Settlements & Billing

**Configuration Guide: Flexible Ramp Product**

Pre-calculation

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 Charge Code in one document.

# Introduction

## Background

The Flexible Ramping product (FRP) is designed to ensure that there is sufficient ramping capability available in the financially binding five-minute interval to meet the forecasted net load for interval t+5 and cover upwards and downwards forecast error uncertainty.

FRP will help the system to maintain and use dispatchable capacity, as well as provide the market more transparent and less volatile price signals when undergoing forecasted ramp-constrained conditions. It will be procured and dispatched to meet five minute to five minute net forecast (load forecast minus VER forecast) changes plus uncertainty and will be modeled as a ramping capability constraint.

The ISO will financially settle FRP in the fifteen-minute market and the five-minute market, with rescission of payments applied to resources with UIE (uninstructed imbalance energy) or OA (operational adjustment) amounts, positive or negative, which are imposed on reserved FRP capacity awards. Settlement and allocation of FRP costs will happen on a daily basis for forecasted movement portion and uncertainty award portion. At the end of the month, the uncertainty award allocation will be reversed and will be re-allocated based on the month’s net UIE or OA values.

As no economic bids are applied to FRP, FRU/FRD awards will be exempt from grid management charges (GMC). Additionally, dispatchable resources will have their FRP awards and forecasted movement assessments - ignoring rescission settlement - included as part of daily RTM bid cost recovery calculations.

## Description

The Flexible Ramp Product Pre-Calculation determines common bill determinants used for the rest of the Flex Ramp Settlement Charge Codes.

# Charge Code Requirements

## Business Rules

| Bus Req ID | Business Rule |
| --- | --- |
|  | Please refer to respective successor charge codes for specific business rules required. Implementation and calculations were shown here with sub-headings under the Formula Section. |

## Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| PC – MSS Netting |
| Pre-calculation Real Time Energy Quantity |
| CC 6473 – Convergence Bidding Real Time Energy Congestion and Loss Settlement |
| CC 7070 – Flexible Ramp Forecasted Movement Settlement |
| CC 7071 – Flexible Ramp Up Uncertainty Capacity Settlement |
| CC 7081 – Flexible Ramp Down Uncertainty Capacity Settlement |

## Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| CC 7070 – Flexible Ramp Forecasted Movement Settlement |
| CC 7076 – Flexible Ramp Forecasted Movement Allocation |
| CC 7071 – Flexible Ramp Up Uncertainty Capacity Settlement |
| CC 7077 – Daily Flexible Ramp Up Uncertainty Award Allocation |
| CC 7078 – Monthly Flexible Ramp Up Uncertainty Award Allocation |
| CC 7081 – Flexible Ramp Down Uncertainty Capacity Settlement |
| CC 7087 – Daily Flexible Ramp Down Uncertainty Award Allocation |
| CC 7088 – Monthly Flexible Ramp Down Uncertainty Award Allocation |

## Inputs – External Systems

| Row # | Variable Name | Description |
| --- | --- | --- |
|  | BAA5mConstraintFRFlag Q’Q’’kmdhcif | For uncertainty movement purposes, a flag with a value of 1 defines Q’ (BAA) has group membership with attribute Q’’ (Constraint\_ID) for the settlement interval  Possible values for Q’’ when k (direction for FlexRamp = ‘UP’ for Flex Ramp Up):  ”FRU\_PASS\_GRP” for any BAA (Q’) that passed the WEIM RSE Up Test.  “EDAM\_AET\_Y” for any BAA in EDAM BAA Pool that fails the WEIM RSE Up Test and did elect AET.  “EDAM\_AET\_N” for any BAA in EDAM BAA Pool that fails the WEIM RSE Up Test and did not elect AET.  “BAA” is a pseudo-group and is for any specific or individual BAA which is not part of any of above grouping.  Possible values for Q’’ when k (direction for FlexRamp = ‘DN’ for Flex Ramp Down):  “FRD\_PASS\_GRP” for any BAA (Q’) that passed the WEIM RSE Down Test.  “EDAM\_DOWN” for any BAA in EDAM BAA Pool that fails the WEIM RSE Down Test.  “BAA” is a pseudo-group and is for any specific or individual BAA which is not part of any of above grouping. |
|  | BAA5mCatFlexRampUMQty Q’a’’kmdhcif | Uncertainty Movement (UM) per resource category (Load, Intertie, or Supply). Assigned to FRU when value is positive, or to FRD when negative. A zero applies to both FRU and FRD.  a'’ is a numeric index, and specific to the context of Flex Ramp Up/Down Uncertainty Resource Category Allocation or Movement the values are defined as ff:  “1” = Load resource category  “2” = Intertie resource category  “3” = Supply resource category  Quotations (either single or double quotes) are for emphasis only in order to separate from document formula heading or numbering. |
|  | FRNDXLoadFactor a’’ | Flex Ramp index for load resource category. a’’ = ‘1’ and the factor value for any interval is 1. |
|  | FRNDXTieFactor a’’ | Flex Ramp index for an intertie resource category. Applies to import or export resource. a’’ = ‘2’ and the factor value for any interval is 1. |
|  | FRNDXSupplyFactor a’’ | Flex Ramp index for a supply resource category. Applies to generator resource. a’’ = ‘3’ and the factor value for any interval is 1. |
|  | FRDIRUpFactor k | Flex Ramp direction applicable to Flexible Ramping Up data. k = “UP” and the factor value for any interval is 1. |
|  | FRDIRDnFactor k | Flex Ramp direction applicable to Flexible Ramping Down data. k = “DN” and the factor value for any interval is 1. |
|  | BA5mResourceRTDFlexRampUncertaintyMovementQty **BrtQ’uT’I’M’L’F’S’mdhcif** | The RTD-specific Flexible Ramping Uncertainty movement (in MW) that is identified for a specified supply or intertie resource. |
|  | MSSResourceInfo **BrtuT'I'M'AA'VpL'md** | A flag (0/1), that, when = 1, indicates that the identified MSS resource is load-following. |
|  | BA5mResourceRTDFlexRampForecastedMovementMWQty BrtQ’uT’I’M’AA’pQL’F’S’mdhcif | RTD flex ramp forecasted movement quantity (in MW) |
|  | PeakHourFlag **mdh** | A flag (1/0/NULL) that, when equal to 1, identifies an associated Trading Hour as being a Peak Flexible Ramp Hour. When the flag is equal to 0 or is NULL (missing), the Trading Hour is deemed to be an Off Peak Flexible Ramp Hour. Peak Flexible Ramp Hours are defined to be Trading Hours 7 through 22, while Off Peak Flexible Ramp Hours consist of Trading Hours 1 through 6 and 23 through 25. |
|  | BAFlexRampExemptAssessmentFlag Bmd | An exemption flag that prevents specific assessment under this charge code. This has a value of 1 for any specific BAID (B) that is not subject to settlement or relevant assessment under this charge code. |
|  | BADayGenOnlyBAAFlag BQ'md | Flag indicating a Gen-Only BAA with 1. |
|  | ZeroDivisorTolerance | Tolerance for dividing by zero. Initially set at 0.00001. |

## Inputs - Predecessor Charge Codes or Pre-calculations

| Row # | Variable Name | Predecessor Charge Code/ Pre-calc Configuration / Description |
| --- | --- | --- |
|  | BA5mBAAMeteredDemandQuantityBQ’mdhcif | PC – MSS Netting |
|  | BAA5mMeteredDemandQuantityQ’mdhcif | PC – MSS Netting |
|  | SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif | Pre-calculation Real Time Energy Quantity |
|  | SettlementIntervalMSSIIE BrtuT’I’Q’M’F’S’mdhcif | Pre-calculation Real Time Energy Quantity |
|  | SettlementIntervalMSSLFOAEnergy BrtuT’I’M’F’S’mdhcif | Pre-calculation Real Time Energy Quantity |
|  | SettlementIntervalMSSLFMeteredEnergyDifference BrtuT’I’Q’M’F’S’mdhcif | Pre-calculation Real Time Energy Quantity |
|  | SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif | Pre-calculation Real Time Energy Quantity |
|  | ResourceWholesaleExemptionFlag rmdhcif | Pre-calculation Real Time Energy Quantity |
|  | BAAVirtualAwardFlexRampDownForecastedMovementMWAmount Q’mdh | CC 6473 – Convergence Bidding Real Time Energy Congestion and Loss Settlement |
|  | BAAVirtualAwardFlexRampUpForecastedMovementMWAmount Q’mdh | CC 6473 – Convergence Bidding Real Time Energy Congestion and Loss Settlement |
|  | BAA5mFRDForecastedMovementSettlementAmount Q’mdhcif | CC 7070 – Flexible Ramp Forecasted Movement Settlement |
|  | BAA5mFRUForecastedMovementSettlementAmount Q’mdhcif | CC 7070 – Flexible Ramp Forecasted Movement Settlement |
|  | BAA5mFlexRampUpUncertaintyAmount Q’mdhcif | CC 7071 – Flexible Ramp Down Uncertainty Capacity Settlement |
|  | BAA5mFlexRampDownUncertaintyAmount Q’mdhcif | CC 7081 – Flexible Ramp Down Uncertainty Capacity Settlement |

## CAISO Charge Code Formula

1. **Forecasted Movement or Uncertainty Movement/Allocation starting quantities**

7071 and 7081

### **BA5mResourceRTDFlexRampForecastedMovementMWFilteredQuantity BrtQ’uT’I’M’L’F’S’mdhcif**

Sum (A,A’,p,Q)

BA5mResourceRTDFlexRampForecastedMovementMWQty BrtQ’uT’I’M’AA’pQL’F’S’mdhcif

7077 and 7087

* + 1. BA5mBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BQ’mdhcif =

Sum (r, t, F’, S’) ( BA5mRSRCBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BrtF’S’Q’mdhcif )

* + 1. BA5mRSRCBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BrtF’S’Q’mdhcif =

Sum (u, T’, I’, M’) {(MSSLoadFollowingResourceFlag BrtuT'I'M'md \* (SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalMSSIIE BrtuT’I’Q’M’F’S’mdhcif ) +BA5mResourceRTDFlexRampLFActualUncertaintyMovementQuantity BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalMSSLFOAEnergy BrtuT’I’M’F’S’mdhcif)}

Where Exists

SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif, SettlementIntervalMSSIIE BrtuT’I’Q’M’F’S’mdhcif, SettlementIntervalMSSLFMeteredEnergyDifference BrtuT’I’Q’M’F’S’mdhcif

* + 1. BA5mResourceRTDFlexRampActualUncertaintyMovementQuantity BrtuT’I’Q’M’F’S’mdhcif =

Sum (L’) (BA5mResourceRTDFlexRampUncertaintyMovementQty BrtQ’uT’I’M’L’F’S’mdhcif / 12)

* + 1. BA5mResourceRTDFlexRampLFActualUncertaintyMovementQuantity BrtuT’I’Q’M’F’S’mdhcif =

Sum (L’) (BA5mResourceRTDFlexRampUncertaintyMovementQty BrtQ’uT’I’M’L’F’S’mdhcif / 12)

Where Load Following Resource (L’) = YES

* + 1. MSSLoadFollowingResourceFlag BrtuT'I'M'md =

Sum (A, A’, V, p, L’) MSSResourceInfo BrtuT'I'M'AA'VpL'mdWhere Load Following Resource (L’) = YES

* + 1. BA5mResourceBAALoadFRUTempAllocationQuantity BrtF’S’Q’mdhcif =

Sum (u, T’, I’, M’) { Min(0, (1 – MSSLoadFollowingResourceFlag BrtuT'I'M'md ) \* SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif)}

Where t = ‘LOAD’

* + 1. BA5mResourceBAALoadFRUUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif =

FRNDXLoadFactor a’’ \* FRDIRUpFactor k \* BA5mResourceBAALoadFRUTempAllocationQuantity BrtF’S’Q’mdhcif

* + 1. BA5mResourceBAAIntertieFRUTempAllocationQuantity BrtF’S’Q’mdhcif =

Sum (u, T’, I’, M’) { Min(0, SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalMSSLFOAEnergy BrtuT’I’M’F’S’mdhcif )}

Where

Resource Type (t) IN { ‘ITIE’, ‘ETIE’ } And Entity Component Type (F’) <> ‘TG’ or ‘HYBD’

Implementation Note: Do not calculate this quantity when BAFlexRampExemptAssessmentFlag Bmd = 1.

* + 1. BA5mResourceBAAIntertieFRUUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif =

FRNDXTieFactor a’’ \* FRDIRUpFactor k \* BA5mResourceBAAIntertieFRUTempAllocationQuantity BrtF’S’Q’mdhcif

* + 1. BA5mResourceBAASupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif =

FRNDXSupplyFactor a’’ \* FRDIRUpFactor k \* (BA5mResourceBAAGenerationSupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’mdhcif + BA5mResourceBAAMSSLFSupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’mdhcif )

* + 1. BA5mResourceBAAGenerationSupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’mdhcif =

Sum (u, T’, I’, M’) {Min(0, (1 – MSSLoadFollowingResourceFlag BrtuT'I'M'md ) \* (BA5mResourceRTDFlexRampActualUncertaintyMovementQuantity BrtuT’I’Q’M’F’S’mdhcif + (1- ResourceWholesaleExemptionFlag rmdhcif)\*SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif ) ) }

Where Resource Type (t) = ‘GEN’ Or Entity Component Type (F’) = ‘TG’

And Resource Type (t) <> ‘LOAD’, ‘ETIE’

* + 1. BA5mResourceBAAMSSLFSupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’mdhcif =

IF BA5mBAAMSSLoadFollowingSupplyFRUUncertaintyAllocationQuantity BQ’mdhcif = 0

THEN

0

ELSE

BA5mBAAMSSLoadFollowingSupplyFRUUncertaintyAllocationQuantity BQ’mdhcif \* (BA5mResBAAMSSLFFRURatioAllocationQuantity BrtF’S’Q’mdhcif / BA5mBAAMSSLFFRUAggregationRatioAllocationQuantity BQ’mdhcif)

END IF

* + 1. BA5mBAAMSSLFFRUAggregationRatioAllocationQuantity BQ’mdhcif =

Sum (r, t, F’, S’) ( BA5mResBAAMSSLFFRURatioAllocationQuantity BrtF’S’Q’mdhcif)

* + 1. BA5mResBAAMSSLFFRURatioAllocationQuantity BrtF’S’Q’mdhcif =

Min(0, BA5mRSRCBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BrtF’S’Q’mdhcif )

* + 1. BA5mBAAMSSLoadFollowingSupplyFRUUncertaintyAllocationQuantity BQ’mdhcif =

Min(0, BA5mBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BQ’mdhcif)

* + 1. BA5mResourceBAALoadFRDTempAllocationQuantity BrtF’S’Q’mdhcif =

Sum (u, T’, I’, M’) { Max(0, (1 – MSSLoadFollowingResourceFlag BrtuT'I'M'md ) \* SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif)}

Where t = ‘LOAD’

* + 1. BA5mResourceBAALoadFRDUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif =

FRNDXLoadFactor a’’ \* FRDIRDnFactor k \* BA5mResourceBAALoadFRDTempAllocationQuantity BrtF’S’Q’mdhcif

* + 1. BA5mResourceBAAIntertieFRDTempAllocationQuantity BrtF’S’Q’mdhcif =

Sum (u, T’, I’, M’) { Max(0, SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalMSSLFOAEnergy BrtuT’I’M’F’S’mdhcif )}

Where

Resource Type (t) IN { ‘ITIE’, ‘ETIE’ } And Entity Component Type (F’) <> ‘TG’ or ‘HYBD’

Implementation Note: Do not calculate this quantity when BAFlexRampExemptAssessmentFlag Bmd = 1.

* + 1. BA5mResourceBAAIntertieFRDUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif =

FRNDXTieFactor a’’ \* FRDIRDnFactor k \* BA5mResourceBAAIntertieFRDTempAllocationQuantity BrtF’S’Q’mdhcif

* + 1. BA5mResourceBAASupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif =

FRNDXSupplyFactor a’’ \* FRDIRDnFactor k \* (BA5mResourceBAAGenerationSupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’mdhcif + BA5mResourceBAAMSSLoadFollowingSupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’mdhcif )

* + 1. BA5mResourceBAAGenerationSupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’mdhcif =

Sum (u, T’, I’, M’) {Max(0, (1 – MSSLoadFollowingResourceFlag BrtuT'I'M'md ) \* (BA5mResourceRTDFlexRampActualUncertaintyMovementQuantity BrtuT’I’Q’M’F’S’mdhcif + (1- ResourceWholesaleExemptionFlag rmdhcif)\*SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif ) ) }

Where Resource Type (t) = ‘GEN’ Or Entity Component Type (F’) = ‘TG’

And Resource Type (t) <> ‘LOAD’, ‘ETIE’

* + 1. BA5mResourceBAAMSSLoadFollowingSupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’mdhcif =

IF BA5mBAAMSSLoadFollowingSupplyFRDUncertaintyAllocationQuantity BQ’mdhcif = 0

THEN

0

ELSE

BA5mBAAMSSLoadFollowingSupplyFRDUncertaintyAllocationQuantity BQ’mdhcif \* (BA5mResBAAMSSLFFRDRatioAllocationQuantity BrtF’S’Q’mdhcif / BA5mBAAMSSLFFRDAggregationRatioAllocationQuantity BQ’mdhcif )

END IF

* + 1. BA5mBAAMSSLFFRDAggregationRatioAllocationQuantity BQ’mdhcif =

Sum (r, t, F’, S’) ( BA5mResBAAMSSLFFRDRatioAllocationQuantity BrtF’S’Q’mdhcif)

* + 1. BA5mResBAAMSSLFFRDRatioAllocationQuantity BrtF’S’Q’mdhcif =

Max(0, BA5mRSRCBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BrtF’S’Q’mdhcif )

* + 1. BA5mBAAMSSLoadFollowingSupplyFRDUncertaintyAllocationQuantity BQ’mdhcif =

Max(0, BA5mBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BQ’mdhcif)

1. **Daily Uncertainty Allocations, Top-Level, or Neutrality Metered Demand**
   * 1. BADailyCompleteFRUncertaintyAllocationAmount BQ’kmd =

Sum (h, c, i, f) BA5mCompleteFRUncertaintyAllocationAmount BQ’kmdhcif

* + 1. BA5mCompleteFRUncertaintyAllocationAmount BQ’kmdhcif =

(BA5mConstraintFRMDAllocatedUncertaintyAmount BQ’kmdhcif +

BA5mBAASpecFRMDAllocatedUncertaintyAmount BQ’kmdhcif + BA5mBAAFRUMAllocatedAmount BQ’kmdhcif)

* + 1. BA5mConstraintFRMDAllocatedUncertaintyAmount BQ’kmdhcif =

Sum (Q’’) (BA5mBAAConstraintFRMDQuantityBQ’Q’’kmdhcif / Constraint5mFRMDQuantityQ’’kmdhcif) \* Constraint5mFRUMNeutralityAmount Q’’kmdhcif

Where Q’’ <> “BAA”

* + 1. BA5mBAASpecFRMDAllocatedUncertaintyAmount BQ’kmdhcif =

BAASpec5mFRUMNeutralityAmount Q’kmdhcif \*{

IF BADayGenOnlyBAAFlag BQ'md = 1

THEN

BADayGenOnlyBAAFlag BQ'md

ELSE

(BA5mBAASpecFRMDQuantity BQ’kmdhcif / BAASpec5mFRMDQuantity Q’kmdhcif)

END IF}

* + 1. BAASpec5mFRUMNeutralityAmount Q’kmdhcif =

BAASpec5mFRUncertaintyCostAmount Q’kmdhcif –

BAASpec5mFRAllocatedUncertaintyAmount Q’kmdhcif

* + 1. BAASpec5mFRUncertaintyCostAmount Q’kmdhcif =

Sum (Q’’) (-1) \* BAA5mConstraintFRUMCostAmount Q’Q’’kmdhcif

Where Q’’ = ‘BAA’

* + 1. BAASpec5mFRAllocatedUncertaintyAmount Q’kmdhcif =

Sum (B, Q’’) BA5mBAAConstraintFRUMAllocatedAmount BQ’Q’’kmdhcif

Where Q’’ = ‘BAA’

* + 1. Constraint5mFRUMNeutralityAmount Q’’kmdhcif =

Constraint5mFRUMCostAmount Q’’kmdhcif - Constraint5mFRUMAllocatedAmount Q’’kmdhcif

* + 1. Constraint5mFRUMCostAmount Q’’kmdhcif =

Sum (Q’) BAA5mConstraintFRUMCostAmount Q’Q’’kmdhcif

Where Q’’ <> “BAA”

* + 1. BAA5mConstraintFRUMCostAmount Q’Q’’kmdhcif =

BAA5mConstraintFRFlag Q’Q’’kmdhcif \*{

IF k {attribute of BAA5mConstraintFRFlag Q’Q’’kmdhcif } = ‘UP’

THEN

BAA5mFlexRampUpUncertaintyAmount Q’mdhcif

ELSE

BAA5mFlexRampDownUncertaintyAmount Q’mdhcif

END IF}

* + 1. Constraint5mFRUMAllocatedAmount Q’’kmdhcif =

Sum (B, Q’) BA5mBAAConstraintFRUMAllocatedAmount BQ’Q’’kmdhcif

Where Q’’ <> “BAA”

* + 1. BA5mBAAFRUMAllocatedAmount BQ’kmdhcif =

Sum (Q’’) BA5mBAAConstraintFRUMAllocatedAmount BQ’Q’’kmdhcif

* + 1. BA5mBAAConstraintFRUMAllocatedAmount BQ’Q’’kmdhcif =

Sum (r, t, F’, S’, a’’) BA5mResourceBAAFRUMAllocatedAmount BrtF’S’Q’Q’’a’’kmdhcif

1. **1 Daily - Allocated Uncertainty Award Costs from Category Distributions**
   * 1. BA5mResourceBAAFRUMAllocatedAmount BrtF’S’Q’Q’’a’’kmdhcif =

BAA5mConstraintCatFRUMDistributionAmount Q’Q’’a’’kmdhcif \*BA5mResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’kmdhcif \* BAA5mConstraintCatFRUARatio

* + 1. BAA5mConstraintCatFRUARatio Q’Q’’a’’kmdhcif =

[IF Q’’ {attribute of BAA5mConstraintCatFRUAQuantity Q’Q’’a’’kmdhcif } <> ‘BAA’

THEN

{IF Abs(Constraint5mCatFRUAQuantity Q’’a’’kmdhcif ) > ZeroDivisorTolerance

THEN (1 / Constraint5mCatFRUAQuantity Q’’a’’kmdhcif ) ELSE 0 END IF}

ELSE

{IF Abs(BAA5mConstraintCatFRUAQuantity Q’Q’’a’’kmdhcif ) > ZeroDivisorTolerance

THEN (1/ BAA5mConstraintCatFRUAQuantity Q’Q’’a’’kmdhcif) ELSE 0 END IF}

END IF]

* + 1. Constraint5mCatFRUAQuantity Q’’a’’kmdhcif =

Sum(Q’) BAA5mConstraintCatFRUAQuantity Q’Q’’a’’kmdhcif

Where Q’’ <> ‘BAA’

* + 1. BAA5mConstraintCatFRUAQuantity Q’Q’’a’’kmdhcif =

Sum(B, r, t, F’, S’)

BA5mResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’kmdhcif

* + 1. BA5mResourceBAAFRUAInterimQuantity BrtF’S’Q’a’’kmdhcif =

(BA5mResourceBAALoadFRUUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif

+ BA5mResourceBAALoadFRDUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif

+ BA5mResourceBAAIntertieFRUUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif

+ BA5mResourceBAAIntertieFRDUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif

+ BA5mResourceBAASupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif

+ BA5mResourceBAASupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif )

Implementation Note: This interim calculation will not be reportable.

* + 1. BA5mResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’kmdhcif =

BAA5mConstraintFRFlag Q’Q’’kmdhcif \* BA5mResourceBAAFRUAInterimQuantity BrtF’S’Q’a’’kmdhcif

**C.2 Daily - Resource Category Distributions**

* + 1. BAA5mConstraintCatFRUMDistributionAmount Q’Q’’a’’kmdhcif =

(-1) \* BAA5mConstraintCatToAllCatFRUMRatio Q’Q’’a’’kmdhcif \* BAA5mConstraintFRUMCostAmount Q’Q’’kmdhcif

* + 1. BAA5mConstraintCatToAllCatFRUMRatio Q’Q’’a’’kmdhcif =

BAA5mConstraintCatFRUMQuantity Q’Q’’a’’kmdhcif \* {

IF Q’’ {attribute of BAA5mConstraintCatFRUMQuantity Q’Q’’a’’kmdhcif } <> ‘BAA’

THEN

{IF Abs(Constraint5mAllCatFRUMQuantity Q’’kmdhcif ) > ZeroDivisorTolerance

THEN (1 / Constraint5mAllCatFRUMQuantity Q’’kmdhcif**)** ELSE 0 END IF**}**

ELSE

{IF Abs(BAASpec5mAllCatFRUMQuantity Q’Q’’kmdhcif) > ZeroDivisorTolerance

THEN (1/ BAASpec5mAllCatFRUMQuantity Q’Q’’kmdhcif) ELSE 0 END IF}

END IF}

* + 1. BAASpec5mAllCatFRUMQuantity Q’Q’’kmdhcif =

Sum (a’’) BAA5mConstraintCatFRUMQuantity Q’Q’’a’’kmdhcif

Where Q’’ = ‘BAA’

* + 1. Constraint5mAllCatFRUMQuantity Q’’kmdhcif =

Sum (a’’) Constraint5mCatFRUMQuantity Q’’a’’kmdhcif

* + 1. Constraint5mCatFRUMQuantity Q’’a’’kmdhcif =

Sum(Q’) BAA5mConstraintCatFRUMQuantity Q’Q’’a’’kmdhcif

Where Q’’ <> ‘BAA’

* + 1. BAA5mConstraintCatFRUMQuantity Q’Q’’a’’kmdhcif =

BAA5mConstraintFRFlag Q’Q’’kmdhcif \* {

IF k {attribute of BAA5mConstraintFRFlag Q’Q’’kmdhcif } = ‘UP’

THEN

Max(0, BAA5mCatFlexRampUMQty Q’a’’kmdhcif )

ELSE

Min(0, BAA5mCatFlexRampUMQty Q’a’’kmdhcif )

END IF}

1. Flex Ramp Metered Demand (MD) Quantities for FRU/FRD where k = “UP” or “DN” respectively:

7076, 7077, 7078, 7087, 7088

### BA5mBAAConstraintFRMDQuantity BQ’Q’’kmdhcif=

BA5mBAAMeteredDemandQuantityBQ’mdhcif \*

BAA5mConstraintFRFlag Q’Q’’kmdhcif

### Constraint5mFRMDQuantity Q’’kmdhcif =

Sum (B,Q’) BA5mBAAConstraintFRMDQuantity BQ’Q’’kmdhcif

Where Q’’ <> ‘BAA’

### BA5mBAASpecFRMDQuantity BQ’kmdhcif =

Sum (Q’’) BA5mBAAConstraintFRMDQuantity BQ’Q’’kmdhcif

Where Q’’ = ‘BAA’

### BAASpec5mFRMDQuantity Q’kmdhcif =

Sum (B) BA5mBAASpecFRMDQuantityBQ’kmdhcif

### BAMonthOffPeakBAAConstraintFRMDQuantity BQ’Q’’km **=**

Sum (d,h,c,i,f) (1 - PeakHourFlag mdh**)** \* BA5mBAAConstraintFRMDQuantity BQ’Q’’kmdhcif

### ConstraintMonthOffPeakFRMDQuantity Q’’km =

Sum (B, Q’) BAMonthOffPeakBAAConstraintFRMDQuantity BQ’Q’’km

Where Q” <> ‘BAA’

### BAMonthOffPeakBAASpecFRMDQuantity BQ’km **=**

Sum (Q’’) BAMonthOffPeakBAAConstraintFRMDQuantity BQ’Q’’km

Where Q” = ‘BAA’

### BAAMonthOffPeakBAASpecFRMDQuantity Q’km =

Sum (B) BAMonthOffPeakBAASpecFRMDQuantity BQ’km

### BAMonthPeakBAAConstraintFRMDQuantity BQ’Q’’km **=**

Sum (d,h,c,i,f) (PeakHourFlag mdh**)** \* BA5mBAAConstraintFRMDQuantity BQ’Q’’kmdhcif

### ConstraintMonthPeakFRMDQuantity Q’’km =

Sum (B, Q’) BAMonthPeakBAAConstraintFRMDQuantity BQ’Q’’km

Where Q” <> ‘BAA’

### BAMonthPeakBAASpecFRMDQuantity BQ’km **=**

Sum (Q’’) BAMonthPeakBAAConstraintFRMDQuantity BQ’Q’’km

Where Q” = ‘BAA’

### BAAMonthPeakBAASpecFRMDQuantity Q’km =

Sum (B) BAMonthPeakBAASpecFRMDQuantity BQ’km

1. **Monthly - Conversion of settlement interval to monthly off/on peak values**
   * 1. BAAMonthOffPeakHourFRUncertaintyCostAmount Q’Q’’km =

Sum(d,h,c,i,f) (1 – PeakHourFlag mdh ) \* (-1) \* BAA5mConstraintFRFlagQ’Q’’kmdhcif \*

BAA5mConstraintFRUMCostAmount Q’Q’’kmdhcif

* + 1. BAAMonthOffPeakConstraintCatFRUMQuantity Q’Q’’a’’km =

Sum(d,h,c,i,f) (1 – PeakHourFlag mdh ) \* BAA5mConstraintCatFRUMQuantity Q’Q’’a’’kmdhcif

* + 1. BAMonthOffPeakResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’km =

Sum(d,h,c,i,f) (1 – PeakHourFlag mdh ) \* BA5mResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’kmdhcif

### BAAMonthPeakHourFRUncertaintyCostAmount Q’Q’’km =

Sum(d,h,c,i,f) (PeakHourFlag mdh ) \* (-1) \* BAA5mConstraintFRFlagQ’Q’’kmdhcif \*

BAA5mConstraintFRUMCostAmount Q’Q’’kmdhcif

* + 1. BAAMonthPeakConstraintCatFRUMQuantity Q’Q’’a’’km =

Sum(d,h,c,i,f) (PeakHourFlag mdh ) \* BAA5mConstraintCatFRUMQuantity Q’Q’’a’’kmdhcif

* + 1. BAMonthPeakResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’km =

Sum(d,h,c,i,f) (PeakHourFlag mdh ) \* BA5mResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’kmdhcif

1. **Forecasted Movement (FM) Allocations**
   * 1. BA5mConstraintFRFMAllocatedAmount BQ’kmdhcif =

Sum (Q’’) (BA5mBAAConstraintFRMDQuantityBQ’Q’’kmdhcif / Constraint5mFRMDQuantityQ’’kmdhcif) \* Constraint5mFRFMAllocationAmount Q’’kmdhcif

Where Q’’ <> “BAA”

* + 1. BA5mBAASpecFRFMAllocatedAmount BQ’kmdhcif =

BAASpec5mFRFMAllocationAmount Q’kmdhcif \*{

IF BADayGenOnlyBAAFlag BQ'md = 1

THEN

BADayGenOnlyBAAFlag BQ'md

ELSE

(BA5mBAASpecFRMDQuantity BQ’kmdhcif / BAASpec5mFRMDQuantity Q’kmdhcif)

END IF}

* + 1. Constraint5mFRFMAllocationAmount Q’’kmdhcif =

Sum (Q’) BAA5mFRFMCostAmount Q’Q’’kmdhcif

Where Q’’ <> ‘BAA’

* + 1. BAASpec5mFRFMAllocationAmount Q’kmdhcif =

Sum (Q’’) BAA5mFRFMCostAmount Q’Q’’kmdhcif

Where Q’’ = ‘BAA’

* + 1. BAA5mFRFMCostAmount Q’Q’’kmdhcif =

BAA5mConstraintFRFlag Q’Q’’kmdhcif \* {

IF k { attribute of BAA5mConstraintFRFlag Q’Q’’kmdhcif } = “UP” THEN

(BAA5mFRUForecastedMovementSettlementAmount Q’mdhcif + BAA5mVirtualAwardFlexRampUpFMMWAmount Q’mdhcif)

ELSE

(BAA5mFRDForecastedMovementSettlementAmount Q’mdhcif + BAA5mVirtualAwardFlexRampDownFMMWAmount Q’mdhcif)

END IF}

* + 1. BAA5mVirtualAwardFlexRampUpFMMWAmount Q’mdhcif =

BAAVirtualAwardFlexRampUpForecastedMovementMWAmount Q’mdh / 12

* + 1. BAA5mVirtualAwardFlexRampDownFMMWAmount Q’mdhcif =

BAAVirtualAwardFlexRampDownForecastedMovementMWAmount Q’mdh / 12

## Output Requirements

| Output Req ID | Name | Description |
| --- | --- | --- |
|  | In addition to any outputs listed below, all inputs shall be included as outputs. | All inputs |
|  | BA5mResourceRTDFlexRampForecastedMovementMWFilteredQuantity BrtQ’uT’I’M’L’F’S’mdhcif | RTD flex ramp forecasted movement quantity (in MW) |
|  | BA5mBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BQ’mdhcif | The total uncertainty (in MWh) that is attributable to the BA of a MSS within the specified BAA, for the case where the uncertainty is associated with MSS load-following resources. |
|  | BA5mRSRCBAAMSSLoadFollowingFRUncertaintyAllocationQuantity BrtF’S’Q’mdhcif | The MSS Load Following Flexible Ramp Uncertainty Allocation Quantity by Resource |
|  | BA5mResourceRTDFlexRampActualUncertaintyMovementQuantity BrtuT’I’Q’M’F’S’mdhcif | The RTD-specific Flexible Ramping Uncertainty Movement (in MWh) that is identified for a specified supply or intertie resource. |
|  | BA5mResourceRTDFlexRampLFActualUncertaintyMovementQuantity BrtuT’I’Q’M’F’S’mdhcif | The RTD-specific Flexible Ramping Uncertainty Movement (in MWh) that is identified for a specified supply or intertie load-following resource. |
|  | MSSLoadFollowingResourceFlag BrtuT'I'M'md | A flag (0/1), that, when = 1, indicates that the identified MSS resource is load-following. |
|  | BA5mResourceBAALoadFRUTempAllocationQuantity BrtF’S’Q’mdhcif | Interim calculation for resources belonging to Load category for FRU towards allocation basis. |
|  | BA5mResourceBAALoadFRUUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif | Allocation basis for FRU uncertainty movement (UM) costs for resources belonging to Load category. |
|  | BA5mResourceBAAIntertieFRUTempAllocationQuantity BrtF’S’Q’mdhcif | Interim calculation for resources belonging to Intertie category for FRU towards allocation basis. |
|  | BA5mResourceBAAIntertieFRUUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif | Allocation basis for FRU UM costs for resources belonging to Intertie category. |
|  | BA5mResourceBAASupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’mdhcif | Allocation basis for FRU UM for resources belonging to Supply category. |
|  | BA5mResourceBAAGenerationSupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’mdhcif | The total FRU uncertainty (in MWh) that is attributable to a BAA resource that is a generating unit or dynamic system resource that is not a MSS load-following resource. |
|  | BA5mResourceBAAMSSLFSupplyFRUUncertaintyAllocationQuantity BrtF’S’Q’mdhcif | MSS Load Following contribution to supply resource base allocation for FRU UM costs. |
|  | BA5mBAAMSSLFFRUAggregationRatioAllocationQuantity BQ’mdhcif | The MSS Load Following Allocation Quantity by Business Associate ID.  Used to distribute the resource level, each contribute to the FRU Uncertainty need. |
|  | BA5mResBAAMSSLFFRURatioAllocationQuantity BrtF’S’Q’mdhcif | The MSS Load Following Allocation Quantity by Resource.  Used together with BA level total, to distribute allocation to resources, which contribute to the FRU Uncertainty need. |
|  | BA5mBAAMSSLoadFollowingSupplyFRUUncertaintyAllocationQuantity BQ’mdhcif | The total FRU uncertainty (in MWh) per BA of an MSS, where the uncertainty is associated with MSS load-following resources. |
|  | BA5mResourceBAALoadFRDTempAllocationQuantity BrtF’S’Q’mdhcif | Interim calculation for resources belonging to Load category for FRD towards allocation basis. |
|  | BA5mResourceBAALoadFRDUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif | Base allocation quantity for FRD uncertainty movement (UM) costs for resources belonging to Load category. |
|  | BA5mResourceBAAIntertieFRDTempAllocationQuantity BrtF’S’Q’mdhcif | Interim calculation for resources belonging to Intertie category for FRD towards allocation basis. |
|  | BA5mResourceBAAIntertieFRDUncertaintyAllocationQuantity BrtF’S’Q’a’’kmdhcif | Base allocation quantity for FRD UM costs for resources belonging to Intertie category. |
|  | BA5mResourceBAASupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’mdhcif | Base allocation quantity for FRD UM for resources belonging to Supply category. |
|  | BA5mResourceBAAGenerationSupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’mdhcif | The total FRD uncertainty (in MWh) attributable to a BAA resource generating unit or dynamic system resource that is not a MSS load-following resource. |
|  | BA5mResourceBAAMSSLoadFollowingSupplyFRDUncertaintyAllocationQuantity BrtF’S’Q’mdhcif | MSS Load Following contribution to supply resource allocation basis for FRD UM costs. |
|  | BA5mBAAMSSLFFRDAggregationRatioAllocationQuantity BQ’mdhcif | The MSS Load Following Allocation Quantity by Business Associate ID.  Used to distribute the resource level, each contribute to the FRD Uncertainty need. |
|  | BA5mResBAAMSSLFFRDRatioAllocationQuantity BrtF’S’Q’mdhcif | The MSS Load Following Allocation Quantity by Resource.  Used together with BA level total, to distribute allocation to resources, which contribute to the FRD Uncertainty need. |
|  | BA5mBAAMSSLoadFollowingSupplyFRDUncertaintyAllocationQuantity BQ’mdhcif | The total FRD uncertainty (in MWh) per BA of an MSS, where the uncertainty is associated with MSS load-following resources. |
|  | BADailyCompleteFRUncertaintyAllocationAmount BQ’kmd | FlexRamp Uncertainty Charge to a BA of resources throughout the EIM Area as a share of the cost of FlexRamp award settlement amount for Trading Day. |
|  | BA5mCompleteFRUncertaintyAllocationAmount BQ’kmdhcif | FlexRamp Uncertainty Charge to a BA of resources throughout the EIM Area as a share of the cost of FlexRamp award per settlement interval. |
|  | BA5mConstraintFRMDAllocatedUncertaintyAmount BQ’kmdhcif | The total FlexRamp Uncertainty Charge allocated to the scheduling BA associated with BAAs belonging to constraint ID not equal to ‘BAA’. |
|  | BA5mBAASpecFRMDAllocatedUncertaintyAmount BQ’kmdhcif | The total FlexRamp Uncertainty Charge allocated to the scheduling BA associated with BAA’s for BAAs under Constraint ID = ‘BAA’. |
|  | BAASpec5mFRUMNeutralityAmount Q’kmdhcif | FlexRamp Uncertainty cost and uncertainty movement charges difference for BAAs under Constraint ID = ‘BAA’ that needs to be allocated. |
|  | BAASpec5mFRUncertaintyCostAmount Q’kmdhcif | The sum of FlexRamp Uncertainty Charges (in $) associated with the FlexRamp uncertainty award settlement amounts relating to the uncertainty movement of each BAA for BAAs under Constraint ID = ‘BAA’. |
|  | BAASpec5mFRAllocatedUncertaintyAmount Q’kmdhcif | The total FlexRamp Uncertainty Charge allocated to the scheduling BA associated with BAA’s under Constraint ID = ‘BAA’. |
|  | Constraint5mFRUMNeutralityAmount Q’’kmdhcif | Constraint ID level difference between FlexRamp uncertainty award costs and charges. |
|  | Constraint5mFRUMCostAmount Q’’kmdhcif | Constraint ID total of FlexRamp UM costs across all BAA belonging to that constraint. Excludes BAA specific constraint. |
|  | BAA5mConstraintFRUMCostAmount Q’Q’’kmdhcif | Constraint ID total of FlexRamp UM costs per BAA. |
|  | Constraint5mFRUMAllocatedAmount Q’’kmdhcif | Constraint ID total of allocated FlexRamp UM charges across all BAA belonging to that constraint. Excludes BAA specific constraint. |
|  | BA5mBAAFRUMAllocatedAmount BQ’kmdhcif | BA allocation of FlexRamp UM charges. |
|  | BA5mBAAConstraintFRUMAllocatedAmount BQ’Q’’kmdhcif | BA level allocation of FlexRamp UM charges per constraint ID. |
|  | BA5mResourceBAAFRUMAllocatedAmount BrtF’S’Q’Q’’a’’kmdhcif | Resource level allocation of FlexRamp UM charges. |
|  | BAA5mConstraintCatFRUARatio Q’Q’’a’’kmdhcif | Per resource category Ratio of BAA’s FlexRamp uncertainty allocation quantities from base resource, either to the BAA itself (when Q’’ = ‘BAA’), or to all BAAs belonging to the same constraint ID, when Q’’ is not equal to ‘BAA’. |
|  | BAASpec5mAllCatFRUAQuantity Q’Q’’kmdhcif | FlexRamp total base allocation quantity across all resource categories per BAA and per Constraint ID (when value is ‘BAA’). |
|  | Constraint5mAllCatFRUAQuantity Q’’kmdhcif | FlexRamp total base allocation quantity per Constraint ID (except when value is ‘BAA’), and per settlement interval. |
|  | Constraint5mCatFRUAQuantity Q’’a’’kmdhcif | FlexRamp total base allocation quantity Constraint ID across all BAAs that belongs to such constraint ID (except when value is ‘BAA’), and per resource category. |
|  | BAA5mConstraintCatFRUAQuantity Q’Q’’a’’kmdhcif | FlexRamp total base allocation quantity per BAA, Constraint ID the BAA belongs, and per resource category. |
|  | BA5mResourceBAAFRUAInterimQuantity BrtF’S’Q’a’’kmdhcif | Interim quantity to assign base allocation quantity to the right attributes for index and direction for flex ramp. Note this is non-reportable. Please rely on next output instead. |
|  | BA5mResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’kmdhcif | Base allocation quantity for a resource depending on the resource category it belongs to, its BAA, and the constraint ID of that BAA. Will be used towards determining allocated charges to cover FlexRamp Uncertainty Award costs. |
|  | BAA5mConstraintCatFRUMDistributionAmount Q’Q’’a’’kmdhcif | FlexRamp Uncertainty Award costs as distributed to the BAA by constraint ID and resource category. |
|  | BAA5mConstraintCatToAllCatFRUMRatio Q’Q’’a’’kmdhcif | Per resource category Ratio of BAA’s FlexRamp uncertainty movement either to itself when Q’’ = ‘BAA’, or to all BAAs that belong to the constraint ID. |
|  | BAASpec5mAllCatFRUMQuantity Q’Q’’kmdhcif | FlexRamp UM across all resource categories per constraint ID per BAA when constraint ID = ‘BAA’. |
|  | Constraint5mAllCatFRUMQuantity Q’’kmdhcif | FlexRamp UM across all resource categories per constraint ID across all BAAs belonging to the same constraint ID, where constraint ID <> ‘BAA’. |
|  | Constraint5mCatFRUMQuantity Q’’a’’kmdhcif | FlexRamp UM per resource category per constraint ID summed across all BAAs, where constraint ID <> ‘BAA’. |
|  | BAA5mConstraintCatFRUMQuantity Q’Q’’a’’kmdhcif | FlexRamp UM per resource category for with constraint ID to which a BAA belongs. |
|  | BA5mBAAConstraintFRMDQuantity BQ’Q’’kmdhcif | FlexRamp Metered Demand (in MWh) for Constraint ID for the BA and BAA. |
|  | Constraint5mFRMDQuantity Q’’kmdhcif | FlexRamp Metered Demand per Constraint where Constraint ID <> “BAA”. |
|  | BA5mBAASpecFRMDQuantityBQ’kmdhcif | FlexRamp Metered Demand for the BA where Constraint ID = “BAA”, i.e., BAA specific. |
|  | BAASpec5mFRMDQuantityQ’kmdhcif | FlexRamp Metered Demand total for the BAA where Constraint ID = “BAA”, i.e., BAA specific. |
|  | BAMonthOffPeakBAAConstraintFRMDQuantity BQ’Q’’km | FlexRamp BA level MD for Constraint ID, as total for Trading Month’s Off-Peak hours. |
|  | ConstraintMonthOffPeakFRMDQuantity Q’’km | FlexRamp Constraint ID level Metered Demand where Constraint ID <> “BAA”, as total for Trading Month’s Off-Peak hours. |
|  | BAMonthOffPeakBAASpecFRMDQuantityBQ’km | FlexRamp BA level Metered Demand where Constraint ID = “BAA”, as total for Trading Month’s Off-Peak hours. |
|  | BAAMonthOffPeakBAASpecFRMDQuantityQ’km | FlexRamp Balancing Authority Area level Metered Demand, where Constraint ID = “BAA”, as total for Trading Month’s Off-Peak hours. |
|  | BAMonthPeakBAAConstraintFRMDQuantity BQ’Q’’km | FlexRamp BA level Metered Demand (in MWh) for Constraint ID as total for Trading Month’s Peak hours. |
|  | ConstraintMonthPeakFRMDQuantity Q’’km | FlexRamp Constraint ID level Monthly Metered Demand (in MWh) where Constraint ID <> “BAA”, as total for Trading Month’s Peak hours. |
|  | BAMonthPeakBAASpecFRMDQuantityBQ’km | FlexRamp BA level Metered Demand (in MWh) where Constraint ID = “BAA”, as total for Trading Month’s Peak hours. |
|  | BAAMonthPeakBAASpecFRMDQuantityQ’km | FlexRamp Balancing Authority Area level Metered Demand (in MWh), where Constraint ID = “BAA”, as total for Trading Month’s Peak hours. |
|  | BAAMonthOffPeakHourFRUncertaintyCostAmount Q’Q’’km | Total uncertainty award cost for all Off-peak hours of the Trading Month per BAA and constraint ID and separated by direction of FlexRamp. |
|  | BAAMonthOffPeakConstraintCatFRUMQuantity Q’Q’’a’’km | Total uncertainty movement by resource category (Load, Intertie, or Supply) for all Off-peak hours of the Trading Month per BAA and constraint ID and separated by direction of FlexRamp. |
|  | BAMonthOffPeakResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’km | Total uncertainty award allocation basis per resource and by category (Load, Intertie, or Supply) for all Off-peak hours of the Trading Month. Also shown per BAA and constraint ID and separated by direction of FlexRamp. |
|  | BAAMonthPeakHourFRUncertaintyCostAmount Q’Q’’km | Total uncertainty award cost for all peak hours of the Trading Month per BAA and constraint ID and separated by direction of FlexRamp. |
|  | BAAMonthPeakConstraintCatFRUMQuantity Q’Q’’a’’km | Total uncertainty movement by resource category (Load, Intertie, or Supply) for all peak hours of the Trading Month per BAA and constraint ID and separated by direction of FlexRamp. |
|  | BAMonthPeakResourceBAAFRUAQuantity BrtF’S’Q’Q’’a’’km | Total uncertainty award allocation basis per resource and by category (Load, Intertie, or Supply) for all peak hours of the Trading Month. Also shown per BAA and constraint ID and separated by direction of FlexRamp. |
|  | BA5mConstraintFRFMAllocatedAmount BQ’kmdhcif | Allocated FlexRamp forecasted movement costs by BA, BAA, and separated by direction. Shown where constraint ID was not BAA specific. |
|  | BA5mBAASpecFRFMAllocatedAmount BQ’kmdhcif | Allocated FlexRamp forecasted movement costs by BA, BAA, and separated by direction. Shown where constraint ID was BAA specific. |
|  | Constraint5mFRFMAllocationAmount Q’’kmdhcif | Total cost of FlexRamp forecasted movement from physical and virtual bidding resources to be allocated by constraint ID when constraint ID <> ‘BAA’. |
|  | BAASpec5mFRFMAllocationAmount Q’kmdhcif | Total cost of FlexRamp forecasted movement from physical and virtual bidding resources to be allocated by BAA when constraint ID = ‘BAA’, i.e. BAA specific. |
|  | BAA5mFRFMCostAmount Q’Q’’kmdhcif | Total cost of FlexRamp forecasted movement from physical and virtual bidding resources by BAA and constraint ID. |
|  | BAA5mVirtualAwardFlexRampUpFMMWAmount Q’mdhcif | BAA level costs from virtual FRU forecasted movement |
|  | BAA5mVirtualAwardFlexRampDownFMMWAmount Q’mdhcif | BAA level costs from virtual FRD forecasted movement |

# Charge Code Effective Date

| Charge Code/  Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Update Type |
| --- | --- | --- | --- | --- |
| Flexible Ramp Product Pre- Calculation | 5.0 | 11/1/22 | 4/30/26 | Configuration Impacted |
| Flexible Ramp Product Pre- Calculation | 5.1 | 5/1/26 | Open | Configuration Impacted |