Settlements & Billing

Configuration Guide: Resource Adequacy Availability Incentive Mechanism (RAAIM)

**Pre-calculation**

Version 5.12

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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 Resource Adequacy Availability Incentive Mechanism (RAAIM) was part of the Reliability Services Initiative, a suite of policies to address rules and process surrounding RA resources.

RAAIM enhances grid reliability and market efficiency by providing an incentive for RA resources that meet their bidding obligation and provide energy bids to the market. The new incentive mechanism replaces the previously existing Standard Capacity Product and utilizes a resource’s economic and self schedule bids to evaluate Resource Adequacy and Capacity Procurement Capacity availability. Similar to SCP, RAAIM establishes a monthly standard that RA resources are expected to perform. RA resources that fail to meet the threshold are subject to a penalty, while resources that exceed the threshold may receive a payment.

Under SCP, a large number of resources were exempted due to the limitation of evaluating availability based on forced outages. A resource’s availability was used in the evaluation of RA and CPM Capacity, but calculated separately under SCP and CPM settlement. In reality, RA and CPM capacity share the same must offer rules and adhere to inter-related rules. Additionally, the Flexible Resource Adequacy Criteria and Must Offer Obligation (FRAC-MOO) initiative created economic bidding requirements that were impossible to measure using an outage availability value. A new incentive mechanism was thus necessary in order to expand, integrate, and evaluate more resources on the grid. and accommodate the new bidding obligations introduced with FRAC-MOO.

## Description

The Resource Adequacy Availability Incentive Mechanism pre-calculation is the pre-calculation which executes daily the hourly availability and obligation quantities that will be used in the monthly calculation of the availability standard and incentive mechanism.

# Charge Code Requirements

## Business Rules

| Bus Req ID | Business Rule |
| --- | --- |
| 1.0 | General |
| 1.1 | A resource that designates generic/flexible RA capacity in a supply plan, or is party to replacement, substitution, or CPM designation shall be subject to the Resource Adequacy Availability Incentive Mechanism (RAAIM). |
| 1.2 | The monthly performance of an RA resource shall be measured by the Availability of the resource in the CAISO market. Availability is calculated based on a resource’s submission of bids to meet their RA bidding obligation on designated assessment hours. |
| 1.3 | System shall use the generic (system and local), flexible category 1, flexible category 2, and flexible category 3 RA availability assessment hours as identified in the BPM for Reliability Requirements for RAAIM assessment |
| 2.0 | Obligation |
| 2.1 | A resource’s daily obligation is determined separately for generic and flexible obligations |
| 2.2 | A resource with generic RA capacity or generic CPM capacity has an obligation to submit bids up to the committed capacity each hour in accordance with the bidding requirements in the BPM for Reliability Requirements. |
| 2.3 | A resource with flexible RA capacity or flexible CPM capacity has an obligation to submit economic bids up to the committed capacity on designated hours dependent on the category of flexible capacity in accordance with the bidding requirements in the BPM for Reliability Requirements. |
| 2.4 | A resource with overlapping generic and flexible obligations in a given market and hour, shall have the overlapping MW be held to the flexible obligation, and any excess shall be determined as generic obligation. |
| 2.5 | A resource’s daily obligation by type shall be the weighted average of the hourly obligations, within the type’s corresponding availability assessment hours, over the day |
| 2.6 | Where a VER is shown on a monthly flexible RA plan for less than its Effective Flexible Capacity (EFC), its flexible bid obligation will be based on its forecast and adjusted downward/upward in proportion to the percent of its EFC that was shown on the monthly flexible RA plan. |
| 2.7 | Long Start resources not committed in the Day Ahead Market or RUC for a given trade hour, will be released from any RAAIM obligation in the Real Time Market for the given trade hour. Long Start resources are defined as having a Cycle time > 255 and a Start-up time <= 1080. |
| 2.8 | Extremely Long Start resources not committed by Day Ahead Market under ELC process for a given trade hour, will not be subject to RAAIM obligation in Real Time Market for the given trade hour. Extremely Long Start resources are defined as having a Start-up time > 1080 |
| 2.9 | Non-Generator Resource-Regulation Energy Management (NGR-REM) must submit economic bids for both Regulation Up and Regulation Down in the Day Ahead Market for its shown MW of Flexible RA Capacity. |
| 2.10 | Non-Generator Resource-Regulation Energy Management (NGR-REM) must submit in the Real Time Market both:   * Economic bids for the remaining Regulation Up not awarded in the Day Ahead Market up to its shown MW of Flexible RA Capacity   AND   * Economic bids for the remaining Regulation Down not awarded in the Day Ahead Market up to its shown MW of Flexible RA Capacity |
| 2.11 | NRS-RA resources not committed in the Day Ahead Market or RUC for a given trade hour, will be released from any RAAIM obligation in the Real Time Market for the given trade hour. |
| 3.0 | Exemptions |
| 3.1 | RA exempt outages that qualify may exempt all or a portion of a resource’s generic and/or flexible RA obligation. |
| 3.3 | Eligible Generic RA Outage shall be equal to the Generic RA bid obligation that exceeds the RA Exempt Outage Threshold. |
| 3.4 | Eligible Flexible RA Outage shall be equal to the Flexible RA bid obligation that exceeds the RA Exempt Outage Threshold. |
| 3.5 | For a generator or tie-generator resource, the RA Exempt Outage Threshold is the resource’s Pmax less the (Min of zero and resource’s Pmin) and less RA Exempt Outage MW. |
| 3.6 | For a non-Resource-Specific System Resource, the RA Exempt Outage Threshold is the RA Exempt Outage MW |
| 3.7 | The following resources are exempt from the RAAIM:   1. Resource’s with Pmax < 1.0 2. Contracts for Energy delivered to CAISO BAA from non-specified resources. 3. Load following MSS resources that are on the monthly supply plan of a load-following MSS. 4. QF resources 5. CHP (Generic RA only) 6. Participating Load that is pumping load 7. Acquired resources under specific conditions. 8. VER resources (Generic RA only) 9. RMR Units 10. Combined Flexible RA Capacity Resource (Flexible only) 11. DRAM with temporary waivers 12. Hybrid Resources (Generic RA only) |
| 3.7.5 | A variable energy resource in the context of RAAIM settlement, assessment, or exemption will be treated as a VER only after the CAISO has certified the resource as providing a state of the art forecast for purposes of Section 3.1, Appendix Q of the CAISO tariff and the CAISO Masterfile reflects the resource fuel type as “VER”. |
| 3.8 | RDRR resources shall not be subject to RAAIM obligation in the Day Ahead Market |
| 3.9 | Load-following MSS resources – RA capacity from load-following MSS resources that are not on the monthly supply plan of a load-following MSS shall be subject to RAAIM. |
| 4.0 | Total and economic bids |
| 4.1 | A resource’s bids shall be no greater than its Outage Availability MW. |
| 4.2 | Non-Generator Resources shall include regulation bid data. |
| 5.0 | Availability |
| 5.1 | A resource’s hourly availability MW shall use the following data in its calculation. The data is needed at an hourly granularity and for each market.  Generic RA obligation  Flexible RA obligation  EFC Pmin  Economic bid  Total bid |
| 5.2 | Each day the system shall calculate a daily availability percentage for the day ahead and real time market by generic and flexible RA. Daily availability values and its associated RA data from the market with the lower daily availability percentage shall become the inputs to the monthly performance calculation. |
| 5.3 | The generic daily availability percentage shall be calculated as the sum of each assessment hour’s hourly generic availability divided by the sum of the corresponding assessment hour generic hourly yotal RA obligation.   * All values of target trade day for each market: ∑ generic hourly availability / ∑ generic hourly total RA obligation |
| 5.4 | The flexible daily availability percentage shall be calculated as the sum of each assessment hour’s hourly flexible availability divided by the sum of the corresponding assessment hour flexible hourly yotal RA obligation.   * All values of target trade day for each market: ∑ flexible hourly availability / ∑ flexible hourly total RA obligation |
| 5.5 | A resource’s generic daily availability MW shall be determined by taking the generic daily availability percentage multiplied by the generic daily obligation. This shall be done for each market. |
| 5.6 | A resource’s flexible daily availability MW shall be determined by taking the flexible daily availability percentage multiplied by the flexible daily obligation. This shall be done for each market. |
| 5.7 | A resource’s flexible availability is equal to the sum of eligible EFC Pmin and submitted economic bids, but no greater than its flexible RA obligation. |
| 5.8 | A resource’s generic availability is equal to maximum of:   1. The resource’s total bid less the MW quantity counted towards flexible availability, or 2. The positive value of generic RA obligation minus flexible RA obligation.   This generic availability value shall not include any negative capacity range, particularly relevant for those resources that can operate with a negative Pmin such as non-generator resources. This rule is included since resource generic RA obligation considers only supply that can be generated.  The maximum generic RA capacity a resource can provide is its net qualifying capacity (NQC) value. That value is the range from zero to Pmax, subject to reductions for deliverability. |
| 5.9 | Non-Generator Resources’ Real Time availability shall include regulation awarded in the Day Ahead in addition to Real Time regulation bid data. |

## Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| Pre-calculation Measured Demand Over Control Area |
| Pre-calculation Measured Demand Over TAC Area and CPM |
| Pre-calculation Start-Up and Minimum Load Cost |
| Real-Time Energy Quantity Pre-calculation |

## Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| CC 8830 – Monthly Resource Adequacy Availability Incentive Mechanism Settlement |
| CC 8831 – Monthly Resource Adequacy Availability Incentive Mechanism Allocation |
| CC 8835 – Annual Resource Adequacy Availability Incentive Mechanism Neutrality |

## Inputs – External Systems

| Row # | Variable Name | Description |
| --- | --- | --- |
|  | MinOperMW BrtF'S'md | This input represents a resource’s minimum energy output.  Pmin  Mapped to the single interval value that exists for the whole day.  This variable is also used in No Pay RUC Pre Calculation. |
|  | Resource90MinStartUpFlag Brtmd | Indicates if a resource’s cold startup time is equal to or less than 90 minutes.  Startup equal to or less than 90Minutes = 1  Startup greater than 90 minutes = 0 |
|  | GenericAssessmentFlag mdh | Indicates the hour that a generic RA or CPM obligation shall be assessed for RAAIM performance. |
|  | ResourceFlexibleAssessmentFlag j’mdh | Indicates the hour that a Flexible RA or CPM obligation shall be assessed for RAAIM performance. Note that the flag is different based on the flexible RA category defined by attribute (j’). |
|  | ResourceEFCQty rmd | A resource’s Eligible Flexible Capacity quantity. |
|  | DayAheadGenericCapacityQty BrtF’S’mdh | Day Ahead generic RA capacity. |
|  | DayAheadGenericCPMCapacityQty BrtF’S’mdh | Day Ahead generic CPM capacity. |
|  | DayAheadFlexibleCapacityQty BrtF’S’j’mdh | Day Ahead flexible RA capacity. |
|  | DayAheadFlexibleCPMCapacityQty BrtF’S’j’mdh | Day Ahead flexible CPM capacity. |
|  | RealTimeGenericCapacityQty BrtF’S’mdh | Real time generic RA capacity. |
|  | RealTimeGenericCPMCapacityQty BrtF’S’mdh | Real time generic CPM capacity. |
|  | RealTimeFlexibleCapacityQty BrtF’S’j’mdh | Real time flexible RA capacity. |
|  | RealTimeFlexibleCPMCapacityQty BrtF’S’j’mdh | Real time flexible CPM capacity. |
|  | DayAheadFlexibleExemptOutageQty BrtF’S’mdh | Sum of flexible RA exempt outage curtailment each hour from the day ahead market (excluding use limited exempt outages) |
|  | DayAheadGenericExemptOutageQty BrtF’S’mdh | Sum of generic RA exempt outage curtailment each hour from the day ahead market (excluding use limited exempt outages) |
|  | DayAheadUseLimitedExemptOutageQty BrtF’S’mdh | Sum of RA/CPM use limited exempt outage curtailment each hour from the day ahead market. |
|  | RealTimeFlexibleExemptOutageQty BrtF’S’mdh | Sum of flexible RA exempt outage curtailment each hour from the real time market (excluding use limited exempt outages) |
|  | RealTimeGenericExemptOutageQty BrtF’S’mdh | Sum of generic RA exempt outage curtailment each hour from the real time market (excluding use limited exempt outages) |
|  | RealTimeUseLimitedExemptOutageQty BrtF’S’mdh | Sum of RA/CPM use limited exempt outage curtailment each hour from the real time market. |
|  | MaxOperMW BrtF'S'md | Maximum Operating MW. The resource’s maximum energy output (Pmax) registered in masterfile.  Mapped to the single interval value that exists for the whole day. |
|  | ResourceAcquiredRightsFlag rmd | Indicates that a resource has met the requirements of acquired rights and is exempt from the Resource Adequacy Availability Incentive Mechanism |
|  | RunOfRiverFlag rmd | Indicates that a resource has met the requirements of ‘Run-of-river’ resource and is exempt from the Resource Adequacy Availability Incentive Mechanism |
|  | ResourcePMaxExemptionFlag rmd | Resource’s PMax is less than one MW, and is therefore exempt from RAAIM. |
|  | ResourceQFExemptionFlag rmd | Resource is identified as QF, and is therefore exempt from RAAIM |
|  | ResourceParticipatingLoadExemptionFlag rmd | Resource is identified as participating load, and is therefore exempt from RAAIM. |
|  | ResourceVERExemptionFlag rmd | Resource is identified as a Variable Energy Resource, and is therefore exempt from generic RAAIM. |
|  | ResourceCHPExemptionFlag rmd | Resource is identified as a Combined Heat Power Resource or is a hybrid resource, and is therefore exempt from generic RAAIM. |
|  | ResourceRDRRFlag rmd | Resource identified as RDRR resource |
|  | ResourceRMRFlag rmd | Resource identified as RMR resource |
|  | ResourceLongStartFlag rmd | Resource identified as Long Start Resource  Long Start resources are defined as having a Cycle time > 255 minutes and a Start-up time <= 1080 minutes. |
|  | ResourceExtremelyLongStartFlag rmd | Resource identified as Extremely Long Start Resource  These resources have Start-up time > 1080 minutes. |
|  | ResourceCombinedFlexibleRAExemptionFlag rmd | A RA resource that is designated in the RA showings to be combined with another RA resource to meet a singular flexible RA obligation. These resources are deemed “Combined Flexible RA Capacity Resources”, and their flexible capacity is exempt from RAAIM. |
|  | DayAheadUpperOperatingLimit BrtF’S’mdh | Resource’s effective upper operating limit as reported in OMS as of the day ahead market. |
|  | DayAheadLowerOperatingLimit BrtF’S’mdh | Resource’s effective lower operating limit as reported in OMS as of the day ahead market. |
|  | RealTimeUpperOperatingLimit BrtF’S’mdhcif | Resource’s effective upper operating limit as reported in OMS as of the RTM market. |
|  | RealTimeLowerOperatingLimit BrtF’S’mdhcif | Resource’s effective lower operating limit as reported in OMS as of the RTM market. |
|  | BAHourlyLowerRegulationLimitQty Brtmdh | Registered lower limit range that a resource can respond and deliver regulation energy.  For an MSG resource, this reflects lower regulation limit of configuration in which MSG resource was awarded Day-Ahead Regulation Up or Down. |
|  | DARegDownAwardedBidQuantity BrtT’uI’Q’M’R’W’F’S’VL'mdh | IFM Awarded Regulation Down Bid Capacity for a given resource and Trading Hour. |
|  | DARegUpAwardedBidQuantity BrtT’uI’Q’M’R’W’F’S’VL'mdh | IFM Awarded Regulation Up Bid Capacity for a given resource and Trading Hour. |
|  | BAHourlyResDAMEnergySelfScheduleBidQty BrtuQ’bAA’pF’S’amdh | The input represents the Hourly Day Ahead Market Self Schedule Bid Quantity by Business Associate.  The bid segment number for Self Schedule Qty will be set to “0”.  This variable is also used in CC4515. |
|  | BAHourlyResDAMEnergyBidQty BrtuQ’bAA’pF’S’mdh | The input represents the Day Ahead Market Energy Bid quantity (in MWh) for bid segment, as submitted by Business Associate.  This variable is also used in CC4515. |
|  | BAHourlyResRTMEnergySelfScheduleBidQty BrtuQ’bAA’pF’S’amdh | The input represents the Hourly Real Time Market Energy Self Schedule Bid Quantity by Business Associate.  The bid segment number for Self Schedule Qty will be set to “0”.  This variable is also used in CC4515. |
|  | BAHourlyResRTMEnergyBidQty BrtuQ’bAA’pF’S’mdh | The input represents the Real Time Market Energy Bid quantity (in MWh) for bid segment, as submitted by Business Associate  This variable is also used in CC4515. |
|  | BAHourlyResDAMRegUpSelfProvisionBidQty BrtQ’bF’S’mdh | The input represents the Hourly Day Ahead Regulation Up Capacity Self Provision Bid quantity (MW) as submitted by Business Associate.  The bid segment number for Self Provision Qty will be set to “0”.  This variable is also used in CC4515. |
|  | BAHourlyResDAMRegUpBidQty BrtQ’bF’S’mdh | The input represents the Day Ahead Market Regulation Up Capacity Bid quantity (MW) as submitted by Business Associate.  This variable is also used in CC4515. |
|  | BAHourlyResRTMRegUpSelfProvisionBidQty BrtQ’bF’S’mdh | The input represents the Hourly Real Time Market Regulation Up Capacity Self Provision Bid Quantity (MW) as submitted by Business Associate.  The bid segment number for Self Provision Qty will be set to “0”  This variable is also used in CC4515. |
|  | BAHourlyResRTMRegUpBidQty BrtQ’bF’S’mdh | The input represents the Hourly Real Time Market Regulation Up Capacity Bid quantity (in MW) as submitted by Business Associate.  This variable is also used in CC4515. |
|  | BAHourlyResDAMRegDownSelfProvisionBidQty BrtQ’bF’S’mdh | The input represents the Hourly Day Ahead Energy Regulation Down Capacity Self Provision Bid Quantity (MW) as submitted by Business Associate.  The bid segment number for Self Provision Qty will be set to “0”  This variable is also used in CC4515. |
|  | BAHourlyResDAMRegDownBidQty BrtQ’bF’S’mdh | The input represents the Day Ahead Market Regulation Down Capacity Bid quantity (MW) as submitted by Business Associate.  This variable is also used in CC4515. |
|  | BAHourlyResRTMRegDownSelfProvisionBidQty BrtQ’bF’S’mdh | The input represents the Hourly Real Time Market Regulation Down Self Provision Capacity Bid Quantity (MW) as submitted by Business Associate.  The bid segment number for Self Provision Qty will be set to “0”  This variable is also used in CC4515. |
|  | BAHourlyResRTMRegDownBidQty BrtQ’bF’S’mdh | The input represents the Hourly Real Time Market Regulation Down Capacity Bid quantity (in MW) as submitted by Business Associate.  This variable is also used in CC4515. |
|  | BA15MinResourceIntertieDeclinePenaltyFMMFinalForecastEnergy BrtF’S’mdhc | The input represents the 15 minute forecast of a VER resource in the FMM market, as provided for a given VER resource and FMM Interval. |
|  | BAResourceHourlyRUCAwardedBidCapacity BrtuT'I'M'VL'W'R'F'S'mdh | Hourly RUC Awarded Bid Capacity |
|  | CAISOMonthlyCPMSoftOfferCapPrice m | The CPM Soft Offer Cap (in $ / kW-month) to which the price of capacity offered into a Competitive Solicitation Process is subject.  This variable is also used in MDoTAC\_CPM\_PC. |
|  | CountFlag m | Dummy flag used for counting calculations. |
|  | ResourceDRAMWaiverExceptionFlag rmd | Indicates that a resource has met the requirements of DRAM waiver and is exempt from the Resource Adequacy Availability Incentive Mechnism. |
|  | ResourceDailyRMRCapacityPrice rmd | RMR contract price per day. |

## Inputs - Predecessor Charge Codes or Pre-calculations

| Row # | | Name | Predecessor Charge Code/  Pre-calc Configuration |
| --- | --- | --- | --- |
|  | | BAMonthlyResourceCPMCapacityPaymentPrice Brto’k’m | Pre-calculation Measured Demand Over TAC Area and CPM  Monthly CPM Capacity Payment Price (in $ / MW-month) by resource and CPM Transaction ID |
|  | | BAHourlyNodalMeteredCAISODemandQuantity\_MDOverCA BAA’mdh | Pre-calculation Measured Demand Over Control Area  Sum of meter input values over the Aggregated Pricing Node A of Aggregated Pricing Node Type A’ for Business Associate B, Trading Hour h, Trading Day d and Trading Month m. The summed quantity includes the individual meter readings for Loads of non-MSS entities and gross-settled MSS entities, and also includes the calculated net MSS Demand value for each net-settled MSS entity. |
|  | SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif | | Real-Time Energy Quantity Pre-calculation  Settlement Interval Resource Day Ahead Energy |

## CAISO Charge Code Formula

The formulas herein are effective on an advisory basis starting on 5/1/2018 and on a production basis starting on 7/1/2018.

### Assessment Bid Obligation & Availability

#### DailyAssessmentGenericCPMObligationQuantity

IF

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyAssessmentGenericCPMObligationQuantity BrtF’S’md = (DailyDayAheadOverallGenericCPMObligationQuantity BrtF’S’md / DailyDayAheadOverallGenericObligationQuantity BrtF’S’md ) \* DailyAssessmentGenericObligationQuantity BrtF’S’md

ELSE

DailyAssessmentGenericCPMObligationQuantity BrtF’S’md =

(DailyRealTimeOverallGenericCPMObligationQuantity BrtF’S’md / DailyRealTimeOverallGenericObligationQuantity BrtF’S’md ) \* DailyAssessmentGenericObligationQuantity BrtF’S’md

END IF

#### DailyAssessmentGenericRAObligationQuantity

IF

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyAssessmentGenericRAObligationQuantity BrtF’S’md =

(DailyDayAheadOverallGenericRAObligationQuantity BrtF’S’md / DailyDayAheadOverallGenericObligationQuantity BrtF’S’md ) \* DailyAssessmentGenericObligationQuantity BrtF’S’md

ELSE

DailyAssessmentGenericRAObligationQuantity BrtF’S’md =

(DailyRealTimeOverallGenericRAObligationQuantity BrtF’S’md / DailyRealTimeOverallGenericObligationQuantity BrtF’S’md ) \* DailyAssessmentGenericObligationQuantity BrtF’S’md

END IF

#### DailyDayAheadOverallGenericObligationQuantity

DailyDayAheadOverallGenericObligationQuantity BrtF’S’md =

DailyDayAheadOverallGenericCPMObligationQuantity BrtF’S’md + DailyDayAheadOverallGenericRAObligationQuantity BrtF’S’md

#### DailyDayAheadOverallGenericCPMObligationQuantity

DailyDayAheadOverallGenericCPMObligationQuantity BrtF’S’md =

**** DayAheadOverallGenericCPMObligationQuantity BrtF’S’mdh

#### DailyDayAheadOverallGenericRAObligationQuantity

DailyDayAheadOverallGenericRAObligationQuantity BrtF’S’md =

**** (DayAheadOverallGenericRAObligationQuantity BrtF’S’mdh )

#### DailyRealTimeOverallGenericObligationQuantity

DailyRealTimeOverallGenericObligationQuantity BrtF’S’md =

DailyRealTimeOverallGenericCPMObligationQuantity BrtF’S’md + DailyRealTimeOverallGenericRAObligationQuantity BrtF’S’md

#### DailyRealTimeOverallGenericCPMObligationQuantity

DailyRealTimeOverallGenericCPMObligationQuantity BrtF’S’md =

**** RealTimeOverallGenericCPMObligationQuantity BrtF’S’mdh

#### DailyRealTimeOverallGenericRAObligationQuantity

DailyRealTimeOverallGenericRAObligationQuantity BrtF’S’md =

**** (RealTimeOverallGenericRAObligationQuantity BrtF’S’mdh )

#### DailyAssessmentGenericObligationQuantity

DailyAssessmentGenericObligationQuantity BrtF’S’md = DailyAssessmentWeightingFactor BrtF’S’md \* DailyGenericObligationQuantity BrtF’S’md

#### DailyAssessmentGenericAvailabilityQuantity

DailyAssessmentGenericAvailabilityQuantity BrtF’S’md = DailyAssessmentWeightingFactor BrtF’S’md \* DailyGenericAvailableQuantity BrtF’S’md

#### DailyAssessmentFlexibleCPMObligationQuantity

IF

DailyFlexibleDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyAssessmentFlexibleCPMObligationQuantity BrtF’S’j’md =

(DailyDayAheadOverallFlexibleCPMObligationQuantity BrtF’S’j’md / DailyDayAheadOverallFlexibleObligationQuantity BrtF’S’j’md ) \* DailyAssessmentFlexibleObligationQuantity BrtF’S’j’md

ELSE

DailyAssessmentFlexibleCPMObligationQuantity BrtF’S’j’md =

(DailyRealTimeOverallFlexibleCPMObligationQuantity BrtF’S’j’md / DailyRealTimeOverallFlexibleObligationQuantity BrtF’S’j’md ) \* DailyAssessmentFlexibleObligationQuantity BrtF’S’j’md

END IF

#### DailyAssessmentFlexibleRAObligationQuantity

IF

DailyFlexibleDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyAssessmentFlexibleRAObligationQuantity BrtF’S’j’md =

(DailyDayAheadOverallFlexibleRAObligationQuantity BrtF’S’j’md / DailyDayAheadOverallFlexibleObligationQuantity BrtF’S’j’md ) \* DailyAssessmentFlexibleObligationQuantity BrtF’S’j’md

ELSE

DailyAssessmentFlexibleRAObligationQuantity BrtF’S’j’md =

(DailyRealTimeOverallFlexibleRAObligationQuantity BrtF’S’j’md / DailyRealTimeOverallFlexibleObligationQuantity BrtF’S’j’md ) \* DailyAssessmentFlexibleObligationQuantity BrtF’S’j’md

END IF

#### DailyDayAheadOverallFlexibleObligationQuantity

DailyDayAheadOverallFlexibleObligationQuantity BrtF’S’j’md =

DailyDayAheadOverallFlexibleCPMObligationQuantity BrtF’S’j’md + DailyDayAheadOverallFlexibleRAObligationQuantity BrtF’S’j’md

#### DailyDayAheadOverallFlexibleCPMObligationQuantity

DailyDayAheadOverallFlexibleCPMObligationQuantity BrtF’S’j’md =

**** DayAheadOverallFlexibleCPMObligQuantity BrtF’S’j’mdh

#### DailyDayAheadOverallFlexibleRAObligationQuantity

DailyDayAheadOverallFlexibleRAObligationQuantity BrtF’S’j’md =

**** (DayAheadOverallFlexibleRAObligationQuantity BrtF’S’j’mdh )

#### DailyRealTimeOverallFlexibleObligationQuantity

DailyRealTimeOverallFlexibleObligationQuantity BrtF’S’j’md =

DailyRealTimeOverallFlexibleCPMObligationQuantity BrtF’S’j’md + DailyRealTimeOverallFlexibleRAObligationQuantity BrtF’S’j’md

#### DailyRealTimeOverallFlexibleCPMObligationQuantity

DailyRealTimeOverallFlexibleCPMObligationQuantity BrtF’S’j’md =

**** RealTimeOverallFlexibleCPMObligQuantity BrtF’S’j’mdh

#### DailyRealTimeOverallFlexibleRAObligationQuantity

DailyRealTimeOverallFlexibleRAObligationQuantity BrtF’S’j’md =

**** (RealTimeOverallFlexibleRAObligationQuantity BrtF’S’j’mdh )

#### DailyAssessmentFlexibleObligationQuantity

DailyAssessmentFlexibleObligationQuantity BrtF’S’j’md = DailyAssessmentWeightingFactor BrtF’S’md \* DailyFlexibleObligationQuantity BrtF’S’j’md

#### DailyAssessmentFlexibleAvailabilityQuantity

DailyAssessmentFlexibleAvailabilityQuantity BrtF’S’j’md = DailyAssessmentWeightingFactor BrtF’S’md \* DailyFlexibleAvailableQuantity BrtF’S’j’md

#### DailyAssessmentWeightingFactor

DailyAssessmentWeightingFactor BrtF’S’md = Min(1,Max(DailyGenericObligationUncappedWeightFactorQuantity BrtF’S’md, DailyFlexibleObligationForWeightQuantity BrtF’S’md) / (DailyGenericAssessCapObligQuantity BrtF’S’md + DailyFlexibleObligationForWeightQuantity BrtF’S’md))

#### DailyFlexibleObligationForWeightQuantity

DailyFlexibleObligationForWeightQuantity BrtF’S’md = ****

IF

DailyFlexibleDAorRTAssessmentFlag BrtF’S’md = 1

THEN

(

IF

DayAheadResourceFlexibleRAAIMExemptionFlag rmd = 1

THEN

DailyFlexibleObligationForWeightQuantity BrtF’S’md = 0

ELSE

DailyFlexibleObligationForWeightQuantity BrtF’S’md = ****(DayAheadFlexibleCapacityQty BrtF’S’j’mdh + DayAheadFlexibleCPMCapacityQty BrtF’S’j’mdh)

/INTDUPLICATE(DailyAssessHoursFlexibleCount jmd)

)

ELSE

(

IF

RealTimeResourceFlexibleRAAIMExemptionFlag rmd = 1

THEN

DailyFlexibleObligationForWeightQuantity BrtF’S’md = 0

ELSE

DailyFlexibleObligationForWeightQuantity BrtF’S’md = ****(RealTimeFlexibleCapacityQty BrtF’S’j’mdh + RealTimeFlexibleCPMCapacityQty BrtF’S’j’mdh)

/INTDUPLICATE(DailyAssessHoursFlexibleCount jmd)

)

END IF

#### DayAheadFlexibleMaxCapacityQuantity

IF

DayAheadResourceFlexibleRAAIMExemptionFlag rmd = 1

THEN

DayAheadFlexibleMaxCapacityQuantity BrtF’S’mdh = 0

ELSE

DayAheadFlexibleMaxCapacityQuantity BrtF’S’mdh = ****(DayAheadFlexibleCapacityQty BrtF’S’j’mdh + DayAheadFlexibleCPMCapacityQty BrtF’S’j’mdh)

#### RealTimeFlexibleMaxCapacityQuantity

IF

RealTimeResourceFlexibleRAAIMExemptionFlag rmd = 1

THEN

RealTimeFlexibleMaxCapacityQuantity BrtF’S’mdh = 0

ELSE

RealTimeFlexibleMaxCapacityQuantity BrtF’S’mdh = ****(RealTimeFlexibleCapacityQty BrtF’S’j’mdh + RealTimeFlexibleCPMCapacityQty BrtF’S’j’mdh)

#### DailyGenericAssessCapObligQuantity

IF

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyGenericAssessCapObligQuantity BrtF’S’md =MAX(0, TotDayAheadGenericCapacityQuantity BrtF’S’mdh -DayAheadFlexibleMaxCapacityQuantity BrtF’S’mdh) / INTDUPLICATE(DailyAssessHoursGenericCount md)

ELSE

DailyGenericAssessCapObligQuantity BrtF’S’md =MAX(0, TotRealTimeGenericCapacityQuantity BrtF’S’mdh -RealTimeFlexibleMaxCapacityQuantity BrtF’S’mdh) / INTDUPLICATE(DailyAssessHoursGenericCount md)

END IF

#### TotDayAheadGenericCapacityQuantity

#### IF

DayAheadResourceGenericRAAIMExemptionFlag rmd = 1

THEN

#### TotDayAheadGenericCapacityQuantity BrtF’S’mdh = 0

ELSE

#### TotDayAheadGenericCapacityQuantity BrtF’S’mdh = (DayAheadGenericCapacityQty BrtF’S’j’mdh + DayAheadGenericCPMCapacityQty BrtF’S’j’mdh) \* GenericAssessmentFlag mdh

#### TotRealTimeGenericCapacityQuantity

#### IF

RealTimeResourceGenericRAAIMExemptionFlag rmd = 1

THEN

#### TotRealTimeGenericCapacityQuantity BrtF’S’mdh = 0

ELSE

#### TotRealTimeGenericCapacityQuantity BrtF’S’mdh = (RealTimeGenericCapacityQty BrtF’S’j’mdh + RealTimeGenericCPMCapacityQty BrtF’S’j’mdh) \* GenericAssessmentFlag mdh

### RAAIM & CPM Availability

#### DailyGenericAvailableQuantity

IF

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyGenericAvailableQuantity BrtF’S’md =DailyDayAheadGenericObligationCappedQuantity BrtF’S’md \* DayAheadGenericAvailabilityPercentage BrtF’S’md

ELSE

DailyGenericAvailableQuantity BrtF’S’md =DailyRealTimeGenericObligationCappedQuantity BrtF’S’md \*RealTimeGenericAvailabilityPercentage BrtF’S’md

END IF

#### DailyFlexibleAvailableQuantity

IF

DailyFlexibleDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyFlexibleAvailableQuantity BrtF’S’j’md =DailyDayAheadFlexibleObligationQuantity BrtF’S’j’md \* DayAheadFlexibleAvailabilityPercentage BrtF’S’md

ELSE

DailyFlexibleAvailableQuantity BrtF’S’j’md =DailyRealTimeFlexibleObligationQuantity BrtF’S’j’md \*RealTimeFlexibleAvailabilityPercentage BrtF’S’md

END IF

### RAAIM & CPM Obligation

#### DailyGenericObligationUncappedWeightFactorQuantity

IF

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyGenericObligationUncappedWeightFactorQuantity BrtF’S’md =

TotDayAheadGenericCapacityQuantity BrtF’S’mdh/INTDUPLICATE(DailyAssessHoursGenericCount md)

ELSE

DailyGenericObligationUncappedWeightFactorQuantity BrtF’S’md =

TotRealTimeGenericCapacityQuantity BrtF’S’mdh/INTDUPLICATE(DailyAssessHoursGenericCount md)

#### DailyGenericObligationUncappedQuantity

IF

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyGenericObligationUncappedQuantity BrtF’S’md =DailyDayAheadGenericObligationUncappedQuantity BrtF’S’md

ELSE

DailyGenericObligationUncappedQuantity BrtF’S’md =DailyRealTimeGenericObligationUncappedQuantity BrtF’S’md

END IF

#### DailyGenericObligationQuantity

IF

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyGenericObligationQuantity BrtF’S’md =DailyDayAheadGenericObligationCappedQuantity BrtF’S’md

ELSE

DailyGenericObligationQuantity BrtF’S’md =DailyRealTimeGenericObligationCappedQuantity BrtF’S’md

END IF

#### DailyGenericDAorRTAssessmentFlag

IF

((DayAheadGenericAvailabilityPercentage BrtF’S’md < RealTimeGenericAvailabilityPercentage BrtF’S’md

AND

DailyDayAheadGenericObligationCappedQuantity BrtF’S’md > 0)

OR

(DailyDayAheadGenericObligationCappedQuantity BrtF’S’md > 0

AND

RealTimeGenericObligationCappedQuantity BrtF’S’md = 0))

AND

(DayAheadResourceGenericRAAIMExemptionFlag rmd = 0)

THEN

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 1

ELSE

DailyGenericDAorRTAssessmentFlag BrtF’S’md = 0

END IF

**Note:** DailyDayAheadGenericObligationCappedQuantity BrtF’S’md and RealTimeGenericObligationCappedQuantity BrtF’S’md shall be used as the business drivers for this equation.

#### DailyFlexibleObligationQuantity

IF

DailyFlexibleDAorRTAssessmentFlag BrtF’S’md = 1

THEN

DailyFlexibleObligationQuantity BrtF’S’j’md =DailyDayAheadFlexibleObligationQuantity BrtF’S’j’md

ELSE

DailyFlexibleObligationQuantity BrtF’S’j’md =DailyRealTimeFlexibleObligationQuantity BrtF’S’j’md

END IF

#### DailyFlexibleDAorRTAssessmentFlag

IF

((DayAheadFlexibleAvailabilityPercentage BrtF’S’md < RealTimeFlexibleAvailabilityPercentage BrtF’S’md

AND

****DailyDayAheadFlexibleObligationQuantity BrtF’S’j’md > 0)

OR

(****DailyDayAheadFlexibleObligationQuantity BrtF’S’j’md > 0

AND

****RealTimeFlexibleObligQuantity BrtF’S’j’md = 0))

AND

(DayAheadResourceFlexibleRAAIMExemptionFlag rmd = 0)

THEN

DailyFlexibleDAorRTAssessmentFlag BrtF’S’md = 1

ELSE

DailyFlexibleDAorRTAssessmentFlag BrtF’S’md = 0

END IF

**Note:** DailyDayAheadFlexibleObligationQuantity BrtF’S’j’md and RealTimeFlexibleObligQuantity BrtF’S’j’md shall be used as the business drivers for this equation.

#### DayAheadOverallGenericRAObligationQuantity

DayAheadOverallGenericRAObligationQuantity BrtF’S’mdh = DayAheadGenericObligationCappedQuantity BrtF’S’mdh \* (DayAheadGenericRAObligQuantity BrtF’S’mdh / (DayAheadGenericRAObligQuantity BrtF’S’mdh + DayAheadGenericCPMObligQuantity BrtF’S’mdh))

#### RealTimeOverallGenericRAObligationQuantity

RealTimeOverallGenericRAObligationQuantity BrtF’S’mdh = RealTimeGenericObligationCappedQuantity BrtF’S’mdh \* (RealTimeGenericRAObligQuantity BrtF’S’mdh / (RealTimeGenericRAObligQuantity BrtF’S’mdh + RealTimeGenericCPMObligQuantity BrtF’S’mdh))

#### DayAheadOverallGenericCPMObligationQuantity

DayAheadOverallGenericCPMObligationQuantity BrtF’S’mdh = DayAheadGenericObligationCappedQuantity BrtF’S’mdh \* (DayAheadGenericCPMObligQuantity BrtF’S’mdh / (DayAheadGenericRAObligQuantity BrtF’S’mdh + DayAheadGenericCPMObligQuantity BrtF’S’mdh))

#### RealTimeOverallGenericCPMObligationQuantity

RealTimeOverallGenericCPMObligationQuantity BrtF’S’mdh = RealTimeGenericObligationCappedQuantity BrtF’S’mdh \* (RealTimeGenericCPMObligQuantity BrtF’S’mdh / (RealTimeGenericRAObligQuantity BrtF’S’mdh + RealTimeGenericCPMObligQuantity BrtF’S’mdh))

#### DayAheadOverallFlexibleRAObligationQuantity

DayAheadOverallFlexibleRAObligationQuantity BrtF’S’j’mdh  =

 DayAheadFlexibleRAObligQuantity BrtF’S’j’mdh

#### RealTimeOverallFlexibleRAObligationQuantity

IF

ResourceVERExemptionFlag rmd = 1

THEN

RealTimeOverallFlexibleRAObligationQuantity BrtF’S’j’mdh =

RealTimeVERFlexibleObligQuantity BrtF’S’j’mdh \* (RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh / (RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh + RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh))

ELSE

RealTimeOverallFlexibleRAObligationQuantity BrtF’S’j’mdh =

RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh

END IF

#### DayAheadOverallFlexibleCPMObligQuantity

DayAheadOverallFlexibleCPMObligQuantity BrtF’S’j’mdh  =

 DayAheadFlexibleCPMObligQuantity BrtF’S’j’mdh

#### RealTimeOverallFlexibleCPMObligQuantity

IF

ResourceVERExemptionFlag rmd = 1

THEN

RealTimeOverallFlexibleCPMObligQuantity BrtF’S’j’mdh =

RealTimeVERFlexibleObligQuantity BrtF’S’j’mdh \* (RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh / (RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh + RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh))

ELSE

RealTimeOverallFlexibleCPMObligQuantity BrtF’S’j’mdh =

 RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh

END IF

### Day Ahead Availability

#### DayAheadGenericAvailabilityPercentage

DayAheadGenericAvailabilityPercentage BrtF’S’md =

DayTotalDayAheadGenericAvailQuantity BrtF’S’md/ RolledUpDayAheadGenericObligationCappedQuantity BrtF’S’md

#### DayTotalDayAheadGenericAvailQuantity

DayTotalDayAheadGenericAvailQuantity BrtF’S’md =

DayAheadGenericAvailQuantity BrtF’S’mdh

#### RolledUpDayAheadGenericObligationCappedQuantity BrtF’S’md= DayAheadGenericObligationCappedQuantity BrtF’S’mdh

#### DayAheadGenericAvailQuantity

DayAheadGenericAvailQuantity BrtF’S’mdh = Max(0, Min(DayAheadGenericOutageAvailabilityQuantity BrtF’S’mdh, DayAheadGenericObligationCappedQuantity BrtF’S’mdh, DayAheadAvailableTotalBidQuantity BrtF’S’mdh- DayAheadHourlyTotCategFlexibleAvailQuantity BrtF’S’mdh ))

#### DayAheadFlexibleAvailabilityPercentage

DayAheadFlexibleAvailabilityPercentage BrtF’S’md =

DayTotalDayAheadFlexibleAvailQuantity BrtF’S’md / DailyDayAheadFlexibleObligationForCapQuantity BrtF’S’md

#### DayTotalDayAheadFlexibleAvailQuantity

DayTotalDayAheadFlexibleAvailQuantity BrtF’S’md =

DayAheadFlexibleAvailQuantity BrtF’S’j’mdh

#### DayAheadHourlyTotCategFlexibleAvailQuantity

DayAheadHourlyTotCategFlexibleAvailQuantity BrtF’S’mdh =

DayAheadFlexibleAvailQuantity BrtF’S’j’mdh

#### DailyDayAheadFlexibleObligationForCapQuantity

DailyDayAheadFlexibleObligationForCapQuantity BrtF’S’md =

DayAheadFlexibleObligationForCapQuantity BrtF’S’mdh

#### DayAheadFlexibleAvailQuantity

DayAheadFlexibleAvailQuantity BrtF’S’j’mdh = Min (DayAheadAvailableEconomicBidQuantity BrtF’S’mdh + DayAheadEligEFCPminQuantity BrtF’S’mdh, DayAheadFlexibleObligQuantity BrtF’S’j’mdh)

#### DayAheadEligEFCPminQuantity

DayAheadEligEFCPminQuantity BrtF’S’mdh = Max(0, Min (DayAheadUpperOperatingLimit BrtF’S’mdh , DayAheadNoSelfSchedFlag BrtF’S’mdh \* Resource90MinStartUpFlag Brtmd \* MinOperMW BrtF'S'md ))

Where F’ <> LESR

**Note:** In the above calculation the MinOperMW daily value will be duplicated each hour.

#### DayAheadNoSelfSchedFlag

IF

(DayAheadUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh = 0

AND DayAheadUpperEnergyBidQuantity BrtF’S’mdh > 0)

THEN

DayAheadNoSelfSchedFlag BrtF’S’mdh = 1

ELSE

DayAheadNoSelfSchedFlag BrtF’S’mdh = 0

END IF

**Note:** The above calculation shall use DayAheadFlexibleObligationForCapQuantity BrtF’S’mdh asa business driver.

### Real Time Availability

#### RealTimeGenericAvailabilityPercentage

DayTotalRealTimeGenericAvailQuantity BrtF’S’md/ RolledUpRealTimeGenericObligationCappedQuantity BrtF’S’md

#### DayTotalRealTimeGenericAvailQuantity

DayTotalRealTimeGenericAvailQuantity BrtF’S’md =

RealTimeGenericAvailQuantity BrtF’S’mdh

#### RolledUpRealTimeGenericObligationCappedQuantity BrtF’S’md= RealTimeGenericObligationCappedQuantity BrtF’S’mdh

#### RealTimeGenericAvailQuantity

#### RealTimeGenericAvailQuantity BrtF’S’mdh = Max(0, Min(RealTimeGenericOutageAvailabilityQuantity BrtF’S’mdh, RealTimeGenericObligationCappedQuantity BrtF’S’mdh, RealTimeAvailableTotalBidQuantity BrtF’S’mdh - RealTimeHourlyTotCategFlexibleAvailQuantity BrtF'S'mdh ))

#### RealTimeFlexibleAvailabilityPercentage

RealTimeFlexibleAvailabilityPercentage BrtF’S’md =

DayTotalRealTimeFlexibleAvailQuantity BrtF’S’md / DailyRealTimeFlexibleObligationForCapQuantity BrtF’S’md

#### DailyRealTimeFlexibleObligationForCapQuantity

DailyRealTimeFlexibleObligationForCapQuantity BrtF’S’md =

RealTimeFlexibleObligationForCapQuantity BrtF’S’mdh

#### DayTotalRealTimeFlexibleAvailQuantity

DayTotalRealTimeFlexibleAvailQuantity BrtF’S’md =

RealTimeFlexibleAvailQuantity BrtF’S’j’mdh

#### RealTimeHourlyTotCategFlexibleAvailQuantity

RealTimeHourlyTotCategFlexibleAvailQuantity BrtF'S'mdh =

RealTimeFlexibleAvailQuantity BrtF’S’j’mdh

#### RealTimeFlexibleAvailQuantity

IF

BAHourlyResDAMRegulationAward Brtmdh > 0

THEN

RealTimeFlexibleAvailQuantity BrtF’S’j’mdh  = Min ((BAHourlyResRegulationSlackCapacity BrtF’S’mdh + RealTimeAvailableEconomicBidQuantity BrtF’S’mdh + RealTimeEligEFCPminQuantity BrtF’S’mdh), RealTimeFlexibleObligQuantity BrtF’S’j’mdh, RealTimeOutageAvailabilityQuantity BrtF'S'mdh)

ELSE

RealTimeFlexibleAvailQuantity BrtF’S’j’mdh  = Min (RealTimeAvailableEconomicBidQuantity BrtF’S’mdh + RealTimeEligEFCPminQuantity BrtF’S’mdh), RealTimeFlexibleObligQuantity BrtF’S’j’mdh)

END IF

#### BAHourlyResRegulationSlackCapacity

IF

BAHourlyResDAMRegulationAward Brtmdh > 0

THEN

BAHourlyResRegulationSlackCapacity BrtF’S’mdh = Max(Min(RealTimeUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh , BAHourlyLowerRegulationLimitQty Brtmdh + BAHourlyResDAMRegDownAward BrtF’S’mdh) - MinOperMW BrtF'S'md,0)

ELSE

BAHourlyResRegulationSlackCapacity BrtF’S’mdh = 0

END IF

**Note:** This will be calculated only when RealTimeUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh exists. The MinOperMW daily value will be duplicated each hour.

#### BAHourlyResDAMRegulationAward

BAHourlyResDAMRegulationAward Brtmdh = sum(u,T’,I’,Q’,M’,V,L’,W’,R’,F,S’) ( DARegUpAwardedBidQuantity BrtT’uI’Q’M’R’W’F’S’VL'mdh + DARegDownAwardedBidQuantity BrtT’uI’Q’M’R’W’F’S’VL'mdh )

#### BAHourlyResDAMRegDownAward

BAHourlyResDAMRegDownAward BrtF’S’mdh = sum(u,T,I’,Q’,M’,V,L’,W’,R’) DARegDownAwardedBidQuantity BrtT’uI’Q’M’R’W’F’S’VL'mdh

#### BAHourlyResDAMRegUpAward

BAHourlyResDAMRegUpAward BrtF’S’mdh = sum(u,T’,I’,Q’,M’,V,L’,W’,R’) DARegUpAwardedBidQuantity BrtT’uI’Q’M’R’W’F’S’VL'mdh

#### RealTimeEligEFCPminQuantity

IF

BAHourlyResDAMRegulationAward Brtmdh > 0

THEN

RealTimeEligEFCPminQuantity BrtF’S’mdh = Max(0, Min (RealTimeHourlyUpperOperatingLimit BrtF’S’mdh , Resource90MinStartUpFlag Brtmd \* MinOperMW BrtF'S'md ))

ELSE

RealTimeEligEFCPminQuantity BrtF’S’mdh = Max(0, Min (RealTimeHourlyUpperOperatingLimit BrtF’S’mdh ,RealTimeNoSelfSchedFlag BrtF’S’mdh \* Resource90MinStartUpFlag Brtmd \* MinOperMW BrtF'S'md ))

END IF

Where F’ <> LESR

Note: In the above calculation the MinOperMW daily value will be duplicated each hour.

#### RealTimeNoSelfSchedFlag

IF

(RealTimeUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh = 0

AND

RealTimeUpperEnergyBidQuantity BrtF’S’mdh > 0)

THEN

RealTimeNoSelfSchedFlag BrtF’S’mdh = 1

ELSE

RealTimeNoSelfSchedFlag BrtF’S’mdh = 0

END IF

**Note:** The above calculation shall use RealTimeFlexibleObligationForCapQuantity BrtF’S’mdh as a business driver.

### Day Ahead Generic Obligation

#### DailyDayAheadGenericObligationCappedQuantity

DailyDayAheadGenericObligationCappedQuantity BrtF’S’md = ****DayAheadGenericObligationCappedQuantity BrtF’S’mdh / INTDUPLICATE(DailyAssessHoursGenericCount md)

#### DailyDayAheadGenericUncappedObligationQuantity

DailyDayAheadGenericObligationUncappedQuantity BrtF’S’md = ****DayAheadGenericObligQuantity BrtF’S’mdh / INTDUPLICATE(DailyAssessHoursGenericCount md)

#### DayAheadGenericObligationCappedQuantity

#### DayAheadGenericObligationCappedQuantity BrtF’S’mdh = Max(0, DayAheadGenericObligQuantity BrtF’S’mdh - DayAheadFlexibleObligationForCapQuantity BrtF’S’mdh)

#### DayAheadGenericObligQuantity

#### DayAheadGenericObligQuantity BrtF’S’mdh = DayAheadGenericRAObligQuantity BrtF’S’mdh + DayAheadGenericCPMObligQuantity BrtF’S’mdh

#### DayAheadGenericRAObligationQuantity

IF

DayAheadResourceGenericRAAIMExemptionFlag rmd = 1

THEN

DayAheadGenericRAObligQuantity BrtF’S’mdh = 0

ELSE

DayAheadGenericRAObligQuantity BrtF’S’mdh = MAX(0, DayAheadGenericCapacityQty BrtF’S’mdh – DayAheadGenericRAOutageExmptQuantity BrtF’S’mdh ) \* GenericAssessmentFlag mdh

END IF

Note: This equation shall utilize DayAheadGenericCapacityQty as the business driver.

#### DayAheadGenericCPMObligQuantity

IF

DayAheadResourceGenericRAAIMExemptionFlag rmd = 1

THEN

DayAheadGenericCPMObligQuantity BrtF’S’mdh =0

ELSE

DayAheadGenericCPMObligQuantity BrtF’S’mdh = MAX(0, DayAheadGenericCPMCapacityQty BrtF’S’mdh – DayAheadGenericCPMOutageExmptQuantity BrtF’S’mdh ) \* GenericAssessmentFlag mdh

END IF

Note: This equation shall utilize DayAheadGenericCPMCapacityQty as the business driver.

### Day Ahead Flexible Obligation

#### DailyDayAheadFlexibleObligationQuantity

DailyDayAheadFlexibleObligationQuantity BrtF’S’j’md = ****DayAheadFlexibleObligQuantity BrtF’S’j’mdh / INTDUPLICATE(DailyAssessHoursFlexibleCount j’md)

#### DayAheadFlexibleObligationForCapQuantity

DayAheadFlexibleObligationForCapQuantity BrtF’S’mdh = DayAheadFlexibleObligQuantity BrtF’S’j’mdh

#### DayAheadFlexibleObligQuantity

DayAheadFlexibleObligQuantity BrtF’S’j’mdh = DayAheadFlexibleRAObligQuantity BrtF’S’j’mdh + DayAheadFlexibleCPMObligQuantity BrtF’S’j’mdh

#### DayAheadFlexibleRAObligQuantity

IF

DayAheadResourceFlexibleRAAIMExemptionFlag rmd = 1

THEN

DayAheadFlexibleRAObligQuantity BrtF’S’j’mdh = 0

ELSE

DayAheadFlexibleRAObligQuantity BrtF’S’j’mdh = MAX(0, DayAheadFlexibleCapacityQty BrtF’S’j’mdh – DayAheadFlexibleRAOutageExmptQuantity BrtF’S’j’mdh ) \* ResourceFlexibleAssessmentFlag j’mdh

END IF

Note: This equation shall utilize DayAheadFlexibleCapacityQty as the business driver.

#### DayAheadFlexibleCPMObligQuantity

IF

DayAheadResourceFlexibleRAAIMExemptionFlag rmd = 1

THEN

DayAheadFlexibleCPMObligQuantity BrtF’S’j’mdh = 0

ELSE

DayAheadFlexibleCPMObligQuantity BrtF’S’j’mdh = MAX(0, DayAheadFlexibleCPMCapacityQty BrtF’S’j’mdh – DayAheadFlexibleCPMOutageExmptQuantity BrtF’S’j’mdh ) \* ResourceFlexibleAssessmentFlag j’mdh

END IF

**Note:** This equation shall utilize DayAheadFlexibleCPMCapacityQty as the business driver.

### Real Time Generic Obligation

#### DailyRealTimeGenericObligationCappedQuantity

DailyRealTimeGenericObligationCappedQuantity BrtF’S’md = ****RealTimeGenericObligationCappedQuantity BrtF’S’mdh / INTDUPLICATE(DailyAssessHoursGenericCount md)

#### DailyRealTimeGenericObligationUncappedQuantity

DailyRealTimeGenericObligationUncappedQuantity BrtF’S’md = ****RealTimeGenericObligQuantity BrtF’S’mdh / INTDUPLICATE(DailyAssessHoursGenericCount md)

#### RealTimeGenericObligationCappedQuantity

#### RealTimeGenericObligationCappedQuantity BrtF’S’mdh = Max(0, RealTimeGenericObligQuantity BrtF’S’mdh - RealTimeFlexibleObligationForCapQuantity BrtF’S’mdh)

#### RealTimeGenericObligQuantity

#### RealTimeGenericObligQuantity BrtF’S’mdh = RealTimeGenericRAObligQuantity BrtF’S’mdh + RealTimeGenericCPMObligQuantity BrtF’S’mdh

#### RealTimeGenericRAObligQuantity

IF

INTDUPLICATE(RealTimeResourceGenericRAAIMExemptionFlag rmd) +ResourceLongStartRealTimeRAAIMExemptionFlag rmdh +ResourceExtremelyLongStartRealTimeRAAIMExemptionFlag rmdh+ ResourceNRSSRealTimeRAAIMExemptionFlag rmdh > 0

THEN

RealTimeGenericRAObligQuantity BrtF’S’mdh = 0

ELSE

RealTimeGenericRAObligQuantity BrtF’S’mdh = MAX(0, RealTimeGenericCapacityQty BrtF’S’mdh – RealTimeGenericRAOutageExmptQuantity BrtF’S’mdh ) \* GenericAssessmentFlag mdh

END IF

**Note:** This equation shall utilize RealTimeGenericCapacityQty as the business driver.

#### RealTimeGenericCPMObligQuantity

IF

INTDUPLICATE(RealTimeResourceGenericRAAIMExemptionFlag rmd) +ResourceLongStartRealTimeRAAIMExemptionFlag rmdh +ResourceExtremelyLongStartRealTimeRAAIMExemptionFlag rmdh+ ResourceNRSSRealTimeRAAIMExemptionFlag rmdh > 0

THEN

RealTimeGenericCPMObligQuantity BrtF’S’mdh = 0

ELSE

RealTimeGenericCPMObligQuantity BrtF’S’mdh = MAX(0, RealTimeGenericCPMCapacityQty BrtF’S’mdh – RealTimeGenericCPMOutageExmptQuantity BrtF’S’mdh ) \* GenericAssessmentFlag mdh

END IF

**Note:** This equation shall utilize RealTimeGenericCPMCapacityQty as the business driver.

### Real Time Flexible Obligation

#### DailyRealTimeFlexibleObligationQuantity

DailyRealTimeFlexibleObligationQuantity BrtF’S’j’md = ****RealTimeFlexibleObligQuantity BrtF’S’j’mdh / INTDUPLICATE(DailyAssessHoursFlexibleCount jmd)

#### RealTimeFlexibleObligationForCapQuantity

RealTimeFlexibleObligationForCapQuantity BrtF’S’mdh = **** RealTimeFlexibleObligQuantity BrtF’S’j’mdh

#### RealTimeFlexibleObligQuantity

RealTimeFlexibleObligQuantity BrtF’S’j’mdh = RealTimeNonVERFlexibleObligQuantity BrtF’S’j’mdh + RealTimeVERFlexibleObligQuantity BrtF’S’j’mdh

#### RealTimeNonVERFlexibleObligQuantity

IF

ResourceVERExemptionFlag Brtmd = 0

THEN

RealTimeNonVERFlexibleObligQuantity BrtF’S’j’mdh = RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh + RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh

ELSE

RealtimeNonVERFlexibleObligQuantity BrtF’S’j’mdh = 0

END IF

#### RealTimeVERFlexibleObligQuantity

IF

ResourceVERExemptionFlag rmd = 1

THEN

RealTimeVERFlexibleObligQuantity BrtF’S’j’mdh = RealTimeHourlyVERForecastQuantity BrtF’S’mdh \* ((RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh + RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh) / ResourceEFCQty rmd)

ELSE

RealTimeVERFlexibleObligQuantity BrtF’S’j’mdh = 0

END IF

#### RealTimeHourlyVERForecastQuantity

RealTimeHourlyVERForecastQuantity BrtF’S’mdh =

**** BA15MinResourceIntertieDeclinePenaltyFMMFinalForecastEnergy BrtF’S’mdhc / 4

#### RealTimeFlexibleRAObligQuantity

IF

INTDUPLICATE(RealTimeResourceFlexibleRAAIMExemptionFlag rmd) +ResourceLongStartRealTimeRAAIMExemptionFlag rmdh +ResourceExtremelyLongStartRealTimeRAAIMExemptionFlag rmdh+ ResourceNRSSRealTimeRAAIMExemptionFlag rmdh > 0

THEN

RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh = 0

ELSE

RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh = MAX(0, RealTimeFlexibleCapacityQty BrtF’S’j’mdh – RealTimeFlexibleRAOutageExmptQuantity BrtF’S’j’mdh ) \* ResourceFlexibleAssessmentFlag j’mdh

END IF

Note: This equation shall utilize RealTimeFlexibleCapacityQty as the business driver.

#### RealTimeFlexibleCPMObligQuantity

IF

INTDUPLICATE(RealTimeResourceFlexibleRAAIMExemptionFlag rmd)+ResourceLongStartRealTimeRAAIMExemptionFlag rmdh + ResourceExtremelyLongStartRealTimeRAAIMExemptionFlag rmdh+ ResourceNRSSRealTimeRAAIMExemptionFlag rmdh > 0

THEN

RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh = 0

ELSE

RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh = MAX(0, RealTimeFlexibleCPMCapacityQty BrtF’S’j’mdh – RealTimeFlexibleCPMOutageExmptQuantity BrtF’S’j’mdh ) \* ResourceFlexibleAssessmentFlag j’mdh

END IF

**Note:** This equation shall utilize RealTimeFlexibleCPMCapacityQty as the business driver.

### RAAIM Exemption

#### DayAheadResourceGenericRAAIMExemptionFlag

IF

ResourceAcquiredRightsFlag rmd + RunOfRiverFlag rmd + ResourcePMaxExemptionFlag rmd + ResourceQFExemptionFlag rmd + ResourceParticipatingLoadExemptionFlag rmd + ResourceVERExemptionFlag rmd + ResourceCHPExemptionFlag rmd + ResourceRDRRFlag rmd + ResourceRMRFlag rmd+ ResourceDRAMWaiverExceptionFlag rmd >= 1

THEN

DayAheadResourceGenericRAAIMExemptionFlag rmd = 1

ELSE

DayAheadResourceGenericRAAIMExemptionFlag rmd = 0

END IF

#### RealTimeResourceGenericRAAIMExemptionFlag

IF

ResourceAcquiredRightsFlag rmd + RunOfRiverFlag rmd + ResourcePMaxExemptionFlag rmd + ResourceQFExemptionFlag rmd + ResourceParticipatingLoadExemptionFlag rmd + ResourceVERExemptionFlag rmd + ResourceCHPExemptionFlag rmd + ResourceRMRFlag rmd + ResourceDRAMWaiverExceptionFlag rmd >= 1

THEN

RealTimeResourceGenericRAAIMExemptionFlag rmd = 1

ELSE

RealTimeResourceGenericRAAIMExemptionFlag rmd = 0

END IF

#### DayAheadResourceFlexibleRAAIMExemptionFlag

IF

ResourceAcquiredRightsFlag rmd + RunOfRiverFlag rmd + ResourcePMaxExemptionFlag rmd + ResourceQFExemptionFlag rmd + ResourceCombinedFlexibleRAExemptionFlag rmd + ResourceVERExemptionFlag rmd + ResourceRDRRFlag rmd + ResourceParticipatingLoadExemptionFlag rmd + ResourceRMRFlag rmd+ ResourceDRAMWaiverExceptionFlag rmd >= 1

THEN

DayAheadResourceFlexibleRAAIMExemptionFlag rmd = 1

ELSE

DayAheadResourceFlexibleRAAIMExemptionFlag rmd = 0

END IF

#### RealTimeResourceFlexibleRAAIMExemptionFlag

IF

ResourceAcquiredRightsFlag rmd + RunOfRiverFlag rmd + ResourcePMaxExemptionFlag rmd + ResourceQFExemptionFlag rmd + ResourceCombinedFlexibleRAExemptionFlag rmd + ResourceParticipatingLoadExemptionFlag rmd + ResourceRMRFlag rmd + ResourceDRAMWaiverExceptionFlag rmd >= 1

THEN

RealTimeResourceFlexibleRAAIMExemptionFlag rmd = 1

ELSE

RealTimeResourceFlexibleRAAIMExemptionFlag rmd = 0

END IF

#### DayAheadGenericRAOutageExmptQuantity

DayAheadGenericRAOutageExmptQuantity BrtF’S’mdh =

DayAheadEligibleGenericExmptOutageQuantity BrtF’S’mdh \* (DayAheadGenericCapacityQty BrtF’S’mdh / (DayAheadGenericCapacityQty BrtF’S’mdh + DayAheadGenericCPMCapacityQty BrtF’S’mdh ))

#### DayAheadGenericCPMOutageExmptQuantity

DayAheadGenericCPMOutageExmptQuantity BrtF’S’mdh =

DayAheadEligibleGenericExmptOutageQuantity BrtF’S’mdh \* (DayAheadGenericCPMCapacityQty BrtF’S’mdh / (DayAheadGenericCapacityQty BrtF’S’mdh + DayAheadGenericCPMCapacityQty BrtF’S’mdh ))

#### DayAheadEligibleGenericExmptOutageQuantity

DayAheadEligibleGenericExmptOutageQuantity BrtF’S’mdh = DayAheadNonIntertieEligibleGenericExmptOutageQuantity BrtF’S’mdh + DayAheadNRSSResourceGenericExemptOutageQuantity BrtF’S’mdh

#### DayAheadNonIntertieEligibleGenericExmptOutageQuantity

DayAheadNonIntertieEligibleGenericExmptOutageQuantity BrtF’S’mdh =

MAX(0, ((DayAheadGenericCapacityQty BrtF’S’mdh + DayAheadGenericCPMCapacityQty BrtF’S’mdh ) – DayAheadResourceGenericExemptOutageThreshold BrtF’S’mdh ))

#### Where Entity Component Type (F’) <> INTERTIE

#### DayAheadResourceGenericExemptOutageThreshold

DayAheadResourceGenericExemptOutageThreshold BrtF’S’mdh = MaxOperMW BrtF'S'md –(DayAheadGenericExemptOutageQty BrtF’S’mdh +DayAheadUseLimitedExemptOutageQty BrtF’S’mdh)

#### Where Entity Component Type (F’) <> INTERTIE

#### DayAheadNRSSResourceGenericExemptOutageQuantity

DayAheadNRSSResourceGenericExemptOutageQuantity BrtF’S’mdh = DayAheadGenericExemptOutageQty BrtF’S’mdh

#### Where Resource Type (t) = ITIE and Entity Component Type (F’) = INTERTIE

#### DayAheadFlexibleRAOutageExmptQuantity

DayAheadFlexibleRAOutageExmptQuantity BrtF’S’j’mdh = DayAheadEligibleFlexibleExmptOutageQuantity BrtF’S’mdh \* (DayAheadFlexibleCapacityQty BrtF’S’j’mdh / (DayAheadFlexibleCapacityQty BrtF’S’j’mdh + DayAheadFlexibleCPMCapacityQty BrtF’S’j’mdh ))

#### DayAheadFlexibleCPMOutageExmptQuantity

DayAheadFlexibleCPMOutageExmptQuantity BrtF’S’j’mdh = DayAheadEligibleFlexibleExmptOutageQuantity BrtF’S’j’mdh \* (DayAheadFlexibleCPMCapacityQty BrtF’S’j’mdh / (DayAheadFlexibleCapacityQty BrtF’S’j’mdh + DayAheadFlexibleCPMCapacityQty BrtF’S’j’mdh ))

#### DayAheadEligibleFlexibleExmptOutageQuantity

DayAheadEligibleFlexibleExmptOutageQuantity BrtF’S’mdh = DayAheadNonIntertieEligibleFlexibleExmptOutageQuantity BrtF’S’mdh + DayAheadNRSSResourceFlexibleExemptOutageQuantity BrtF’S’mdh

#### DayAheadNonIntertieEligibleFlexibleExmptOutageQuantity

DayAheadNonIntertieEligibleFlexibleExmptOutageQuantity BrtF’S’mdh =

MAX(0, ((DayAheadFlexibleCapacityQty BrtF’S’j’mdh + DayAheadFlexibleCPMCapacityQty BrtF’S’j’mdh + ((1- Resource90MinStartUpFlag Brtmd ) \* MinOperMW BrtF'S'md)) – DayAheadResourceFlexibleExemptOutageThreshold BrtF’S’mdh ))

#### Where Entity Component Type (F’) <> INTERTIE

#### DayAheadResourceFlexibleExemptOutageThreshold

DayAheadResourceFlexibleExemptOutageThreshold BrtF’S’mdh = Max(0, MaxOperMW BrtF'S'md – Min(0, MinOperMW BrtF'S'md) - (DayAheadFlexibleExemptOutageQty BrtF’S’mdh+ DayAheadUseLimitedExemptOutageQty BrtF’S’mdh ))

#### Where Entity Component Type (F’) <> INTERTIE

#### DayAheadNRSSResourceFlexibleExemptOutageQuantity

DayAheadNRSSResourceFlexibleExemptOutageQuantity BrtF’S’mdh = DayAheadFlexibleExemptOutageQty BrtF’S’mdh

#### Where Resource Type (t) = ITIE and Entity Component Type (F’) = INTERTIE

#### RealTimeGenericRAOutageExmptQuantity

RealTimeGenericRAOutageExmptQuantity BrtF’S’mdh =

RealTimeEligibleGenericExmptOutageQuantity BrtF’S’mdh \* (RealTimeGenericCapacityQty BrtF’S’mdh / (RealTimeGenericCapacityQty BrtF’S’mdh + RealTimeGenericCPMCapacityQty BrtF’S’mdh ))

#### RealTimeGenericCPMOutageExmptQuantity

RealTimeGenericCPMOutageExmptQuantity BrtF’S’mdh =

RealTimeEligibleGenericExmptOutageQuantity BrtF’S’mdh \* (RealTimeGenericCPMCapacityQty BrtF’S’mdh / (RealTimeGenericCapacityQty BrtF’S’mdh + RealTimeGenericCPMCapacityQty BrtF’S’mdh ))

#### RealTimeEligibleGenericExmptOutageQuantity

RealTimeEligibleGenericExmptOutageQuantity BrtF’S’mdh = RealTimeNonIntertieEligibleGenericExmptOutageQuantity BrtF’S’mdh + RealTimeNRSSResourceGenericExemptOutageQuantity BrtF’S’mdh

#### RealTimeNonIntertieEligibleGenericExmptOutageQuantity

RealTimeNonIntertieEligibleGenericExmptOutageQuantity BrtF’S’mdh =

MAX(0, ((RealTimeGenericCapacityQty BrtF’S’mdh + RealTimeGenericCPMCapacityQty BrtF’S’mdh ) – RealTimeResourceGenericExemptOutageThreshold BrtF’S’mdh ))

#### Where Entity Component Type (F’) <> INTERTIE

#### RealTimeResourceGenericExemptOutageThreshold

RealTimeResourceGenericExemptOutageThreshold BrtF’S’mdh = MaxOperMW BrtF'S'md –(RealTimeGenericExemptOutageQty BrtF’S’mdh +RealTimeUseLimitedExemptOutageQty BrtF’S’mdh )

#### Where Entity Component Type (F’) <> INTERTIE

#### RealTimeNRSSResourceGenericExemptOutageQuantity

RealTimeNRSSResourceGenericExemptOutageQuantity BrtF’S’mdh = RealTimeGenericExemptOutageQty BrtF’S’mdh

#### Where Resource Type (t) = ITIE and Entity Component Type (F’) = INTERTIE

#### RealTimeFlexibleRAOutageExmptQuantity

RealTimeFlexibleRAOutageExmptQuantity BrtF’S’j’mdh = RealTimeEligibleFlexibleExmptOutageQuantity BrtF’S’mdh \* (RealTimeFlexibleCapacityQty BrtF’S’j’mdh / (RealTimeFlexibleCapacityQty BrtF’S’j’mdh + RealTimeFlexibleCPMCapacityQty BrtF’S’j’mdh ))

#### RealTimeFlexibleCPMOutageExmptQuantity

RealTimeFlexibleCPMOutageExmptQuantity BrtF’S’j’mdh = RealTimeEligibleFlexibleExmptOutageQuantity BrtF’S’j’mdh \* (RealTimeFlexibleCPMCapacityQty BrtF’S’j’mdh / (RealTimeFlexibleCapacityQty BrtF’S’j’mdh + RealTimeFlexibleCPMCapacityQty BrtF’S’j’mdh ))

#### RealTimeEligibleFlexibleExmptOutageQuantity

RealTimeEligibleFlexibleExmptOutageQuantity BrtF’S’mdh = RealTimeNonIntertieEligibleFlexibleExmptOutageQuantity BrtF’S’mdh + RealTimeNRSSResourceFlexibleExemptOutageQuantity BrtF’S’mdh

#### RealTimeNonIntertieEligibleFlexibleExmptOutageQuantity

RealTimeNonIntertieEligibleFlexibleExmptOutageQuantity BrtF’S’j’mdh =

MAX(0, ((RealTimeFlexibleCapacityQty BrtF’S’j’mdh + RealTimeFlexibleCPMCapacityQty BrtF’S’j’mdh + ((1- Resource90MinStartUpFlag Brtmd ) \* MinOperMW BrtF'S'md)) – RealTimeResourceFlexibleExemptOutageThreshold BrtF’S’mdh ))

#### Where Entity Component Type (F’) <> INTERTIE

#### RealTimeResourceFlexibleExemptOutageThreshold

RealTimeResourceFlexibleExemptOutageThreshold BrtF’S’mdh = Max(0, MaxOperMW BrtF'S'md – Min(0, MinOperMW BrtF'S'md) - (RealTimeFlexibleExemptOutageQty BrtF’S’mdh +RealTimeUseLimitedExemptOutageQty BrtF’S’mdh ))

#### Where Entity Component Type (F’) <> INTERTIE

#### RealTimeNRSSResourceFlexibleExemptOutageQuantity

RealTimeNRSSResourceFlexibleExemptOutageQuantity BrtF’S’mdh = RealTimeFlexibleExemptOutageQty BrtF’S’mdh

#### Where Resource Type (t) = ITIE and Entity Component Type (F’) = INTERTIE

#### ResourceNRSRARUCAwardQuantity rmdh =

**** BAResourceHourlyRUCAwardedBidCapacity BrtuT'I'M'VL'W'R'F'S'mdh

Where Resource Type (t) = ITIE and Entity Component Type (F’) = INTERTIE

Note: This charge type will not be reportable

#### ResourceNRSRADAMAwardQuantity rmdh =

**** SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif

Where Resource Type (t) = ITIE and Entity Component Type (F’) = INTERTIE

Note: This charge type will not be reportable

#### ResourceNRSSRealTimeRAAIMExemptionFlag rmdh =

IF

(ResourceNRSRARUCAwardQuantity rmdh + ResourceNRSRADAMAwardQuantity rmdh) > 0

THEN

ResourceNRSSRealTimeRAAIMExemptionFlag rmdh = 0

ELSE

ResourceNRSSRealTimeRAAIMExemptionFlag rmdh = 1

END IF

#### ResourceExtremelyLongStartRealTimeRAAIMExemptionFlag

IF

ResourceHourlyDayAheadEnergy rmdh = 0

AND

ResourceExtremelyLongStartFlag rmd = 1

THEN

ResourceExtremelyLongStartRealTimeRAAIMExemptionFlag rmdh = 1

ELSE

ResourceExtremelyLongStartRealTimeRAAIMExemptionFlag rmdh = 0

END IF

#### ResourceLongStartRealTimeRAAIMExemptionFlag

IF

(ResourceHourlyRUCAwardQuantity rmdh + ResourceHourlyDayAheadEnergy rmdh) = 0

AND

ResourceLongStartFlag rmd = 1

THEN

ResourceLongStartRealTimeRAAIMExemptionFlag rmdh = 1

ELSE

ResourceLongStartRealTimeRAAIMExemptionFlag rmdh = 0

END IF

#### ResourceHourlyRUCAwardQuantity

ResourceHourlyRUCAwardQuantity rmdh = **** (BAResourceHourlyRUCAwardedBidCapacity BrtuT'I'M'VL'W'R'F'S'mdh

#### ResourceHourlyDayAheadEnergy

ResourceHourlyDayAheadEnergy rmdh = ****SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif

### Day Ahead Total & Economic Bid

#### DayAheadAvailableTotalBidQuantity

DayAheadAvailableTotalBidQuantity BrtF’S’mdh = DayAheadTotalEnergyBidQuantity BrtF’S’mdh + DayAheadNGRTotalBidQuantity BrtF’S’mdh

#### DayAheadAvailableEconomicBidQuantity

DayAheadAvailableEconomicBidQuantity BrtF’S’mdh = DayAheadEconomicEnergyBidQuantity BrtF’S’mdh + DayAheadNGREconomicBidQuantity BrtF’S’mdh

#### DayAheadTotalEnergyBidQuantity

DayAheadTotalEnergyBidQuantity BrtF’S’mdh =

Min(DayAheadOutageAvailabilityQuantity BrtF’S’mdh , Max(0,DayAheadUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh , DayAheadUpperEnergyBidQuantity BrtF’S’mdh))

Where S’ <> REM, NREM

#### DayAheadUpperSelfScheduleEnergyBidQuantity

DayAheadUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh = Sum (u, Q’, b, A, A’, p, a) BAHourlyResDAMEnergySelfScheduleBidQty BrtuQ’bAA’pF’S’amdh

Where S’ <> REM

#### DayAheadEconomicEnergyBidQuantity

DayAheadEconomicEnergyBidQuantity BrtF’S’mdh = Max(0, Min(DayAheadOutageAvailabilityQuantity BrtF’S’mdh , DayAheadUpperEnergyBidQuantity BrtF’S’mdh ) - DayAheadLowerEnergyBidQuantity BrtF’S’mdh )

Where S’ <> REM, NREM

#### DayAheadUpperEnergyBidQuantity

DayAheadUpperEnergyBidQuantity BrtF’S’mdh = Max over (u, Q’, b, A, A’, p) (BAHourlyResDAMEnergyBidQty BrtuQ’bAA’pF’S’mdh)

#### DayAheadLowerEnergyBidQuantity

DayAheadLowerEnergyBidQuantity BrtF’S’mdh = Sum (u, Q, b, A, A’, p) BAHourlyResDAMEnergyBidQty BrtuQ’bAA’pF’S’mdh

Where Bid Segment Number (b) = 1

#### DayAheadNGRTotalBidQuantity

DayAheadNGRTotalBidQuantity BrtF’S’mdh = Min(DayAheadOutageAvailabilityQuantity BrtF’S’mdh , Max(0,DayAheadNGRTotalRegUpBidQuantity BrtF’S’mdh , DayAheadNGRTotalRegDownBidQuantity BrtF’S’mdh , DayAheadUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh, DayAheadUpperEnergyBidQuantity BrtF’S’mdh - DayAheadLowerEnergyBidQuantity BrtF’S’mdh)

Where S’ = REM, NREM

#### DayAheadNGRTotalRegUpBidQuantity

DayAheadNGRTotalRegUpBidQuantity BrtF’S’mdh = Sum (Q’, b) (BAHourlyResDAMRegUpSelfProvisionBidQty BrtQ’bF’S’mdh + BAHourlyResDAMRegUpBidQty BrtQ’bF’S’mdh)

Where S’ = REM, NREM

#### DayAheadNGRTotalRegDownBidQuantity

DayAheadNGRTotalRegDownBidQuantity BrtF’S’mdh = Sum (Q’, b) (BAHourlyResDAMRegDownSelfProvisionBidQty BrtQ’bF’S’mdh + BAHourlyResDAMRegDownBidQty BrtQ’bF’S’mdh)

Where S’ = REM

#### DayAheadNGREconomicBidQuantity

DayAheadNGREconomicBidQuantity BrtF’S’mdh = Max(0, Min(DayAheadOutageAvailabilityQuantity BrtF’S’mdh , Max((DayAheadUpperEnergyBidQuantity BrtF’S’mdh - DayAheadLowerEnergyBidQuantity BrtF’S’mdh), DayAheadNGREconomicRegUpBidQuantity BrtF’S’mdh, DayAheadNGREconomicRegDownBidQuantity BrtF’S’mdh )))

Where S’ = REM, NREM

#### DayAheadNGREconomicRegUpBidQuantity

DayAheadNGREconomicRegUpBidQuantity BrtF’S’mdh =

Sum (Q’, b) BAHourlyResDAMRegUpBidQty BrtQ’bF’S’mdh

Where S’ = REM, NREM

#### DayAheadNGREconomicRegDownBidQuantity

DayAheadNGREconomicRegDownBidQuantity BrtF’S’mdh =

Sum (Q’, b) BAHourlyResDAMRegDownBidQty BrtQ’bF’S’mdh

Where S’ = REM

#### DayAheadOutageAvailabilityQuantity

DayAheadOutageAvailabilityQuantity BrtF’S’mdh = Max(0, DayAheadUpperOperatingLimit BrtF’S’mdh – MIN(0, DayAheadLowerOperatingLimit BrtF’S’mdh ))

#### DayAheadGenericOutageAvailabilityQuantity

DayAheadGenericOutageAvailabilityQuantity BrtF’S’mdh = Max(0, DayAheadUpperOperatingLimit BrtF’S’mdh)

### Real Time Total & Economic Bid

#### RealTimeAvailableTotalBidQuantity

RealTimeAvailableTotalBidQuantity BrtF’S’mdh = RealTimeTotalEnergyBidQuantity BrtF’S’mdh + RealTimeNGRTotalBidQuantity BrtF’S’mdh

#### RealTimeAvailableEconomicBidQuantity

RealTimeAvailableEconomicBidQuantity BrtF’S’mdh = RealTimeEconomicEnergyBidQuantity BrtF’S’mdh + RealTimeNGREconomicBidQuantity BrtF’S’mdh

#### RealTimeTotalEnergyBidQuantity

RealTimeTotalEnergyBidQuantity BrtF’S’mdh =

Min(RealTimeOutageAvailabilityQuantity BrtF’S’mdh , Max(0,RealTimeUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh , RealTimeUpperEnergyBidQuantity BrtF’S’mdh))

Where S’ <> REM, NREM

#### RealTimeUpperSelfScheduleEnergyBidQuantity

RealTimeUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh = ****BAHourlyResRTMEnergySelfScheduleBidQty BrtuQ’bAA’pF’S’amdh

Where S’ <> REM

#### RealTimeEconomicEnergyBidQuantity

RealTimeEconomicEnergyBidQuantity BrtF’S’mdh = Max(0, Min(RealTimeOutageAvailabilityQuantity BrtF’S’mdh , RealTimeUpperEnergyBidQuantity BrtF’S’mdh ) - RealTimeLowerEnergyBidQuantity BrtF’S’mdh)

Where S’ <> REM, NREM

#### RealTimeUpperEnergyBidQuantity

RealTimeUpperEnergyBidQuantity BrtF’S’mdh = Max over u, Q’, b, A, A’, p (BAHourlyResRTMEnergyBidQty BrtuQ’bAA’pF’S’mdh )

#### RealTimeLowerEnergyBidQuantity

RealTimeLowerEnergyBidQuantity BrtF’S’mdh = ****BAHourlyResRTMEnergyBidQty BrtuQ’bAA’pF’S’mdh

Where Bid Segment Number (b) = 1

#### RealTimeNGRTotalBidQuantity

RealTimeNGRTotalBidQuantity BrtF’S’mdh = Min(RealTimeOutageAvailabilityQuantity BrtF’S’mdh , Max(0,RealTimeNGRTotalRegUpBidQuantity BrtF’S’mdh + BAHourlyResDAMRegUpAward BrtF’S’mdh , RealTimeNGRTotalRegDownBidQuantity BrtF’S’mdh + BAHourlyResDAMRegDownAward BrtF’S’mdh , RealTimeUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh , RealTimeUpperEnergyBidQuantity BrtF’S’mdh - RealTimeLowerEnergyBidQuantity BrtF’S’mdh))

Where S’ = REM, NREM

#### RealTimeNGRTotalRegUpBidQuantity

RealTimeNGRTotalRegUpBidQuantity BrtF’S’mdh = Sum (Q’, b) (BAHourlyResRTMRegUpSelfProvisionBidQty BrtQ’bF’S’mdh + BAHourlyResRTMRegUpBidQty BrtQ’bF’S’mdh)

Where S’ = REM, NREM

#### RealTimeNGRTotalRegDownBidQuantity

RealTimeNGRTotalRegDownBidQuantity BrtF’S’mdh = Sum (Q’, b) **(**BAHourlyResRTMRegDownSelfProvisionBidQty BrtQ’bF’S’mdh + BAHourlyResRTMRegDownBidQty BrtQ’bF’S’mdh)

Where S’ = REM

#### RealTimeNGREconomicBidQuantity

RealTimeNGREconomicBidQuantity BrtF’S’mdh = Max(0, Min(RealTimeOutageAvailabilityQuantity BrtF’S’mdh ,Max((RealTimeUpperEnergyBidQuantity BrtF’S’mdh - RealTimeLowerEnergyBidQuantity BrtF’S’mdh), RealTimeNGREconomicRegUpBidQuantity BrtF’S’mdh + BAHourlyResDAMRegUpAward BrtF’S’mdh , RealTimeNGREconomicRegDownBidQuantity BrtF’S’mdh + BAHourlyResDAMRegDownAward BrtF’S’mdh)))

Where S’ = REM, NREM

#### RealTimeNGREconomicRegUpBidQuantity

RealTimeNGREconomicRegUpBidQuantity BrtF’S’mdh =

Sum (Q’, b) BAHourlyResRTMRegUpBidQty BrtQ’bF’S’mdh

Where S’ = REM, NREM

#### RealTimeNGREconomicRegDownBidQuantity

RealTimeNGREconomicRegDownBidQuantity BrtF’S’mdh =

Sum (Q’, b) BAHourlyResRTMRegDownBidQty BrtQ’bF’S’mdh

Where S’ = REM

#### RealTimeOutageAvailabilityQuantity

RealTimeOutageAvailabilityQuantity BrtF’S’mdh = Max(0, RealTimeHourlyUpperOperatingLimit BrtF’S’mdh – MIN(0, RealTimeHourlyLowerOperatingLimit BrtF’S’mdh ))

#### RealTimeGenericOutageAvailabilityQuantity

RealTimeGenericOutageAvailabilityQuantity BrtF’S’mdh = Max(0, RealTimeHourlyUpperOperatingLimit BrtF’S’mdh)

#### RealTimeHourlyUpperOperatingLimit

RealTimeHourlyUpperOperatingLimit BrtF’S’mdh = INTMAX(RealTimeUpperOperatingLimit BrtF’S’mdhcif )

Note: The above equation does not perform a frequency conversion of the 5-minute variable.

#### RealTimeHourlyLowerOperatingLimit

RealTimeHourlyLowerOperatingLimit BrtF’S’mdh = INTMAX(RealTimeLowerOperatingLimit BrtF’S’mdhcif )

Note: The above equation does not perform a frequency conversion of the 5-minute variable.

### Prices for RAAIM Settlement

#### RAAIMNonAvailabiltyChargePrice

RAAIMNonAvailabiltyChargePrice m = 0.6\*1000\*CAISOMonthlyCPMSoftOfferCapPrice m

**Note:**

In the above formula the 1,000 multiplier serves to convert the price units from $ / kW–month to $ / MW–month

#### MonthlyResourceRAAIMCPMPrice

MonthlyResourceRAAIMCPMPrice Brtm = Max over o’ and k’ **(**BAMonthlyResourceCPMCapacityPaymentPrice Brto’k’m)

WHERE o’ <> FRDEF

#### MonthlyResourceRAAIMFlexibleCPMPrice

MonthlyResourceRAAIMFlexibleCPMPrice Brtm = Max over o’ and k’ **(**BAMonthlyResourceCPMCapacityPaymentPrice Brto’k’m)

WHERE o’ = FRDEF

### Determining Number of Obligation Hours for RAAIM Settlement

#### MonthlyAssessDaysGenericObligationCount

MonthlyAssessDaysGenericObligationCount m = ****DailyAssessGenericObligationFlag md

#### DailyAssessGenericObligationFlag

#### DailyAssessGenericObligationFlag md = INTMAX(GenericAssessmentFlag mdh)

#### MonthlyAssessDaysFlexibleObligationCount

#### MonthlyAssessDaysFlexibleObligationCount j’m = DailyAssessFlexibleObligationFlag j’md

#### DailyAssessFlexibleObligationFlag

#### DailyAssessFlexibleObligationFlag j’md = INTMAX(ResourceFlexibleAssessmentFlag j’mdh)

#### DailyAssessHoursGenericCount

DailyAssessHoursGenericCount md = ****GenericAssessmentFlag mdh

#### DailyAssessHoursFlexibleCount

DailyAssessHoursFlexibleCount jmd = ****ResourceFlexibleAssessmentFlag j’mdh

#### MonthlyObligationHoursQuantity

MonthlyObligationHoursQuantity m = ****DailyTradeHoursCount mdh

#### DailyTradeHoursCount

DailyTradeHoursCount mdh = INTDUPLICATE(CountFlag m)

### Metered Demand for RAAIM Neutrality Settlement

#### BusinessAssociateMonthlyRAAIMNodalMeteredCAISODemandQty

BusinessAssociateMonthlyRAAIMNodalMeteredCAISODemandQty Bm =

#### BAHourlyNodalMeteredCAISODemandQuantity\_MDOverCA BAA’mdh

### RMR Contract Price calculations

#### RMRMonthlyContractPrice rm =

#### Sum over (d) ResourceDailyRMRCapacityPrice rmd

## Outputs

| Output Req ID | Name | Description |
| --- | --- | --- |
|  | In addition to any outputs listed below, all inputs shall be included as outputs. |  |
|  | DailyAssessmentGenericCPMObligationQuantity BrtF’S’md | A resource’s daily generic CPM obligation used for RAAIM assessment |
|  | DailyDayAheadOverallGenericObligationQuantity BrtF’S’md | The combined daily day ahead generic CPM and generic RA obligation that is in excess of the combined daily day ahead flexible RA and flexible CPM obligation |
|  | DailyDayAheadOverallGenericCPMObligationQuantity BrtF’S’md | The daily day ahead generic CPM obligation that is in excess of the combined daily day ahead flexible RA and flexible CPM obligation |
|  | DailyDayAheadOverallGenericRAObligationQuantity BrtF’S’md | The daily day ahead generic RA obligation that is in excess of the combined day ahead flexible RA and day ahead flexible CPM obligation |
|  | DailyRealTimeOverallGenericObligationQuantity BrtF’S’md | The combined daily real-time generic CPM and generic RA obligation that is in excess of the combined daily real-time flexible RA and real-time flexible CPM obligation |
|  | DailyRealTimeOverallGenericCPMObligationQuantity BrtF’S’md | The daily real time generic CPM obligation that is in excess of the combined daily real time flexible RA and real-time flexible CPM obligation |
|  | DailyRealTimeOverallGenericRAObligationQuantity BrtF’S’md | The daily real time generic RA obligation that is in excess of the combined daily real time flexible RA and real-time flexible CPM obligation |
|  | DailyAssessmentGenericRAObligationQuantity BrtF’S’md | A resource’s daily generic RA obligation used for RAAIM assessment |
|  | DailyAssessmentGenericObligationQuantity BrtF’S’md | A resource’s daily generic RA and CPM obligation used for RAAIM assessment |
|  | DailyAssessmentGenericAvailabilityQuantity BrtF’S’md | A resource’s daily generic RA and CPM availability used for RAAIM assessment |
|  | DailyAssessmentFlexibleCPMObligationQuantity BrtF’S’j’md | A resource’s daily flexible CPM obligation used for RAAIM assessment |
|  | DailyDayAheadOverallFlexibleObligationQuantity BrtF’S’j’md | The sum of the Day-Ahead RAAIM CPM and RA obligation with respect to each Flexible RA category for a resource over all Trading Hours of the Trading Day |
|  | DailyDayAheadOverallFlexibleCPMObligationQuantity BrtF’S’j’md | The sum of the Day-Ahead RAAIM CPM obligation with respect to each Flexible RA category for a resource over all Trading Hours of the Trading Day |
|  | DailyDayAheadOverallFlexibleRAObligationQuantity BrtF’S’j’md | The sum of the Day-Ahead RAAIM RA obligation (capacity without CPM) with respect to each Flexible RA category for a resource over all Trading Hours of the Trading Day |
|  | DailyRealTimeOverallFlexibleObligationQuantity BrtF’S’j’md | The sum of the Real-Time RAAIM CPM and RA obligation with respect to each Flexible RA category for a resource over all Trading Hours of the Trading Day |
|  | DailyRealTimeOverallFlexibleCPMObligationQuantity BrtF’S’j’md | The sum of the Real-Time RAAIM CPM obligation with respect to each Flexible RA category for a resource over all Trading Hours of the Trading Day |
|  | DailyRealTimeOverallFlexibleRAObligationQuantity BrtF’S’j’md | The sum of the Real-Time RAAIM RA obligation (capacity without CPM) with respect to each Flexible RA category for a resource over all Trading Hours of the Trading Day |
|  | DailyAssessmentFlexibleRAObligationQuantity BrtF’S’j’md | A resource’s daily flexible RA obligation used for RAAIM assessment |
|  | DailyAssessmentFlexibleObligationQuantity BrtF’S’j’md | A resource’s daily flexible RA and CPM obligation used for RAAIM assessment |
|  | DailyAssessmentFlexibleAvailabilityQuantity BrtF’S’j’md | A resource’s daily flexible RA and CPM availability used for RAAIM assessment |
|  | DailyAssessmentWeightingFactor BrtF’S’md | Daily weighting factor used to  apportion a MW value to generic RA/CPM and flexible RA/CPM when the availability assessment hours for generic and flexible do not fully overlap |
|  | DailyFlexibleObligationForWeightQuantity BrtF’S’md | Daily flexbile RA/CPM obligation value used in the daily weighting factor |
|  | DailyGenericAvailableQuantity BrtF’S’md | Daily generic RA/CPM available quantity after day head or real time assessment flag is applied |
|  | DailyFlexibleAvailableQuantity BrtF’S’j’md | Daily flexible RA/CPM available quantity after day head or real time assessment flag is applied |
|  | DailyGenericObligationUncappedQuantity BrtF’S’md | Daily generic RA/CPM obligation quantity after day head or real time assessment flag is applied |
|  | DailyGenericObligationQuantity BrtF’S’md | Daily generic RA/CPM obligation quantity after day head or real time assessment flag is applied, that is in excess of flexible obligation |
|  | DailyGenericDAorRTAssessmentFlag BrtF’S’md | Assessment that determines which market to assess RAAIM for generic RA/CPM capacity  1 = Day ahead market  0 = Real time market |
|  | DailyFlexibleObligationQuantity BrtF’S’j’md | Daily flexible RA/CPM obligation quantity after day head or real time assessment flag is applied |
|  | DailyFlexibleDAorRTAssessmentFlag BrtF’S’md | Assessment that determines which market to assess RAAIM for flexible RA/CPM capacity  1 = Day ahead market  0 = Real time market |
|  | DayAheadOverallGenericRAObligationQuantity BrtF’S’mdh | The hourly day ahead generic RA obligation that is in excess of day ahead flexible RA and flexible CPM |
|  | RealTimeOverallGenericRAObligationQuantity BrtF’S’mdh | The hourly real time generic RA obligation that is in excess of real time flexible RA and flexible CPM |
|  | DayAheadOverallGenericCPMObligationQuantity BrtF’S’mdh | The hourly day ahead generic CPM obligation that is in excess of day ahead flexible RA and flexible CPM |
|  | RealTimeOverallGenericCPMObligationQuantity BrtF’S’mdh | The hourly real time generic CPM obligation that is in excess of real time flexible RA and flexible CPM |
|  | DayAheadOverallFlexibleRAObligationQuantity BrtF’S’j’mdh | The sum of the Day-ahead RAAIM obligation (capacity without CPM) over all Flexible RA categories for a resource and Trading Hour |
|  | RealTimeOverallFlexibleRAObligationQuantity BrtF’S’j’mdh | The sum of the Real-Time RAAIM obligation (capacity without CPM) over all Flexible RA categories for a resource and Trading Hour |
|  | DayAheadOverallFlexibleCPMObligQuantity BrtF’S’j’mdh | The sum of the Day-ahead RAAIM obligation CPM capacity over all Flexible RA categories for a resource and Trading Hour |
|  | RealTimeOverallFlexibleCPMObligQuantity BrtF’S’j’mdh | The sum of the Real-Time RAAIM obligation CPM capacity over all Flexible RA categories for a resource and Trading Hour |
|  | DayAheadGenericAvailabilityPercentage BrtF’S’md | Percentage of generic RA/CPM availability to generic RA/CPM obligation in day ahead |
|  | DayTotalDayAheadGenericAvailQuantity BrtF’S’md | The daily total quantity (in MW) of bids that meet the day ahead generic RA/CPM capacity bidding obligation under RAAIM. |
|  | DayAheadGenericAvailQuantity BrtF’S’mdh | The quantity of bids that meet the day ahead generic RA/CPM capacity bidding obligation under RAAIM. |
|  | DayAheadFlexibleAvailabilityPercentage BrtF’S’md | Percentage of flexible RA/CPM availability to flexible RA/CPM obligation in day ahead |
|  | DayTotalDayAheadFlexibleAvailQuantity BrtF’S’md | The daily total quantity (in MW) of the flexible available capacity in the Day Ahead Market over all Trading Hours and categories of flexible RA capacity. |
|  | DailyDayAheadFlexibleObligationForCapQuantity BrtF’S’md | The daily total of the hourly day ahead flexible RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions. The output is used for determining excess day ahead generic RA/CPM capacity |
|  | DayAheadFlexibleAvailQuantity BrtF’S’j’mdh | The quantity of economic bids that meet the day ahead flexible RA/CPM capacity bidding obligation under RAAIM. |
|  | DayAheadHourlyTotCategFlexibleAvailQuantity BrtF’S’mdh | Hourly total flex category availability of the resource for the Day-Ahead. |
|  | DayAheadEligEFCPminQuantity BrtF’S’mdh | The portion of an RA resource’s Pmin that count towards its day ahead hourly flexible availability. |
|  | DayAheadNoSelfSchedFlag BrtF’S’mdh | Indicates if a resource did not submit a self schedule into the day ahead market. |
|  | RealTimeGenericAvailabilityPercentage BrtF’S’md | Percentage of generic RA/CPM availability to generic RA/CPM obligation in real time |
|  | DayTotalRealTimeGenericAvailQuantity BrtF’S’md | The daily total (in MW) of the hourly quantity of bids that meet the real time generic RA/CPM capacity bidding obligation under RAAIM. |
|  | RealTimeGenericAvailQuantity BrtF’S’mdh | The quantity of bids that meet the real time generic RA/CPM capacity bidding obligation under RAAIM. |
|  | RealTimeFlexibleAvailabilityPercentage BrtF’S’md | Percentage of flexible RA/CPM availability to flexible RA/CPM obligation in real time. |
|  | DailyRealTimeFlexibleObligationForCapQuantity BrtF’S’md | The daily total (in MW) of the hourly real time flexible RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions, The output is used for determining excess real time generic RA/CPM capacity |
|  | DayTotalRealTimeFlexibleAvailQuantity BrtF’S’md | The daily total quantity (in MW) of the flexible available capacity in the RealTime Market over all Trading Hours and categories of flexible RA capacity. |
|  | RealTimeFlexibleAvailQuantity BrtF’S’j’mdh | The quantity of economic bids that meet the real time flexible RA/CPM capacity bidding obligation under RAAIM. |
|  | RealTimeHourlyTotCategFlexibleAvailQuantity BrtF’S’mdh | Hourly total flex category availability of the resource for the Real-Time market. |
|  | BAHourlyResRegulationSlackCapacity BrtF’S’mdh | Capacity between Pmin and RT self- schedule that is eligible towards RT flexible RA/CPM availability. This eligibility is due to a resource’s required self-scheduling requirements in RT due to DA up/down regulation awards. |
|  | BAHourlyResDAMRegulationAward Brtmd | Sum of Day-ahead regulation up or down award, with unused attributes removed. |
|  | BAHourlyResDAMRegDownAward BrtF’S’md | Day-Ahead Regulation Down Award summed over non-used attributes. |
|  | BAHourlyResDAMRegUpAward BrtF’S’md | Day-Ahead Regulation Up Award summed over non-used attributes. |
|  | RealTimeEligEFCPminQuantity BrtF’S’mdh | The portion of an RA resource’s Pmin that count towards its real time hourly flexible availability. |
|  | RealTimeNoSelfSchedFlag BrtF’S’mdh | Indicates if a resource did not submit a self schedule into the real time market. |
|  | DailyDayAheadGenericObligationCappedQuantity BrtF’S’md | Daily day ahead generic RA/CPM capacity subject to RAAIM that is in excess of day ahead flexible RA/CPM capacity |
|  | DailyDayAheadGenericObligationUncappedQuantity BrtF’S’md | Daily day ahead generic RA/CPM capacity subject to RAAIM |
|  | DayAheadGenericObligationCappedQuantity BrtF’S’mdh | Hourly day ahead generic RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions that is in excess of day ahead flexible RA/CPM capacity |
|  | DayAheadGenericObligQuantity BrtF’S’mdh | Hourly day ahead generic RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | DayAheadGenericRAObligQuantity BrtF’S’mdh | Day ahead RA generic capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | DayAheadGenericCPMObligQuantity BrtF’S’mdh | Day ahead generic CPM capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | DailyDayAheadFlexibleObligationQuantity BrtF’S’j’md | Daily day ahead flexible RA/CPM capacity subject to RAAIM |
|  | DayAheadFlexibleObligationForCapQuantity BrtF’S’mdh | Hourly day ahead flexible RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions, used for determining excess day ahead generic RA/CPM capacity |
|  | DayAheadFlexibleObligQuantity BrtF’S’j’mdh | Hourly day ahead flexible RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | DayAheadFlexibleRAObligQuantity BrtF’S’j’mdh | Day Ahead flexible RA capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | DayAheadFlexibleCPMObligQuantity BrtF’S’j’mdh | Day Ahead flexible CPM capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | DailyRealTimeGenericObligationCappedQuantity BrtF’S’md | Daily real time generic RA/CPM capacity subject to RAAIM that is in excess of real time flexible RA/CPM capacity |
|  | DailyRealTimeGenericObligationUncappedQuantity BrtF’S’md | Daily real time generic RA/CPM capacity subject to RAAIM |
|  | RealTimeGenericObligationCappedQuantity BrtF’S’mdh | Hourly real time generic RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions that is in excess of real time flexible RA/CPM capacity |
|  | RealTimeGenericObligQuantity BrtF’S’mdh | Hourly real time generic RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | RealTimeGenericRAObligQuantity BrtF’S’mdh | Real time generic RA capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | RealTimeGenericCPMObligQuantity BrtF’S’mdh | Real time generic CPM capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | DailyRealTimeFlexibleObligationQuantity BrtF’S’j’md | Daily real time flexible RA/CPM capacity subject to RAAIM |
|  | RealTimeFlexibleObligationForCapQuantity BrtF’S’mdh | Hourly real time flexible RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions, used for determining excess real time generic RA/CPM capacity |
|  | RealTimeFlexibleObligQuantity BrtF’S’j’mdh | Hourly real time flexible RA/CPM capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | RealTimeNonVERFlexibleObligQuantity BrtF’S’j’mdh | Non Variable Energy Resource’s (VER) real time flexible bidding obligation. |
|  | RealTimeVERFlexibleObligQuantity BrtF’S’j’mdh | Variable Energy Resource’s (VER’s) real time flexible bidding obligation after adjusting for the resource’s forecast. |
|  | RealTimeHourlyVERForecastQuantity BrtF’S’mdh | The hourly average of the 15 minute VER forecasts from the FMM market. |
|  | RealTimeFlexibleRAObligQuantity BrtF’S’j’mdh | Real time flexible RA capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | RealTimeFlexibleCPMObligQuantity BrtF’S’j’mdh | Real time flexible CPM capacity subject to RAAIM after applying outage and resource specific exemptions. |
|  | DayAheadResourceGenericRAAIMExemptionFlag rmd | Identifies if a resource’s generic RA or CPM capacity is exempt in day ahead from RAAIM. |
|  | RealTimeResourceGenericRAAIMExemptionFlag rmd | Identifies if a resource’s generic RA or CPM capacity is exempt in real time from RAAIM. |
|  | DayAheadResourceFlexibleRAAIMExemptionFlag rmd | Identifies if a resource’s flexible RA or CPM capacity is exempt in day ahead from RAAIM. |
|  | RealTimeResourceFlexibleRAAIMExemptionFlag rmd | Identifies if a resource’s flexible RA or CPM capacity is exempt in real time from RAAIM. |
|  | DayAheadGenericRAOutageExmptQuantity BrtF’S’mdh | Portion of generic RA capacity in the day ahead market that is exempt from RAAIM. |
|  | DayAheadGenericCPMOutageExmptQuantity BrtF’S’mdh | Portion of generic CPM capacity in the day ahead market that is exempt from RAAIM. |
|  | DayAheadEligibleGenericExmptOutageQuantity BrtF’S’mdh | Quantity of generic RAAIM eligible to be exempt in the day ahead by comparing exempt outages and generic obligation of the resource. |
|  | DayAheadNonIntertieEligibleGenericExmptOutageQuantity BrtF’S’mdh | Quantity of a non-intertie resource’s generic RAAIM eligible to be exempt in the day ahead by comparing exempt outages and generic obligation of the resource. |
|  | DayAheadResourceGenericExmptOutageThreshold BrtF’S’mdh | MW value that qualifies day ahead generic RAAIM obligation to be exempt for generators and tie-generators. This value is calculated by subtracting the hourly max curtailment value of eligible outages from a resource’s p-max. |
|  | DayAheadNRSSResourceGenericExemptOutageQuantity BrtF’S’mdh | MW value of the day ahead generic RAAIM obligation that is to be exempt for NRSS resources. This value is based on the hourly max curtailment value of eligible outages. |
|  | DayAheadFlexibleRAOutageExmptQuantity BrtF’S’j’mdh | Portion of flexible RA capacity in the day ahead market that is exempt from RAAIM. |
|  | DayAheadFlexibleCPMOutageExmptQuantity BrtF’S’j’mdh | Portion of flexible CPM capacity in the day ahead market that is exempt from RAAIM. |
|  | DayAheadEligibleFlexibleExmptOutageQuantity BrtF’S’j’mdh | Quantity of flexible RAAIM eligible to be exempt in the day ahead by comparing exempt outages and flexible obligation of the resource. |
|  | DayAheadNonIntertieEligibleFlexibleExmptOutageQuantity BrtF’S’mdh | Quantity of a non-intertie resource’s flexible RAAIM eligible to be exempt in the day ahead by comparing exempt outages and flexible obligation of the resource. |
|  | DayAheadResourceFlexibleExemptOutageThreshold BrtF’S’mdh | MW value that qualifies day ahead flexible RAAIM obligation to be exempt for generators and tie-generators. This value is calculated by subtracting the hourly max curtailment value of eligible outages from a resource’s p-max. |
|  | DayAheadNRSSResourceFlexibleExemptOutageQuantity BrtF’S’mdh | MW value of the day ahead flexible RAAIM obligation that is to be exempt for NRSS resources. This value is based on the hourly max curtailment value of eligible outages. |
|  | RealTimeGenericRAOutageExmptQuantity BrtF’S’mdh | Portion of generic RA capacity in the real time market that is exempt from RAAIM. |
|  | RealTimeGenericCPMOutageExmptQuantity BrtF’S’mdh | Portion of generic CPM capacity in the real time market that is exempt from RAAIM. |
|  | RealTimeEligibleGenericExmptOutageQuantity BrtF’S’mdh | Quantity of generic RAAIM eligible to be exempt in the real time market by comparing exempt outages and generic obligation of the resource. |
|  | RealTimeNonIntertieEligibleGenericExmptOutageQuantityBrtF’S’mdh | Quantity of a non-intertie resource’s generic RAAIM eligible to be exempt in the real time market by comparing exempt outages and generic obligation of the resource. |
|  | RealTimeResourceGenericExemptOutageThreshold BrtF’S’mdh | MW value that qualifies real time generic RAAIM obligation to be exempt for generators and tie-generators. This value is calculated by subtracting the hourly max curtailment value of eligible outages from a resource’s p-max. |
|  | RealTimeNRSSResourceGenericExemptOutageQuantity BrtF’S’mdh | MW value of the real time generic RAAIM obligation that is to be exempt for NRSS resources. This value is based on the hourly max curtailment value of eligible outages. |
|  | RealTimeFlexibleRAOutageExmptQuantity BrtF’S’j’mdh | Portion of flexible RA capacity in the real time market that is exempt from RAAIM. |
|  | RealTimeFlexibleCPMOutageExmptQuantity BrtF’S’j’mdh | Portion of flexible CPM capacity in the real time market that is exempt from RAAIM. |
|  | RealTimeEligibleFlexibleExmptOutageQuantity BrtF’S’j’mdh | Quantity of flexible RAAIM eligible to be exempt in the real time market by comparing exempt outages and flexible obligation of the resource. |
|  | RealTimeNonIntertieEligibleFlexibleExmptOutageQuantity BrtF’S’j’mdh | Quantity of a non-intertie resource’s flexible RAAIM eligible to be exempt in the real time market by comparing exempt outages and flexible obligation of the resource. |
|  | RealTimeResourceFlexibleExemptOutageThreshold BrtF’S’mdh | MW value that qualifies real time flexible RAAIM obligation to be exempt for generators and tie-generators. This value is calculated by subtracting the hourly max curtailment value of eligible outages from a resource’s p-max. |
|  | RealTimeNRSSResourceFlexibleExemptOutageQuantity BrtF’S’mdh | MW value of the real time flexible RAAIM obligation that is to be exempt for NRSS resources. This value is based on the hourly max curtailment value of eligible outages. |
|  | ResourceNRSRARUCAwardQuantity rmdh | RUC Award quantity for NRSS for trade hour **h**  This is an intermediate calculation variable and will not be reportable. If desired, shadow validation can be done on the reportable variable BAResourceHourlyRUCAwardedBidCapacity |
|  | ResourceNRSRADAMAwardQuantity rmdh | Day Ahead Market Award quantity for NRSS for trade hour **h**  This is an intermediate calculation variable and will not be reportable. If desired, shadow validation can be done on the reportable variable SettlementIntervalResouceDayAheadEnergy |
|  | ResourceNRSSRealTimeRAAIMExemptionFlag rmdh | Flag exempting NRSS from RAAIM obligation in Real Time Market for trade hour **h** |
|  | ResourceExtremelyLongStartRealTimeRAAIMExemptionFlag rmdh | Flag exempting Extremely Long Start Resource from RAAIM obligation in Real Time Market for trade hour **h** |
|  | ResourceLongStartRealTimeRAAIMExemptionFlag rmdh | Flag exempting Long Start Resource from RAAIM obligation in Real Time Market for trade hour **h** |
|  | ResourceHourlyRUCAwardQuantity rmdh | Hourly RUC Award Quantity |
|  | ResourceHourlyDayAheadEnergy rmdh | Hourly Day Ahead Energy |
|  | DayAheadAvailableTotalBidQuantity BrtF’S’mdh | Represents the portion of a resource’s day ahead total bids after outages and use limitations that will be used in the RAAIM availability calculation |
|  | DayAheadAvailableEconomicBidQuantity BrtF’S’mdh | Represents the portion of a resource’s day ahead economic bids after outages and use limitations that will be used in the RAAIM availability calculation. |
|  | DayAheadTotalEnergyBidQuantity BrtF’S’mdh | The MW value of all bids/schedules for a resource that submitted into the day ahead market. |
|  | DayAheadUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh | The MW quantity of self-scheduled bids that a resource submitted for the day ahead market. |
|  | DayAheadEconomicEnergyBidQuantity BrtF’S’mdh | The MW quantity of economic bids that a resource submitted for the day ahead market. |
|  | DayAheadUpperEnergyBidQuantity BrtF’S’mdh | The MW value at the top of a resource’s day ahead energy bid curve. |
|  | DayAheadLowerEnergyBidQuantity BrtF’S’mdh | The MW value at the bottom of a resource’s day ahead energy bid curve. |
|  | DayAheadNGRTotalBidQuantity BrtF’S’mdh | Day ahead bid quantity used for day ahead generic RA availability for an NGR resource |
|  | DayAheadNGRTotalRegUpBidQuantity BrtF’S’mdh | Total of regulation up economic bids and self provision submitted by a NGR resource in day ahead. |
|  | DayAheadNGRTotalRegDownBidQuantity BrtF’S’mdh | Total of regulation down economic bids and self provision submitted by a NGR-REM resource in day ahead. |
|  | DayAheadNGREconomicBidQuantity BrtF’S’mdh | Day ahead bid quantity used for day ahead flexible RA availability for an NGR resource |
|  | DayAheadNGREconomicRegUpBidQuantity BrtF’S’mdh | Total of regulation up economic bids submitted by a NGR resource in day ahead. |
|  | DayAheadNGREconomicRegDownBidQuantity BrtF’S’mdh | Total of regulation down economic bids submitted by a NGR-REM resource in day ahead. |
|  | DayAheadOutageAvailabilityQuantity BrtF’S’mdh | A resource’s day ahead operational availability based on outages. This will be applicable to flexible capacity assessment only. |
|  | DayAheadGenericOutageAvailabilityQuantity BrtF’S’mdh | A resource’s day ahead operational availability based on outages, applicable for generic assessment. Excludes negative capacity range. |
|  | RealTimeAvailableTotalBidQuantity BrtF’S’mdh | Represents the portion of a resource’s real time total bids after outages and use limitations that will be used in the RAAIM availability calculation. |
|  | RealTimeAvailableEconomicBidQuantity BrtF’S’mdh | Represents the portion of a resource’s real time economic bids after outages and use limitations that will be used in the RAAIM availability calculation. |
|  | RealTimeTotalEnergyBidQuantity BrtF’S’mdh | The MW value of all bids/schedules for a resource that submitted into the real time market. |
|  | RealTimeUpperSelfScheduleEnergyBidQuantity BrtF’S’mdh | The MW quantity of self-scheduled bids that a resource submitted for the real time market. |
|  | RealTimeEconomicEnergyBidQuantity BrtF’S’mdh | The MW quantity of economic bids that a resource submitted for the real time market. |
|  | RealTimeUpperEnergyBidQuantity BrtF’S’mdh | The MW value at the top of a resource’s real time energy bid curve. |
|  | RealTimeLowerEnergyBidQuantity BrtF’S’mdh | The MW value at the bottom of a resource’s real time energy bid curve. |
|  | RealTimeNGRTotalBidQuantity BrtF’S’mdh | Real-time bid quantity used for real-time generic RA/CPM availability for an NGR resource |
|  | RealTimeNGRTotalRegUpBidQuantity BrtF’S’mdh | Total regulation up economic bids and self provision submitted by a NGR resource in real time. |
|  | RealTimeNGRTotalRegDownBidQuantity BrtF’S’mdh | Total regulation down economic bids and self provision submitted by a NGR-REM resource in real time. |
|  | RealTimeNGREconomicBidQuantity BrtF’S’mdh | Real time bid quantity used for real time flexible RA/CPM availability for an NGR resource |
|  | RealTimeNGREconomicRegUpBidQuantity BrtF’S’mdh | Total of regulation up economic bids submitted by a NGR resource in real time. |
|  | RealTimeNGREconomicRegDownBidQuantity BrtF’S’mdh | Total of regulation down economic bids submitted by a NGR-REM resource in real time. |
|  | RealTimeOutageAvailabilityQuantity BrtF’S’mdh | A resource’s real time operational availability based on outages. This will be applicable to flexible capacity assessment only. |
|  | RealTimeGenericOutageAvailabilityQuantity BrtF’S’mdh | A resource’s real time operational availability based on outages, applicable for generic assessment. Excludes negative capacity range. |
|  | RealTimeHourlyUpperOperatingLimit BrtF’S’mdh | Represents a resource’s real time maximum upper operating limit for the hour. |
|  | RealTimeHourlyLowerOperatingLimit BrtF’S’mdh | Represents a resource’s real time minimum lower operating limit for the hour. |
|  | RAAIMNonAvailabiltyChargePrice m | The "price" value of the Non-Availability Charge is 60% of the CSP soft offer cap. |
|  | MonthlyResourceRAAIMCPMPrice Brtm | The “price” value of the Non-Availability Charge for generic CPM |
|  | MonthlyResourceRAAIMFlexibleCPMPrice Brtm | The “price” value of the Non-Availability Charge for flexible CPM |
|  | MonthlyAssessDaysGenericObligationCount m | Count of assessment days of generic obligation within trade month m |
|  | DailyAssessGenericObligationFlag md | Indicator for assessment of generic obligation for trade date d |
|  | MonthlyAssessDaysFlexibleObligationCount j’m | Count of assessment days of flexible obligation for flex category j’ within trade month m |
|  | DailyAssessFlexibleObligationFlag j’md | Indicator for assessment of flexible obligation for trade date d |
|  | DailyAssessHoursGenericCount md | Count of assessment hours of generic obligation within trade date d |
|  | DailyAssessHoursFlexibleCount jmd | Count of assessment hours of flexible obligation for flex category **j’** within trade date d |
|  | MonthlyObligationHoursQuantity m | Total number of hours within a given trade month. |
|  | DailyTradeHoursCount mdh | Total number of hours within a given trade day. |
|  | BusinessAssociateMonthlyRAAIMNodalMeteredCAISODemandQty Bm | Monthly Nodal RAAIM CAISO Metered Demand by Business Associate B |
|  | RolledUpRealTimeGenericObligationCappedQuantity BrtF’S’md | Exists solely to roll up hourly values to the day so as to avoid frequency conversion issues in a subsequent equation |
|  | RolledUpDayAheadGenericObligationCappedQuantity BrtF’S’md | Exists solely to roll up hourly values to the day so as to avoid frequency conversion issues in a subsequent equation |
|  | DailyGenericObligationUncappedWeightFactorQuantity BrtF’S’md | Reflects either the original DA or RT sum of Generic CPM and RA Obligations |
|  | TotDayAheadGenericCapacityQuantity BrtF’S’mdh | Sum of hourly DA Generic and Generic CPM Assessment Hour capacity |
|  | TotRealTimeGenericCapacityQuantity BrtF’S’mdh | Sum of hourly RT Generic and Generic CPM Assessment Hour capacity |
|  | DayAheadFlexibleMaxCapacityQuantity BrtF’S’mdh | Sum of hourly DA Flex and Flex CPM Assessment Hour capacity |
|  | RealTimeFlexibleMaxCapacityQuantity BrtF’S’mdh | Sum of hourly RT Flex and Flex CPM Assessment Hour capacity |
|  | DailyGenericAssessCapObligQuantity BrtF’S’md | Generic Assessment Hour capped quantity for trade date d |
|  | RMRMonthlyContractPrice rm | RMR monthly contract price |

# Charge Code Effective Date

| Charge Code/  Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Update Type |
| --- | --- | --- | --- | --- |
| RAAIM Pre-Calculation | 5.4.1 | 11/01/16 | 4/30/2018 | Configuration Impacted |
| RAAIM Pre-Calculation | 5.5.1 | 5/01/18 | 5/31/2018 | Configuration Impacted |
| RAAIM Pre-Calculation | 5.6.1 | 6/1/2018 | 6/30/2018 | Configuration Impacted |
| RAAIM Pre-Calculation | 5.7 | 7/1/2018 | 10/31/2018 | Configuration Impacted |
| RAAIM Pre-Calculation | 5.8 | 11/1/2018 | 12/31/2019 | Configuration Impacted |
| RAAIM Pre-Calculation | 5.9 | 1/1/2020 | 6/30/2020 | Configuration Impacted |
| RAAIM Pre-Calculation | 5.9a | 7/1/2020 | 12/14/2021 | Documentation Only Update |
| RAAIM Pre-Calculation | 5.9b | 12/15/2021 | 5/31/2022 | Documentation Only Update |
| RAAIM Pre-Calculation | 5.10.0a | 6/1/2022 | 5/31/2022 | Documentation Edits Only |
| RAAIM Pre-Calculation | 5.10.0b | 6/1/2022 | 2/28/2023 | Documentation Edits Only |
| RAAIM Pre-Calculation | 5.10.6 | 3/1/2023 | 5/31/2024 | Configuration Impacted |
| RAAIM Pre-Calculation | 5.11.2 | 6/1/2024 | 4/30/2026 | Configuration Impacted |
| RAAIM Pre-Calculation | 5.12 | 5/1/2026 | Open | Configuration Impacted |