhcif = 0

)

**BA5MResourceIntertieHASPReversalAmount Brtmdhcif =**

#### Sum over (u,T',I',M',F',S')

{

#### ABS(BAHourlyResourceExportHASPReversalAmount BrtuT'I'M'F'S'mdh +BAHourlyResourceImportHASPReversalAmount BrtuT'I'M'F'S'mdh )

Where t = ITIE or ETIE

}

**BA5MResourceHASPUpliftSettlementPrice Brtbmdhcif =**

Sum over (u,T',I',M',V,L',W',R',F',S')

{

SettlementIntervalTightSystemConditionsIndicatorFlag mdhcif \*

Max(0, FMMEnergyBidPrice BrtuT'bI'M'VL'W'R'F'S'mdhcif – Intduplicate(BAHourlyResourceAverageFMMLMPPrice Brtmdh))

}

Where t = ITIE or ETIE

**BA5MResourceIntertieBidOptionsFilteredFlag Brtmdhcif =**

Sum over (Q’) {Intduplicate(BAHourlyResourceIntertieBidOptionsFlag BrtQ’mdh)}

**BAHourlyResourceAverageFMMLMPPrice Brtmdh =**

(BAHourlyResourceTotalFMMLMPAmount Brtmdh/ BAHourlyResourceTotalHASPUpliftQuantity Brtmdh)

**BAHourlyResourceTotalHASPUpliftQuantity Brtmdh =**

Sum over (b,u,M’c,i,f) {BA5MResourceHASPUpliftSettlementQuantity BrtbuM’mdhcif}

**BAHourlyResourceTotalFMMLMPAmount Brtmdh =**

#### Sum over (c,i,f)

#### BA5MResourceTotalFMMLMPAmount Brtmdhcif

**BA5MResourceTotalFMMLMPAmount Brtmdhcif =**

#### Sum over (b,u,M’)

#### {

#### INTDUPLICATE(FMMIntervalLMPPrice BrtuM’mdhc) \* BA5MResourceHASPUpliftSettlementQuantity BrtbuM’mdhcif

#### }

**CAISOHourlyHASPUpliftSettlementAmount mdh =**

Sum over (B,r,t)

{

**BAHourlyResourceHASPUpliftSettlementAmount Brtmdh**

}

Note: This value is calculated within the Hierarchy of this charge code for use in subsequent Charge codes

## Outputs

| Output Req ID | Name | Description |
| --- | --- | --- |
|  | In addition to any outputs listed below, all inputs shall be included as outputs. | All inputs. Refer to section 3.6 and 3.7 above for input descriptions. |
|  | BAHourlyResourceHASPUpliftSettlementAmount Brtmdh | Total of HASP Uplift Settlement Amount (in U.S. $) for all Business Associate and Trading Day for each given hour. |
|  | BA5MResourceHASPUpliftSettlementAmount Brtmdhcif | Total of HASP Uplift Settlement Amount (in U.S. $) for all Business Associate and Trading Day for each Settlement Interval including any PTB adjustments. |
|  | BA5MResourceHASPUpliftSettlementQuantity BrtubM’mdhcif | Total of HASP Uplift Settlement Quantity (in MWh) of Hourly Block Economic Bid Intertie Resources for a given Business Associate, Resource, and Settlement Interval. |
|  | BA5MResourceWheelFlag Brtmdhcif | A flag (1/0) where 1 indicates that a given resource is a Wheeling resource and is therefore exempted from HASP Uplift Settlement |
|  | BA5MResourceWheelTotalExpectedEnergyFilteredQuantity Brtmdhcif | The Total Expected Energy (in MWh) for a given Intertie Wheeling resource for each Settlement Interval |
|  | BA5MResourceHASPUpliftExemptionFlag Brtmdhcif | A flag (1/0) where 1 indicates that a given resource has been subject to either HASP Reversal or Intertie Deviation Settlement and therefore exempted from HASP Uplift Settlement |
|  | BA5MResourceIntertieHASPReversalAmount Brtmdhcif | The Total HASP Reversal Amount (in U.S. $) for a given Import and Export Intertie resource. |
|  | BA5MResourceHASPUpliftSettlementPrice Brtbmdhcif | The designated price to be applied to the HASP Uplift Settlement. This price is the difference between the HASP Block Intertie Schedule bid, and Relevant hourly average FMM LMPs for the applicable Trading Hour |
|  | BA5MResourceIntertieBidOptionsFilteredFlag Brtmdhcif | An integer-valued input that indicates the Intertie Bid Option for a given resource and Trading Hour as follows:  1 – DYNAMIC: The resource is a dynamic resource.  2 – EB15MIN: Economic bid with participation in 15-minute market.  3 – EBHB: Economic bid hourly block.  4 – EBHBCHG: Economic bid hourly block with single intra-hour economic schedule change.  5 – SSHB: Self scheduled hourly block.  6 – SSVER: Self-scheduled variable energy resource forecast. |
|  | BAHourlyResourceAverageFMMLMPPrice Brtmdh | The Hourly Average FMM LMP Price for a given resource and Trading Hour. |
|  | BAHourlyResourceTotalFMMLMPAmount Brtmdh | The Hourly Total FMM LMP Amount for a given resource and Trading hour |
|  | BA5MResourceTotalFMMLMPAmount Brtmdhcif | The Settlement Interval Total FMM LMP Amount for a given resource and Trading hour |
|  | BAHourlyResourceTotalHASPUpliftQuantity Brtmdh | The Hourly Total HASP Uplift Quantity for a given resource and Trading hour |
|  | CAISOHourlyHASPUpliftSettlementAmount mdh | The CIASO Hourly Total HASP Uplift Settlement Amount |

# Charge Code Effective Dates

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Charge Code/  Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Update Type |
| Hour-Ahead Scheduling Process Uplift Settlement | 5.0 | 06/01/2021 | TBD | Documentation Edits and Configuration Impacted |
| Hour-Ahead Scheduling Process Uplift Settlement | 5.1 | TBD | Open | Documentation Edits and Configuration Impacted |