Settlements & Billing

Configuration Guide: Flexible Ramp Up Uncertainty Capacity Settlement

CC 7071

Version 5.3

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# Purpose of Document

The purpose of this document is to capture the business and functional requirements of 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 for Forecasted Movement and Uncertainty Capacity in the fifteen-minute market (FMM) and the five-minute market (RTM), 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 movement portion. At the end of the month, the uncertainty movement 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

For each Settlement Interval, this charge code will calculate the Flexible Ramp Up Uncertainty Award Settlement

# Charge Code Requirements

## Business Rules

| **Bus Req ID** | **Business Rule** |
| --- | --- |
| 1.0 | For each Settlement Interval, this charge code will settle the Flexible Ramp Up Uncertainty Capacity at the relevant Flexible Ramp Up Price |
| 2.0 | For each Settlement Interval, the Total Flexible Ramp Up Settlement Amount is the sum total of the FMM Flexible Ramp Up Uncertainty Capacity Settlement Amount, the RTD Flexible Ramp Up Uncertainty Capacity Settlement Amount, the Flexible Ramp Up Uncertainty Capacity Rescission Amount  |
| 3.0 | For a resource with an IRU Award, the CAISO applies a deviation settlement as the product of the Flexible Ramp Up Price and the difference between the upward Five-minute Imbalance Reserve Quantity and upward FMM Uncertainty Award. If a resource has no IRU Award, then the CAISO settles upward Uncertainty Awards as the product of the Uncertainty Up Award and the Flexible Ramp Up Price. |
| 3.0 | The FMM Flexible Ramp Up Uncertainty Capacity Settlement Amount is calculated as the product of FMM Flexible Ramp Up Uncertainty Capacity and the relevant FMM Flexible Ramp Up Constraint Shadow Prices |
| 3.1 | In each FMM Interval, the FMM Flexible Ramp Up Uncertainty Capacity will be converted from MW to MWhs prior to calculating the FMM Flexible Ramp Up Uncertainty Capacity Settlement Amount. |
| 3.2 | The market will procure FMM Flexible Ramp Up Uncertainty Capacity from resources that are able to be dispatched to resolve potential FMM net load variations when advisory intervals become binding.  |
| 3.3 | The FMM Flexible Ramp Up Uncertainty Capacity are procured at the FMM Flexible Ramp Up Constraint Price in which they resolve.  |
| 4.0 | The RTD Flexible Ramp Up Uncertainty Capacity Settlement Amount is calculated as the product of Incremental RTD Flexible Ramp Up Uncertainty Capacity and the relevant RTD Flexible Ramp Up Constraint Shadow Prices |
| 4.1 | In each Settlement Interval, the RTD Flexible Ramp Up Uncertainty Capacity will be converted from MW to MWhs prior to calculating the RTD Flexible Ramp Up Uncertainty Capacity Settlement Amount. |
| 4.2 | The market will procure RTD Flexible Ramp Up Uncertainty Capacity from resources that are able to be dispatched to resolve potential RTD net load variations when advisory intervals become binding |
| 4.3 | The Incremental RTD Flexible Ramp Up Uncertainty Capacity is the algebraic difference between the RTD Flexible Ramp Up Uncertainty Capacity and the relevant FMM Flexible Ramp Up Uncertainty Capacity. |
| 4.4 | The RTD Flexible Ramp Up Uncertainty Capacity is procured based RTD Flexible Ramp Up Constraint Price in which they resolve. |
| 5.0 | The Flexible Ramp Up Uncertainty Capacity Rescission Amount will be calculated for each resource who receives a FMM Flexible Ramp Up Uncertainty Capacity award or RTD Flexible Ramp Up Uncertainty Capacity award |
| 5.1 | The Flexible Ramp Up Uncertainty Capacity Rescission Amount by resource is calculated as the product of Flexible Ramp Up Uncertainty Capacity Rescission Quantity and the relevant RTD Flexible Ramp Up Constraint Shadow Prices |
| 5.2 | The Flexible Ramp Up Uncertainty Capacity Rescission Quantity by resource is minimum of the RTD Flexible Ramp Up Uncertainty Capacity and the Total Flexible Ramp Up Rescission Quantity  |
| 5.3 | The Total Flexible Ramp Up Rescission Quantity by resource is the minimum of the Total Flexible Ramp Up Quantity and Positive Deviation Quantity |
| 5.3 | The Total Flexible Ramp Up Quantity by resource is the sum of the RTD Flexible Ramp Up Uncertainty Capacity award and the positive RTD Flexible Ramp Forecasted Movement Quantity  |
| 5.4 | The Positive Deviation Quantity by resource is maximum of sum of Uninstructed Imbalance Energy plus Operational Adjustment and zero. |
| 6.0 | The Flexible Ramp Up Forecasted Movement Rescission Quantity, by resource, is the difference between the Total Flexible Ramp Up Rescission Quantity and the Flexible Ramp Up Uncertainty Capacity Rescission |
| 7.0 | 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. |
| 8.0 | When an eligible resource has an interval with a negative MWh meter, CAISO will not charge for the energy of those intervals. |
| 9.0 | Settlements shall settle uncertainty awards by FRUMP and FRDMP For each BAA, the host control area ID shall either be EIM Area or BAA specific depending upon the passing of the sufficiency test. |

## Predecessor Charge Codes

| **Charge Code/ Pre-calc Name** |
| --- |
| PC Real Time Energy PC |
| PC Flexible Ramp Product |
| CC 8071 – Day Ahead Imbalance Reserve Up Settlement |

## Successor Charge Codes

| **Charge Code/ Pre-calc Name** |
| --- |
| PC RTM Net Amount |
| PC Flexible Ramp Product |
| CC 7070 Flexible Ramp Up Forecasted Movement Settlement |
|  |

##  Inputs – External Systems

| **Input Req ID** | **Variable Name** | **Description** |
| --- | --- | --- |
|  | BA15mResourceFMMFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhc | Resource Specific FMM Flexible Ramp Up Uncertainty Capacity quantity (in MW) |
|  | BA5mResourceRTDFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhcif | Resource Specific RTD Flexible Ramp Up Uncertainty Capacity quantity (in MW) |
|  | BA15ResourceFMMFlexRampUpBAAPrice BrtQ’uT’I’M’L’F’S’mdhc | FMM Flexible Ramp Up BAA Constraint price (in $/MWh) by Balancing Authority Area Q’  |
|  | BA5mResourceRTDFlexRampUpBAAPrice BrtQ’uT’I’M’L’F’S’mdhcif | RTD Flexible Ramp Up BAA Constraint price (in $/MWh) by Balancing Authority Area Q’  |
|  | PTB\_BAFRUUncertaintyCapacityAdjustmentAmount BrtJQ’Q’’mdhcif | PTB charge adjustment (in $) |
|  |  |  |
|  | BAHourlyResIRU5MRampCapableQty BrtQ’mdh | The IRU award for the 5-minute ramp-capable portion. (MW) |

## Inputs - Predecessor Charge Codes or Pre-calculations

|  |  |  |
| --- | --- | --- |
| **Input Req ID** | **Variable Name** | **Predecessor Charge Code/ Pre-calc Configuration** |
|  | SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif | Real-Time Energy PC |
|  | SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif | Real-Time Energy PC |
|  | ResourceWholesaleExemptionFlag *rmdhcif* | Real Time Energy PC |
|  | BA5mResourceRTDFlexRampForecastedMovementMWFilteredQuantity BrtQ’uT’I’M’L’F’S’mdhcif | Flexible Ramp Product PC |
|  | BAHourlyResIRUScheduleFilterQuantity BrtuT'I'Q'M'F'S'L'mdh | CC 8071 – Day Ahead Imbalance Reserve Up Settlement |

## CAISO Formula

### *Flex Ramp Up Settlement Amount*:

### BA5mResTotalFRUUncertaintySTLMTAmount BrtQ’uT’I’M’L’F’S’mdhcif =

((BA5mResRTDFRUUncertaintyAmount BrtQ’uT’I’M’L’F’S’mdhcif + BA15mResFMMFRUUncertaintyAmount BrtQ’uT’I’M’L’F’S’mdhc + BA5mResFRUUncertaintySTLMTAdjustmentAmount BrtQ’mdhcif ) + (BA5mResFRUUncertaintyRescissionAmount BrtQ’uT’I’M’L’F’S’mdhcif )

### BA5mResFRUUncertaintySTLMTAdjustmentAmount BrtQ’mdhcif

Sum (J,Q’’) PTB\_BAFRUUncertaintyCapacityAdjustmentAmount BrtJQ’Q’’mdhcif

### BA5mResRTDFRUUncertaintyAmount BrtQ’uT’I’M’L’F’S’mdhcif =

 (-1) \* (BA5mResRTDIncFRUUncertaintyQuantity BrtQ’uT’I’M’L’F’S’mdhcif \* BA5mResourceRTDFlexRampUpBAAPrice BrtQ’uT’I’M’L’F’S’mdhcif)

### BA5mResRTDIncFRUUncertaintyQuantity BrtQ’uT’I’M’L’F’S’mdhcif =

((BA5mResourceRTDFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhcif) – Intduplicate (BA15mResourceFMMFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhc))/12

### BA15mResFMMFRUUncertaintyAmount BrtQ’uT’I’M’L’F’S’mdhc = (-1) \* (BA15mResFMMFRUUncertaintyQuantity BrtQ’uT’I’M’L’F’S’mdhc \* BA15ResourceFMMFlexRampUpBAAPrice BrtQ’uT’I’M’L’F’S’mdhc)

### BA15mResFMMFRUUncertaintyQuantity BrtQ’uT’I’M’L’F’S’mdhc = IF

###  BAHourlyResIRUScheduleFilterQuantityBrtuT'I'Q'M'F'S'L'mdh > 0

 THEN

BAHourlyResIRU5MRampCapableQty BrtQ’mdh – (0.25 \* BA15mResourceFMMFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhc)

ELSE

(0.25 \* BA15mResourceFMMFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhc)

END IF

Implementation note: Both BAHourlyResIRUScheduleFilterQuantityBrtuT'I'Q'M'F'S'L'mdh and BA15mResourceFMMFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhc are business drivers.

### BA5mResFRUUncertaintyRescissionAmount BrtQ’uT’I’M’L’F’S’mdhcif =

BA5mResFRUUncertaintyCapacityRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif \* BA5mResourceRTDFlexRampUpBAAPrice BrtQ’uT’I’M’L’F’S’mdhcif

### *Flex Ramp Up Rescission Quantity*:

### BA5mResFRUForecastedMovementRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif =

BA5mResourceTotalFlexRampUpRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif - BA5mResFRUUncertaintyCapacityRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif

### BA5mResFRUUncertaintyCapacityRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif =

Min ((BA5mResourceRTDFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhcif /12), BA5mResourceTotalFlexRampUpRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif )

### BA5mResourceTotalFlexRampUpRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif =

Min (BA5mResTotalFlexRampUpQuantity BrtQ’uT’I’M’L’F’S’mdhcif, BA5mResourcePositiveDeviationQuantity BrtuT’I’Q’M’F’S’mdhcif)

### BA5mResourcePositiveDeviationQuantity BrtuT’I’Q’M’F’S’mdhcif =

If

ResourceWholesaleExemptionFlag *rmdhcif* = 0

THEN

Max (SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif, 0)

Else

Max (SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif, 0)

Where Resource type (t) in ‘GEN’, ‘ITIE’, ‘ETIE’

### BA5mResTotalFlexRampUpQuantity BrtQ’uT’I’M’L’F’S’mdhcif =

(BA5mResourceRTDFlexRampUpUncertaintyCapacityQty BrtQ’uT’I’M’L’F’S’mdhcif + Max(BA5mResourceRTDFlexRampForecastedMovementMWFilteredQuantity BrtQ’uT’I’M’L’F’S’mdhcif, 0))/12

*Flex Ramp Up Uncertainty Assessment Amount:*

### BA5mResFlexRampUpUncertaintyAwardAssessmentAmount BrtQ’uT’I’M’L’F’S’mdhcif =

(BA5mResRTDFRUUncertaintyAmount BrtQ’uT’I’M’L’F’S’mdhcif + BA15mResFMMFRUUncertaintyAmount BrtQ’uT’I’M’L’F’S’mdhc + BA5mResFRUUncertaintySTLMTAdjustmentAmount BrtQ’mdhcif )

###

*Flex Ramp Up Uncertainty BAA Constraint Amount:*

### BAA5mFlexRampUpUncertaintyAmount Q’mdhcif =

Sum (Brt uT’I’M’L’F’S’) BA5mResTotalFRUUncertaintySTLMTAmount BrtQ’uT’I’M’L’F’S’mdhcif

## Outputs

| **Output ID** | **Name** | Description |
| --- | --- | --- |
|  | In addition to the outputs below, all inputs are required to be accessible for review by analysts and report on Settlement statements. |  |
|  | BA5mResTotalFRUUncertaintySTLMTAmount BrtQ’uT’I’M’L’F’S’mdhcif | Total Flexible Ramp Up Uncertainty Settlement Amount by Resource, BAA for Settlement Interval f **($)** |
|  | BA5mResFRUUncertaintySTLMTAdjustmentAmount BrtQ’mdhcif | Total Flexible Ramp Up Uncertainty Settlement Adjustment Amount by Resource, BAA for Settlement Interval f **($)** |
|  | BA5mResRTDFRUUncertaintyAmount BrtQ’uT’I’M’L’F’S’mdhcif | RTD Flexible Ramp Up Uncertainty Settlement Amount by Resource, BAA for Settlement Interval f **($)** |
|  | BA5mResRTDIncFRUUncertaintyQuantity BrtQ’uT’I’M’L’F’S’mdhcif | RTD Incremental Flexible Ramp Up Uncertainty Settlement Quantity by Resource for Settlement Interval f **(MWh)** |
|  | BA15mResFMMFRUUncertaintyAmount BrtQ’uT’I’M’L’F’S’mdhc | FMM Flexible Ramp Up Uncertainty Settlement Amount by Resource, BAA Constraint for FMM Interval c **($)** |
|  | BA15mResFMMFRUUncertaintyQuantity BrtQ’uT’I’M’L’F’S’mdhc | FMM Flexible Ramp Up Uncertainty Quantity by Resource, BAA Constraint for FMM Interval c **(MWh)** |
|  | BA5mResFRUUncertaintyRescissionAmount BrtQ’uT’I’M’L’F’S’mdhcif | Flexible Ramp Up Uncertainty Rescission Amount by Resource and BAA Constraint for Settlement Interval f **($)** |
|  | BA5mResFRUForecastedMovementRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif | Flexible Ramp Up Forecasted Movement Rescission Quantity by Resource and BAA Constraint for Settlement Interval f **(MWh)** |
|  | BA5mResFRUUncertaintyCapacityRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif | Flexible Ramp Up Uncertainty Rescission Quantity by Resource and BAA Constraint for Settlement Interval f **(MWh)** |
|  | BA5mResourceTotalFlexRampUpRescissionQuantity BrtQ’uT’I’M’L’F’S’mdhcif | Total Flexible Ramp Up Rescission Quantity by Resource and BAA Constraint for Settlement Interval f **(MWh)** |
|  | BA5mResourcePositiveDeviationQuantity BrtuT’I’Q’M’F’S’mdhcif | Positive Uninstructed Imbalance Energy Quantity by Resource for Settlement Interval f **(MWh)** |
|  | BA5mResTotalFlexRampUpQuantity BrtQ’uT’I’M’L’F’S’mdhcif | Total Flexible Ramp Up Quantity by Resource for Settlement Interval f (MWh)Represents the sum of Flexible Ramp Up Forecasted Movement plus Flexible Ramp Uncertaity Awarded Capacity  |
|  | BA5mResFlexRampUpUncertaintyAwardAssessmentAmount BrtQ’uT’I’M’L’F’S’mdhcif | Total Flexible Ramp Up Uncertainty Award Assessment Amount by Resource r and Balancing Authority Area Q’ for Settlement Interval f **($)** |
|  | BAA5mFlexRampUpUncertaintyAmount Q’mdhcif | Total Flexible Ramp Up Uncertainty Settlement Amount by BAA for Settlement Interval f **($)** |
|  |  |  |

# Charge Code Effective Dates

| Charge Code/Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version update Type |
| --- | --- | --- | --- | --- |
| Flexible Ramp Up Uncertainty Capacity Settlement | 5.0 | 11/01/16 | 9/30/2020 | Configuration Impacted |
| Flexible Ramp Up Uncertainty Capacity Settlement | 5.1 | 10/1/2020 | 10/31/2022 | Configuration Impacted |
| Flexible Ramp Up Uncertainty Capacity Settlement | 5.2 | 11/1/2022 | 4/30/2026 | Configuration Impacted |
| Flexible Ramp Up Uncertainty Capacity Settlement | 5.3 | 5/1/2026 | Open | Configuration Impacted |