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|  | | Settlements & Billing |
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| Configuration Guide: | Day Ahead Imbalance Reserve Down Tier 1 Allocation | |
|  |  | |
|  | 8086 | |
|  |  | |
|  | Version 5.0 | |

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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

The Day-Ahead Market Enhancements initiative introduced the imbalance reserves product to address imbalances caused by uncertainty in the day-ahead net load forecast and granularity differences between hourly day-ahead market and fifteen-minute real-time market schedules. Imbalance reserves ensure the integrated forward market schedules sufficient dispatch capability to meet net load imbalances between the day-ahead and real-time markets. Imbalance reserves can be imbalance reserves up (IRU) that provide upward dispatch capability or imbalance reserves down (IRD) that provide downward dispatch capability. A resource awarded schedule for IRU, IRD or both has an obligation to provide economic energy bids to the real-time market for the quantity of their awards. The market may schedule a resource to provide both IRU and IRD, but not for the same hourly intervals.

The integrated forward market co-optimizes the procurements of energy, ancillary services, and imbalance reserves. It procures imbalance reserves to meet an hourly imbalance reserve requirement. The market uses imbalance reserve deployment scenarios to ensure imbalance reserves are transmission-feasible to the locations the uncertainty is expected to materialize if they are fully deployed. The market clears prices for imbalance reserves at each node, resulting in locational marginal prices that reflect transmission constraints.

Imbalance reserves enable the day-ahead market to compensate resources that provide flexible reserves to meet net load uncertainty and ramping needs. Imbalance reserves are meant to reduce the need for out-of-market actions by the market operators and create a market price signal for day-ahead flexible reserves.

The day-ahead market only awards imbalance reserves to resources that are dispatchable in the fifteen-minute market. Although the day-ahead market will schedule imbalance reserves hourly, the maximum award would be based on a resource’s 30-minute ramp capability. Offline resources could be awarded imbalance reserves if the resource has a start-up time of 15 minutes or less.

Resources awarded imbalance reserves would receive a day-ahead payment at the product’s locational marginal price. Ramping capability provided by imbalance reserve awards in the day-ahead market would be settled against the flexible ramping product in the real-time market. The market would recover the costs of imbalance reserves, including congestion costs, through cost allocations that collect payments from entities based on their contribution to the need for procuring the product.

## Description

Charge Code “CC 8086 – Day Ahead Imbalance Reserve Down Tier 1 Allocation” 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 be calculated on a daily basis. |
|  | 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.) |
|  | Settlements will allocate IFM IRD costs in 2 tiers |
|  | **Tier-1 IRD Cost Allocation**  For each individual component, and on hourly basis:   * Tier-1 IFM IRD Allocation Cost = Tier-1 IRD Allocation Quantity \* Tier-1 IRD BAA Allocation Price. * Tier-1 IRD Allocation Quantity shall be calculated and varies per resource type, or for the case of an MSS that has elected to load follow, would be based on the MSS-level net portfolio uninstructed deviation. |
|  | **Tier-1 IRD Allocation Quantities (See table below)** |
|  | Load Following is an MSS Annual Election. For the MSS that has elected to Load Follow, the generation and load resource shall be excluded from the Generation Bucket and Load Bucket, and instead be calculated as a separate bill determinant at the MSS portfolio level based upon Net Deviation of the portfolio (Net of Generation UIE and Load UIE). The Net UIE shall determine if that MSS Bubble receives an IRU or IRD allocation for any given interval. |
|  | **Tier-1 IRD BAA Allocation Price**  For each BAA, and on hourly basis, this price shall be calculated as follows:   * Min (IRD BAA Requirement Price , IRD BAA Derived Price) * where * IRD BAA Requirement Price = Sum (IRD Requirement Cost - IRD Surplus Adjustment + IRD No Pay Revenue) / (Sum of BAA IRD Requirement - sum of IRD Surplus MW) over all zones * IRD BAA Derived Price = Sum (IRD Requirement Cost – IRD Surplus Adjustment + IRD No Pay Revenue) across BAA / Sum of Tier-1 IRD Allocation Quantity across BAA. * IRD Requirement Cost across BAA = IRD Requirement MW \* IRD BAA Requirement Price * IRD Surplus Adjustment = Sum of (IRD Surplus MW \* IRD Surplus Marginal Price) over all Surplus zones in BAA |
|  | **Tier-2 IRD Cost Allocation**  For each BAA, and on hourly basis:   * System shall calculate Tier-2 IRD BAA Allocation Cost as the remainder (left over) of unallocated IRD costs from Tier-1, as follows: * Tier-2 IRD BAA Allocation Cost = [IRD Requirement Cost - Sum of IRD Surplus Adjustment + IRD No Pay Revenue across BAA – Sum of Tier-1 IRD Cost Allocation across BAA] * System shall allocate Tier-2 IRD BAA Allocation Cost proportional to Metered Demand within each BAA, except for: * If a BAA is Gen-only (does not have metered demand), Tier-2 IRD BAA Allocation Cost shall be directly allocated to the Entity of the BAA. |
|  | Treatment of MSS   * If MSS operator has elected to load follow to manage its own load variability, it shall get IRD Tier-1 and IRD Tier-2 cost allocations based on the MSS operator’s net portfolio uninstructed deviations. * Otherwise, for both IRD Tier-1 and IRD Tier 2 cost allocations, MSS resources shall be settled in a similar manner as non-MSS resources, regardless of their Net versus Gross selection. |
|  | Treatment of ETC, and TOR   * System shall exclude the ETC and TOR self-schedules from IR Tier-1 and IR Tier-2 allocations up to the valid and balanced portion of ETC and TOR self-schedules.   In contrast, System shall consider quantities above the valid and balanced portion of the ETC or TOR self-schedules in IRD Tier-1 and IRD Tier-2 cost allocations. |
|  | Tier-1 IRD Cost Allocation to Generation and Import/Export component types applies to all generation resources, regardless of whether they are awarded IRD or not. |
|  | ESRs (using either the NGR model or the proposed ESR mode) will be considered under the “Generation” component type of the Tier-1 IRD cost allocations. |
|  | For each BAA, if the IRD obligation is higher than the IRD awards, all of the IRD cost will be allocated to IRD Tier-1, otherwise, IRD cost will be split between Tier-1 and Tier-2. |
|  |  |
|  | This cost allocation does not apply to WEIM-Only BAAs.  WEIM-Only BAAs do not participate in EDAM and will not be cost allocated for Imbalance Reserve. |

**Tier-1 IRD Allocation Quantity:**

|  |  |
| --- | --- |
| **Component Type** | **Tier-1 IRD Allocation Quantity** |
| Generation  (including ESR) | Max (0, FMMMaxExCap - DAEnergySchedule) as  affected by rerates or self-schedules (if applicable)) |
| Import | Max(0, FMMSelfSchedule – DAEnergySchedule) |
| Load | Positive UIE |
| Export | Max (0, DAEnergySchedule – FMMMaxExCap) as as affected by e-Tag transmission profile) |
| MSS  (on Load Following) | MSS operator’s net portfolio uninstructed deviations. |
| MSS  (NOT on Load Following, regardless of their Net versus Gross selection) | Same as non-MSS resources |

## Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| PC Real Time Energy Quantity |
| PC MSS Netting |
| PC ETC TOR CVR Quantity |
| CC 6011 – Day Ahead Energy, Congestion, Loss Settlement |
| CC 8081 – Day Ahead Imbalance Reserve Down Settlement |

## Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| CC 8087 – Day Ahead Imbalance Reserve Down Tier 2 Allocation |

## Inputs – External Systems

| Row # | Variable Name | Description |
| --- | --- | --- |
|  | 15MFMMSelfScheduleQuantity BrtuT'I'Q’M'F'S'VL'mdhc | 15 Minute Self Schedule submitted in FMM Market (MW) |
|  | WEIMOnlyBAAFlag Q’md | Flag indicating an EIM BAA that participates in the WEIM only, not EDAM. |
|  | BAAHourlyIRDReqQty Q'AA’Qpmdh | The Hourly IRD requirement quantity for each BAA. (MW) |
|  | BAAHourlyIRDReqtPrc Q'AA’Qpmdh | The Hourly IRD requirement price for each BAA and APnode. ($/MW) |
|  | BAAHourlyIRDSurplusQty Q'AA’Qpmdh | The Hourly IRD surplus quantity for each BAA. (MW) |
|  | BAAHourlyIRDSurplusMarginalPrc Q'AA’Qpmdh | The Hourly IRD surplus marginal price for each BAA and APnode. ($/MW) |
|  | PTBAdjBAHourlyIRDTier1AllocAmtBQ’JM’mdh | PTB Adjustment for the Tier 1 IRD cost allocation amount portion |

## Inputs - Predecessor Charge Codes or Pre-calculations

| Row # | Variable Name | Predecessor Charge Code/ Pre-calc Configuration |
| --- | --- | --- |
|  | BAHourlyResIRDSettlementAmountBrtQ’M’F’S’L’mdh | CC 8081 – Day Ahead Imbalance Reserve Down Settlement |
|  | BAHourlyResIRD\_NonComplianceAmountBrtQ’mdh | CC 8081 – Day Ahead Imbalance Reserve Down Settlement |
|  | HourlyResourceDayAheadEnergy BrtuT’I’Q’M’F’S’mdh | CC 6011 – Day Ahead Energy, Congestion, Loss Settlement  This value will be negative for LOAD and ETIE resource types |
|  | BAHourlyResFMMMaxExCapQuantity BrtQ’uT'I'M'F'S'mdh | CC 8076 – Day Ahead Imbalance Reserve Up Tier 1 Allocation |
|  | BAMSSLoadFollowingFlag BM'md | CC 8076 – Day Ahead Imbalance Reserve Up Tier 1 Allocation |
|  | BAHourlyResBalancedContractQuantityBrtmdh | CC 8076 – Day Ahead Imbalance Reserve Up Tier 1 Allocation |
|  | BASettlementIntervalResPosUIEQuantity BrtQ’M’mdhcif | CC 8076 – Day Ahead Imbalance Reserve Up Tier 1 Allocation |
|  | BASettlementIntervalResUIEQuantity BrtQ’M’mdhcif | CC 8076 – Day Ahead Imbalance Reserve Up Tier 1 Allocation |
|  | BAHourlyMSSLF\_IRBaseAllocQuantity BQ’M’mdh | CC 8076 – Day Ahead Imbalance Reserve Up Tier 1 Allocation |

## CAISO Formula

The daily settlement for this charge code 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.

### **BAHourlyIRDTier1AllocAmount BQ’M’mdh =** BAHourlyIRDTier1AllocQuantityBQ’M’mdh\* BAAHourlyIRDTier1AllocPrice Q’mdh + PTBAdjustmentBAHourlyIRDTier1AllocAmountBQ’M’mdh

**PTBAdjustmentBAHourlyIRDTier1AllocAmount BQ’M’mdh =**   
  
Sum (J) { PTBAdjBAHourlyIRDTier1AllocAmt BQ’JM’mdh }

**BAATotalHourlyIRDTier1AllocAmount Q’mdh =**   
  
Sum (B, M’) {BAHourlyIRDTier1AllocAmountBQ’M’mdh }

**BAAHourlyIRDTier2CostAmount Q’mdh =**   
  
BAAHourlyIRDAllocationCost **Q’mdh** - BAATotalHourlyIRDTier1AllocAmountQ’mdh

**A. Resource and MSS LF Tier 1 IRD Allocation Quantities**

**BAHourlyIRDTier1AllocQuantity BQ’M’mdh =**   
  
{BAHourlyTotalResIRDTier1AllocQuantityBQ’M’mdh

+ BAHourlyMSSLF\_IRDTier1AllocQuantityBQ’M’mdh }

**BAHourlyTotalResIRDTier1AllocQuantity BQ’M’mdh =**   
  
Sum (r, t)

{BAHourlyGenResIRDTier1AllocQuantity BrtQ’M’mdh + BAHourlyImportResIRDTier1AllocQuantity BrtQ’M’mdh + BAHourlyLoadResIRDTier1AllocQuantity BrtQ’M’mdh + BAHourlyExportResIRDTier1AllocQuantity BrtQ’M’mdh }

**BAHourlyGenResIRDTier1AllocQuantity** **BrtQ’M’mdh =**

Sum (u, T’, I’, F’, S’)

{Max (0, [(BAHourlyResFMMMaxExCapQuantityBrtQ’uT'I'M'F'S'mdh - HourlyResourceDayAheadEnergy BrtuT’I’Q’M’F’S’mdh) - BAHourlyResBalancedContractQuantityBrtmdh])}

where Resource\_Type (t) = ‘GEN’

Excluding records where these variables exists WEIMOnlyBAAFlag Q’md, and BAMSSLoadFollowingFlagBM'md

**BAHourlyImportResIRDTier1AllocQuantity** **BrtQ’M’mdh =**

Sum (u, T’, I’, F’, S’)

{Max (0, [(BAHourlyResFMMMaxExCapQuantityBrtQ’uT'I'M'F'S'mdh - HourlyResourceDayAheadEnergy BrtuT’I’Q’M’F’S’mdh) - BAHourlyResBalancedContractQuantityBrtmdh])}

where Resource\_Type (t) = ‘ITIE’

Excluding records where these variables exists WEIMOnlyBAAFlag Q’md, and BAMSSLoadFollowingFlagBM'md

**BAHourlyLoadResIRDTier1AllocQuantity** **BrtQ’M’mdh =**

Sum (c, i, f)

{BASettlementIntervalResPosUIEQuantity BrtQ’M’mdhcif }

where Resource\_Type (t) = ‘LOAD’

Excluding records where these variables exists WEIMOnlyBAAFlag Q’md, and BAMSSLoadFollowingFlagBM'md

**BAHourlyExportResIRDTier1AllocQuantity** BrtQ’M’mdh =

Sum (u, T’, I’, F’, S’, V, L’)

{Max (0, [Abs(INTDUPLICATE(HourlyResourceDayAheadEnergy BrtuT’I’Q’M’F’S’mdh )) -0.25\*(15MFMMSelfScheduleQuantity BrtuT'I'Q’M'F'S'VL'mdhc ) - Abs( BAHourlyResBalancedContractQuantityBrtmdh)])}

where Resource\_Type (t) = ‘ETIE’

Excluding records where these variables exists WEIMOnlyBAAFlag Q’md, and BAMSSLoadFollowingFlagBM'md

**BAHourlyMSSLF\_IRDTier1AllocQuantity BQ’M’mdh =**   
  
Max(0,BAHourlyMSSLF\_IRBaseAllocQuantity BQ’M’mdh )

**B. Tier 1 Price Calculations**

**BAAHourlyIRDTier1AllocPrice** **Q’mdh =**

Min (BAAHourlyIRDTier1ReqtPrice Q’mdh, BAAHourlyIRDTier1DerivedPrice Q’mdh)

### BAAHourlyIRDAllocationCost **Q’mdh =**

Max (0, BAAHourlyIRDReqtCost Q’mdh - BAAHourlyIRDSurplusAdjustment Q’mdh) + BAAHourlyIRDNoPayRevenue Q’mdh

**BAAHourlyTotalIRDTier1AllocQuantity Q’mdh** =

Sum (B, M’) {BAHourlyTotalResIRDTier1AllocQuantityBQ’M’mdh }

**BAAHourlyIRDTier1DerivedPrice** Q’mdh =

BAAHourlyIRDAllocationCost Q’mdh

*/* BAAHourlyTotalIRDTier1AllocQuantityQ’mdh

### BAAHourlyIRDReqtCost Q’mdh=Sum (A,A’,Q,p) { BAAHourlyIRDReqQty Q'AA’Qpmdh \* BAAHourlyIRDReqtPrc Q'AA’Qpmdh }

### BAAHourlyIRDSurplusAdjustment Q’mdh=Sum (A,A’,Q,p) { BAAHourlyIRDSurplusQty Q'AA’Qpmdh \* BAAHourlyIRDSurplusMarginalPrc Q'AA’Qpmdh }

### BAAHourlyIRDNoPayRevenue Q’mdh=Sum (B,r,t) { BAHourlyResIRD\_NonComplianceAmountBrtQ’mdh }

### BAAHourlyIRDTier1ReqtPrice Q’mdh=BAAHourlyIRDAllocationCost Q’mdh/ BAAHourlyIRDTier1AdjustedReqtQuantity Q’mdh

### BAAHourlyIRDTier1AdjustedReqtQuantity Q’mdh=Sum (A,A’,Q,p) {BAAHourlyIRDReqQty Q'AA’Qpmdh - BAAHourlyIRDSurplusQty Q'AA’Qpmdh}

## Outputs

| 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. |
|  | BAHourlyIRDTier1AllocAmount BQ’M’mdh | Tier 1 allocation of IRD costs |
|  | PTBAdjustmentBAHourlyIRDTier1AllocAmount BQ’M’mdh | PTB for Tier 1 IRD cost allocation component |
|  | BAATotalHourlyIRDTier1AllocAmount Q’mdh | Total Tier 1 IRD cost allocation per BAA |
|  | BAAHourlyIRDTier2CostAmount Q’mdh | Total Tier 2 IRD costs to be allocated per BAA |
|  | BAHourlyIRDTier1AllocQuantity BQ’M’mdh | Total Tier 1 IRD allocation quantity. Combines total resource level or MSS level (if load following) per BA and MSS. |
|  | BAHourlyTotalResIRDTier1AllocQuantity BQ’M’mdh | Tier 1 IRD allocation quantity for all resources per BA |
|  | BAHourlyGenResIRDTier1AllocQuantity BrtQ’M’mdh | Tier 1 allocation quantity contribution for GEN resource type |
|  | BAHourlyImportResIRDTier1AllocQuantity BrtQ’M’mdh | Tier 1 allocation quantity contribution for import (ITIE) resource type |
|  | BAHourlyLoadResIRDTier1AllocQuantity BrtQ’M’mdh | Tier 1 IRD cost allocation quantity contribution for LOAD resource type |
|  | BAHourlyExportResIRDTier1AllocQuantity BrtQ’M’mdh | Tier 1 IRD cost allocation quantity contribution for export (ETIE) resource type |
|  | BAHourlyMSSLF\_IRDTier1AllocQuantity BQ’M’mdh | Tier 1 IRD cost allocation quantity at MSS level (if load following) |
|  | BAAHourlyIRDTier1AllocPrice Q’mdh | Tier 1 IRD cost allocation price |
|  | BAAHourlyIRDAllocationCost Q’mdh | IRD cost to be allocated. Could be split between Tier 1 and Tier 2. |
|  | BAAHourlyTotalIRDTier1AllocQuantity Q'mdh | BAA hourly total IRD Tier 1 allocation quantity |
|  | BAAHourlyIRDTier1DerivedPrice Q’mdh | IRD Tier 1 derived price |
|  | BAAHourlyIRDReqtCost Q’mdh | Hourly IRD requirement cost by BAA |
|  | BAAHourlyIRDSurplusAdjustment Q’mdh | Total IRD Surplus Adjustment over all surplus zones in the BAA |
|  | BAAHourlyIRDNoPayRevenue Q’mdh | Hourly IRD No Pay revenue by BAA |
|  | BAAHourlyIRDTier1ReqtPrice Q’mdh | Hourly IRD Tier 1 requirement price by BAA |
|  | BAAHourlyIRDTier1AdjustedReqtQuantity Q’mdh | Hourly IRD requirement less surplus across all zones in BAA |

# Charge Code Effective Dates

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Charge Code/  Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Update Type |
| Day Ahead Imbalance Reserve Down Tier 1 Allocation | 5.0 | 05/01/2026 | Open | Configuration Impacted |