Settlements & Billing

Configuration Guide: Regulation No Pay Quantity Pre-calculation

Version 5.5

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# Purpose of Document

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

# Introduction

## Background

According to CAISO Tariff Sections 8.10.8 and 11.10.9, when CAISO issues an AS Award in the DAM, HASP, and RTM, an AS capacity payment is made through the DAM, HASP, and RTM Charge Codes specified for each AS in the BPM for Settlements & Billing. These AS charges flow through to Settlements, regardless of resource performance in Real-Time.

The resources issued AS Awards are required to convert that capacity into Energy if dispatched in Real-Time or keep that capacity unloaded and available on their resource for potential Dispatch of Energy in Real-Time. If a resource fails to fulfill the requirements of the AS Award, then that resource is not entitled to its full AS capacity payment. The No Pay charges eliminate AS capacity payments to the extent that the requirements were not fulfilled. The No Pay amount for Qualified AS self-provision reduces the relevant SC’s effective AS self-provision in the AS cost allocation, effectively charged back at the relevant AS rate.

## Description

The Regulation No Pay Quantity Pre-calculation determines the Regulation Up and/or Regulation Down rescission No Pay quantities in each Settlement Interval for resources that are scheduled for Regulation Up and/or Down capacities.

# Charge Code Requirements

## Business Rules

| Bus Req ID | Business Rule |
| --- | --- |
| 1.0 | Payment for Regulation Up and/or Regulation Down Capacity will be rescinded per CAISO Tariff if the resource providing Regulation Up and Regulation Down capacity:   1. is off Regulation or off Automatic Generation Control (AGC), 2. is not running, 3. is not providing sufficient Regulating Range, 4. is generating outside the Regulating Range, or 5. has telemetry equipment that is not available. 6. Has Resource Constraint Disqualifications |
| 2.0 | Resources covered in this charge code are those certified to provide Regulation (such as Generating Units and Dynamic System Resources and certain NGR resources). |
| 2.1 | These resources are required to turn on equipment at the plant that turns control of the resource to the CAISO so that it responds to CAISO signals also known as setpoints via AGC. Thus, rescission of payments can happen if a resource is off AGC. |
| 2.2 | These resources must generate within the scheduled regulating range in order to respond to CAISO signals. A resource violates this category when it is out-of-range for a MW threshold for a consecutive set of minutes. |
| 2.3 | These resources must provide adequate operating capacity to accommodate the scheduled regulation capacity. CAISO sets Effective High and Low Regulation Limits only within the operating limits sent by the plant. Resources with constrained capacity will be evaluated for rescission of payments. |
| 2.4 | These resources must have communication equipment (RIG) available that allows the resource to receive CAISO signals. This is a user-entered category that is determined by manual research. |
| 3.0 | The Regulation No Pay conditions above shall be classified as Regulation Unavailable Capacity. These conditions are mutually exclusive of each other, and the final Unavailable Capacity will be the maximum among the quantities, i.e.,  Regulation Up/Down Unavailable Capacity  = Max(Off Control MW, Constrained MW, Out of Range MW, Communication Error MW) |
| 3.1 | The billable quantity for Regulation Up Unavailable MW shall not be greater than the unit’s Regulation Up Award and QSP capacity, which is inclusive of Day-Ahead and Real-Time. |
| 3.2 | The Regulation Up Unavailable MW shall be applied to awarded Regulation Up capacity first, and then any remainder shall be applied to the Regulation Up QSP. |
| 3.3 | The billable quantity for Regulation Down Unavailable MW shall not be greater than the unit’s Regulation Down Award and QSP capacity. |
| 3.3 | The Regulation Down Unavailable MW shall be applied to awarded Regulation Down capacity first, and then any remainder shall be applied to the Regulation Down QSP, which is inclusive of Day-Ahead and Real-Time. |
| 4.0 | Plant Information (PI) tags shall be created for all resources in Masterfile that are actively certified for regulation. However, only those resources with awards or QSPs will be relevant for this charge code. |
| 4.1 | Data quality tags are created for most tags and are considered in evaluating the different categories of unavailable capacity. The categories are off control, out of range, communication error, and constrained. |
| 4.2 | If a PI tag or data quality tag needed to calculate a particular category of unavailable capacity is missing for a resource, the resource shall be exempt from the computation of unavailable capacity for such category to the extent that such tag cannot be deduced from other existing valid tags. |
| 5.0 | Official outage information available through OMS (Outage Management System) or designated system shall be used. No Pay shall be assessed for every 15-minute interval that a resource is on outage since the unit is considered unavailable.  Outage duration shall be rounded up to the nearest 15-minute duration if the outage is for half or for more than half of the 15-minute interval. Outage duration shall be ignored if it is less than half of a 15-minute interval.  In case of conflicting data between Outage and AGC, the Outage information shall be followed. Only full outage of the resource shall be considered from OMS or designated system. |
| 6.0 | EDAM Requirements:  EDAM entities have AS Self Provision (QSP) and AS Requirement.  EDAM resources cannot bid in for Ancillary Services  EDAM BAA resources cannot provide Ancillary Service for CISO BAA  EDAM AS Self Provision (QSP) is not assessed No Pay |
| 6.1 | EDAM Requirements:  This PC will receive Ancillary Service Awarded Bid quantities of zero and Ancillary Service Capacity Schedules of non-zero. They will be filtered out in equations. EDAM BAA Ancillary Service Self-provision and requirements are simply information at this point. |

## Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| Ancillary Service Pre-calculation |

## Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| Ancillary Service Pre-calculation |
| CC 6750 Day Ahead Congestion – AS Regulation Up Import Settlement |
| CC 6760 Day Ahead Congestion – AS Regulation Down Import Settlement |
| CC 6524 Non-Compliance Regulation Up Settlement |
| CC 6624 Non-Compliance Regulation Down Settlement |
| RTM Net Amount Pre-calculation |

## Inputs – External Systems

| Row # | Variable Name | Description |
| --- | --- | --- |
| 1 | RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Final RTPD Cleared Regulation Up MW. This is the amount of Regulation Up the resource is expected to deliver in real-time. Includes both award and QSP, if any. (MW) |
| 2 | RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Final RTPD Cleared Regulation Down MW. This is the amount of Regulation Down the resource is expected to deliver in real-time. Includes both award and QSP, if any. (MW) |
| 3 | DARegUpAwardedBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdh | Day Ahead Regulation Up Awarded Bid capacity for Business Associate B resource r for Trading Day d and Trading Hour h (MW) |
| 4 | 15MinuteRTMRegUpAwardedBidQuantityBrtuT’I’Q’M’VL’W’R’F’S’mdhc | Real-Time Regulation Up Awarded Bid capacity for Business Associate B resource r for Trading Day d and Trading Hour h and RTUC Ancillary Service Commitment interval c (MW).  Values are incremental with respect to IFM values. |
| 5 | DARegDownAwardedBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdh | Day Ahead Regulation Down Awarded Bid capacity for Business Associate B resource r for Trading Day d and Trading Hour h (MW) |
| 6 | 15MinuteRTMRegDownAwardedBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Real-Time Regulation Down Awarded Bid capacity for Business Associate B resource r for Trading Day d and Trading Hour h and RTUC Ancillary Service Commitment interval c (MW).  Values are incremental with respect to IFM values. |
| 7 | OffAGCStatusCalculationTag BrtQ’F’S’mdhcif | IF the AGC unit status (UAGC status) = OFF for each minute in the Five-Minute Interval and the UAGC Quality State is “Normal” or “Al” for each minute  THEN OFF AGC Status Calculation Tag = 1 (this represents off AGC) ELSE OFF AGC Status Calculation Tag = 0 (this represents on AGC )  “Normal” and “Al” represent valid quality states, all other states indicate invalid quality.  This rule will only return a “1” off AGC flag when the resource is off for all 5 minutes and the quality of the data is valid.  If the resource is on AGC for at least one minute, then the resource will get credit for being on AGC for the entire five minute interval. Also if the quality tags associated with the UAGC tag is not valid for any minute, the resource will get credit for being on AGC for the entire five-minute interval. |
| 8 | RegulationCommunicationErrorFlag BrtQ’F’S’mdhc | Resources that have regulation up or down capacity must have communication equipment (RIG) available that allows the resource to receive CAISO signals.  This is a user-entered category that is determined by manual research.  Default value for this flag is “0”, or the bill determinant may not exist (or not get created) at all, indicating no communication error for the resource.  User enters “1” to represent a fifteen minute interval that contained a verified communication (telemetry) error for the entire fifteen minute interval.  Verified communication (telemetry) error can be confirmed by a OMS outage submitted by the SC indicating their communication equipment (RIG) is unavailable or by a OMS log indicating the ISO where the communication problem is the SC’s responsibility (i.e., no ISO technical problems exist)  The data is created based on existence and validity of UNMW PI data. |
| 9 | FiveMinuteDOTCalculationTag BrtQ’F’S’mdhcif | Represents the five minute average of the Effective DOP in MW.  Dispatch Operating Point (DOP) is the expected generation output calculated as the linear curve between two 5 minute RTD dispatch (DOT) goto instruction from the market awards. |
| 10 | HighRegulationLimitCalculationTag BrtQ’F’S’mdhc | Represents the fifteen minute average of the Effective High Regulation Limit in MW  This is an ISO-created PI Tag and there is no quality tag associated with it. Precision is 2 decimals. |
| 11 | LowRegulationLimitCalculationTag BrtQ’F’S’mdhc | Represents the fifteen minute average of the Effective Low Regulation Limit in MW  This is an ISO-created PI Tag and there is no quality tag associated with it. Precision is 2 decimals. |
| 12 | DOTLowAndHighRegLimitExistsTogetherFlag BrtQ’F’S’mdhc | A flag that indicates for a particular time interval that the following three inputs exists together:  FiveMinuteDOTCalculationTag (at least one five-minute value within the relevant 15-minute interval), HighRegulationLimitCalculationTag, and  LowRegulationLimitCalculationTag. |
| 13 | UnitOperatingHighLimitQualityCalculationTag BrtQ’F’S’mdhc | IF the Unit Operating High Limit tag quality state does not equal “Normal” or “Al” for any minute of the fifteen minute interval OR Unit Operating High Limit tag + 0.1 < Effective High Reg Limit for any minute of the fifteen minute interval  THEN Fifteen Minute Unit Operating High Limit Quality Calculation Tag = 0 (meaning that the quality standard has not been met)  ELSE Fifteen Minute Unit Operating High Limit Quality Calculation Tag = 1 (quality has been met)  0.1 is a small tolerance to deal with precision issues between the Effective High Reg Limit and Unit Operating High Limit.  A resource’s Unit Operating High Limit (UOHL) is the maximum operating limit sent from the plant to the CAISO’s EMS. The CAISO must always set the Regulation Limits within the Operating Limits sent by the plant. If the quality status of the Unit Operating High Limit is not Normal or Al then the quality state indicates a telemetry error.  This quality calculation tag can be used in both the Out of Range and Constrained Capacity category. |
| 14 | UnitOperatingLowLimitQualityCalculationTag BrtQ’F’S’mdhc | IF the Unit Operating Low Limit tag quality state does not equal “Normal” or “Al” for any minute of the fifteen minute interval OR Unit Operating Low Limit tag + 0.1 > Effective Low Reg Limit for any minute of the fifteen minute interval  THEN Fifteen Minute Unit Operating Low Limit Quality Calculation Tag = 0 (meaning that the quality standard has not been met)  ELSE Fifteen Minute Unit Operating Low Limit Quality Calculation Tag = 1 (quality has been met)  0.1 is a small tolerance to deal with precision issues between the Effective Low Reg Limit and Unit Operating Low Limit.  A resource’s Unit Operating Low Limit (UOLL) is the minimum operating limit sent from the plant to the CAISO’s EMS. The CAISO must always set the Regulation Limits within the Operating Limits sent by the plant. If the quality status of the Unit Operating Low Limit is not Normal or Al then the quality state indicates a telemetry error.  This quality calculation tag can be used in both the Out of Range and Constrained Capacity category. |
| 15 | SetpointQualityCalculationTag BrtQ’F’S’mdhc | IF MW Setpoint is > Effective High Reg Limit OR MW Setpoint < Effective Low Reg Limit for any minute of the fifteen minute interval.  THEN Setpoint Quality Tag = 0 (meaning that the quality standard has not been met)  ELSE Setpoint Quality Tag = 1 (quality has been met)  This will only be used as a quality tag in the Out of Range category. The ISO should never send a setpoint outside of the Reg Limits so if this happens then any unit generation outside of the Reg Limits might be due to the ISO’s erroneous setpoint and the resource cannot be held responsible for any Out of Range. |
| 16 | RegOutOfRangeFlag BrtQ’F’S’mdhc | IF Generation MW > Effective High Reg Limit + Tolerance Band for each minute of the Fifteen-Minute Interval OR IF Generation MW < Effective Low Reg Limit – Tolerance Band for each minute of the Fifteen-Minute Interval  THEN Out of Range Flag = 1  ELSE Out of Range Flag = 0  This rule will only return a “1” out of range flag when the resource’s output is out of range on either limit by the amount of the tolerance band for 15 consecutive minutes.  Tolerance Band currently used is 10 MW. |
| 17 | ResourceRegulationOutageFlag BrtQ’F’S’mdhc | Indicates whether a resource is determined to be on outage based on information from OMS or designated system for logging outages, for the given 15-minute interval c.  OMS outage duration shall be rounded up to the nearest 15-minute duration if the outage is for half or for more than half of the 15-minute interval, and ignored if the outage duration is less than half of a 15-minute interval.  No Pay shall be assessed for every 15-minute interval that a resource is on outage.  In case of conflicting data between Outage and AGC, the Outage information shall be followed. Only full outage of the resource shall be considered from OMS or designated system. |

## Inputs - Predecessor Charge Codes or Pre-calculations

| Row # | Variable Name | Predecessor Charge Code/ Pre-calc Configuration |
| --- | --- | --- |
| 1 | 15MRTRegUpResConstraintDisqualifiedQuantity BrtQ’F’S’mdhc | Ancillary Service Pre-calculation |
| 2 | 15MRTRegDownResConstraintDisqualifiedQuantity BrtQ’F’S’mdhc | Ancillary Service Pre-calculation |

## CAISO Formula

**Regulation Up No Pay calculations:**

### RegUpOffControlMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = (OffAGCStatusCalculationTag BrtQ’F’S’mdhcif)/3) \* RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

Implementation Note: The division by three will be taken cared of automatically by frequency conversion and will not show up in the configuration output file.

### RegUpCommunicationErrorMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = RegulationCommunicationErrorFlag BrtQ’F’S’mdhc \* RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

### FifteenMinuteDOTCalculationTag BrtQ’F’S’mdhc = Average over (i,f) { FiveMinuteDOTCalculationTag BrtQ’F’S’mdhcif }

Where Bal Authority Area (Q‘) = CISO

### RegUpAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc

IF DOTLowAndHighRegLimitExistsTogetherFlag BrtQ’F’S’mdhc = 1 THEN

(

IF FifteenMinuteDOTCalculationTag BrtQ’F’S’mdhc > HighRegulationLimitCalculationTag BrtQ’F’S’mdhc

THEN

RegUpAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc =

Max(0, HighRegulationLimitCalculationTag BrtQ’F’S’mdhc - LowRegulationLimitCalculationTag BrtQ’F’S’mdhc - RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc )

ELSE

RegUpAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc =

Max(0,HighRegulationLimitCalculationTag BrtQ’F’S’mdhc – FifteenMinuteDOTCalculationTag BrtQ’F’S’mdhc )

)

ELSE

RegUpAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

Note: The above charge type is to be created whenever RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc exists.

### RegUpConstrainedMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = Max(0, RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc - RegUpAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc ) \* UnitOperatingHighLimitQualityCalculationTag BrtQ’F’S’mdhc \* UnitOperatingLowLimitQualityCalculationTag BrtQ’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

### RegUpOutOfRangeMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc\* RegOutOfRangeFlag BrtQ’F’S’mdhc \* SetpointQualityCalculationTag BrtQ’F’S’mdhc \* UnitOperatingHighLimitQualityCalculationTag BrtQ’F’S’mdhc \* UnitOperatingLowLimitQualityCalculationTag BrtQ’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

### RegUpOutageMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc\* ResourceRegulationOutageFlag BrtQ’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

### RegUpUnavailableCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc = Max(RegUpOffControlMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc, RegUpCommunicationErrorMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc, RegUpConstrainedMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc, RegUpOutOfRangeMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc, RegUpOutageMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc )

### BA15minTotalAwardRegUpCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc = (4 \* DARegUpAwardedBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdh ) + 15MinuteRTMRegUpAwardedBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

Note: The DA hourly quantity is multiplied by four to offset the frequency conversion of the hourly input to a 15-min output, which will divide the DA quantity by four.

### NoPayRegUpBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc = Min(BA15minTotalAwardRegUpCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc , RegUpUnavailableCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc +15MRTRegUpResConstraintDisqualifiedQuantity BrtQ’F’S’mdhc)

### NoPayRegUpQSPCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc = (RegUpUnavailableCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc+15MRTRegUpResConstraintDisqualifiedQuantity BrtQ’F’S’mdhc) - NoPayRegUpBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc

### HourlyTotalNoPayRegUpBid BrtT’uI’Q’M’R’W’F’S’VL'mdh = ( Average of NoPayRegUpBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc for the hour)

### HourlyTotalNoPayRegUpQSP BrtT’uI’Q’M’R’W’F’S’VL'mdh = ( Average of NoPayRegUpQSPCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc for the hour)

### BAHourlyNoPayRegUpBid\_DAImportCongQuantity BrtQ’F’S’mdh = Sum(u,T’,I’,M’,V,L’,W’,R’) ( Average of NoPayRegUpBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc for the hour)

Where resource type (t) = ‘ITIE’

### BAHourlyNoPayRegUpQSP\_DAImportCongQuantity BrtQ’F’S’mdh = SUM(u,T’,I’,M’,V,L’,W’,R’) ( Average of NoPayRegUpQSPCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc for the hour)

Where resource type (t) = ‘ITIE’

### BA5minNoPayRegUpBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhcif = NoPayRegUpBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc / 12

Note: The formula is actually {(NoPayRegUpBidCapacityBrtuT’I’Q’M’VL’W’R’F’S’mdhc / 4) /3}. The charge type converts MW capacity to MWh given at the 5-minute level. The input is an hourly value provided every 15-minutes. In configuration output file, the formula will show up only as division by 4, instead of 12, as further division by 3 will be taken cared of automatically by the frequency conversion within the system.

### BA10minNoPayRegUpBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhci = BA5minNoPayRegUpBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhcif

**Regulation Down No Pay calculations:**

### RegDownOffControlMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = (OffAGCStatusCalculationTag BrtQ’F’S’mdhcif)/3) \* RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

Implementation Note: The division by three will be taken cared of automatically by frequency conversion and will not show up in the configuration output file.

### RegDownCommunicationErrorMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = RegulationCommunicationErrorFlag BrtQ’F’S’mdhc \* RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

### RegDownAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc

IF DOTLowAndHighRegLimitExistsTogetherFlag BrtQ’F’S’mdhc = 1 THEN

(

IF FifteenMinuteDOTCalculationTag BrtQ’F’S’mdhc < LowRegulationLimitCalculationTag BrtQ’F’S’mdhc

THEN

RegDownAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc =

Max(0, HighRegulationLimitCalculationTag BrtQ’F’S’mdhc - LowRegulationLimitCalculationTag BrtQ’F’S’mdhc - RegUpCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc )

ELSE

RegDownAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc =

Max(0, FifteenMinuteDOTCalculationTag BrtQ’F’S’mdhc – LowRegulationLimitCalculationTag BrtQ’F’S’mdhc

)

ELSE

RegDownAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

Note: The above charge type is to be created whenever RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc exists.

### RegDownConstrainedMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = Max(0, RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc - RegDownAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc ) \* UnitOperatingHighLimitQualityCalculationTag BrtQ’F’S’mdhc \* UnitOperatingLowLimitQualityCalculationTag BrtQ’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

### RegDownOutOfRangeMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc \* RegOutOfRangeFlag BrtQ’F’S’mdhc \* SetpointQualityCalculationTag BrtQ’F’S’mdhc \* UnitOperatingHighLimitQualityCalculationTag BrtQ’F’S’mdhc \* UnitOperatingLowLimitQualityCalculationTag BrtQ’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

### RegDownOutageMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc = RegDownCapacitySchedule BrtuT’I’Q’M’VL’W’R’F’S’mdhc\* ResourceRegulationOutageFlag BrtQ’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

### RegDownUnavailableCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc = Max(RegDownOffControlMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc, RegDownCommunicationErrorMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc, RegDownConstrainedMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc, RegDownOutOfRangeMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc, RegDownOutageMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc)

### BA15minTotalAwardRegDownCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc = (4 \* DARegDownAwardedBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdh ) + 15MinuteRTMRegDownAwardedBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhc

Where Bal Authority Area (Q‘) = ‘CISO’

Note: The DA hourly quantity is multiplied by four to offset the frequency conversion of the hourly input to a 15-min output, which will divide the DA quantity by four.

### NoPayRegDownBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc = Min(BA15minTotalAwardRegDownCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc , RegDownUnavailableCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc + 15MRTRegDownResConstraintDisqualifiedQuantity BrtQ’F’S’mdhc)

### NoPayRegDownQSPCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc = (RegDownUnavailableCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc+15MRTRegDownResConstraintDisqualifiedQuantity BrtQ’F’S’mdhc) - NoPayRegDownBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc

### HourlyTotalNoPayRegDownBid BrtT’uI’Q’M’R’W’F’S’VL'mdh = ( Average of NoPayRegDownBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc for the hour)

### HourlyTotalNoPayRegDownQSP BrtT’uI’Q’M’R’W’F’S’VL'mdh = ( Average of NoPayRegDownQSPCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc for the hour)

### BAHourlyNoPayRegDownBid\_DAImportCongQuantity BrtQ’F’S’mdh = SUM(u,T’,I’,M’,V,L’,W’,R’) ( Average of NoPayRegDownBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc for the hour)

Where resource type (t) = ‘ITIE’

### BA5minNoPayRegDownBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhcif = NoPayRegDownBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc / 12

Note: The formula is actually {(NoPayRegDownBidCapacityBrtuT’I’Q’M’VL’W’R’F’S’mdhc / 4) /3}. The charge type converts MW capacity to MWh given at the 5-minute level. The input is an hourly value provided every 15-minutes. In configuration output file, the formula will show up only as division by 4, instead of 12, as further division by 3 will be taken cared of automatically by the frequency conversion within the system.

### BA10minNoPayRegDownBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhci = BA5minNoPayRegDownBidQuantity BrtuT’I’Q’M’VL’W’R’F’S’mdhcif

## Outputs

| Output ID | Name | Description |
| --- | --- | --- |
|  | In addition to any outputs listed below, all inputs shall be included as outputs. |  |
| 1 | RegUpOffControlMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Up non-compliance quantity due to unit not under AGC control by CAISO. (MW) |
| 2 | RegUpCommunicationErrorMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Up non-compliance quantity due to communication error. (MW) |
| 3 | RegUpAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Up actual available capacity at real-time. (MW) |
| 4 | RegUpConstrainedMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Up non-compliance quantity due to unit having constrained capacity. (MW) |
| 5.0 | RegUpOutOfRangeMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Up non-compliance quantity due to unit regulating out of range. (MW) |
| 5.1 | RegUpOutageMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Up non-compliance quantity due to resource on outage from designated system for logging outages. (MW) |
| 6 | RegUpUnavailableCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Up Unavailable Capacity computed from the different non-compliance categories. (MW) |
| 7 | BA15minTotalAwardRegUpCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Fifteen Minute Total Regulation Up Awarded Bid capacity for Business Associate B resource r for Trading Day d, Trading Hour h, and AS Interval c. (MW)  Includes both Day-Ahead award and Real-Time incremental award. |
| 8 | NoPayRegUpBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Fifteen Minute Non Compliance Regulation Up Awarded Bid capacity for Business Associate B resource r for Trading Day d, Trading Hour h, and AS Interval c. (MW) |
| 9 | NoPayRegUpQSPCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Fifteen Minute Non Compliance Regulation Up QSP capacity for Business Associate B resource r for Trading Day d, Trading Hour h, and AS Interval c. (MW) |
| 10 | HourlyTotalNoPayRegUpBid BrtT’uI’Q’M’R’W’F’S’VL'mdh | Hourly Total Non Compliance Regulation Up Awarded Bid capacity for Business Associate B resource r for Trading Day d and Trading Hour h **(MW)** |
| 11 | HourlyTotalNoPayRegUpQSP BrtT’uI’Q’M’R’W’F’S’VL'mdh | Hourly Total Non Compliance Regulation Up associated with Qualified Self-Provision for Business Associate B resource r for Trading Day d and Trading Hour h **(MW)** |
| 12 | BAHourlyNoPayRegUpBid**\_**DAImportCongQuantityBrtQ’F’S’mdh | Hourly Non-compliance Regulation Up Bid. This may contain the Undispatchable Capacity due to a transmission derate, affecting Scheduling Point / System Resource r of resource type t, Entity Component Type F’, Entity Component Subtype S’, intertie constraint a’ in the export direction, for Business Associate B for Trading Hour h across all markets. (MW) |
| 13 | BAHourlyNoPayRegUpQSP**\_**DAImportCongQuantityBrtQ’F’S’mdh | Hourly Non-compliance Regulation Up QSP. This may contain the Undispatchable Capacity due to a transmission derate, affecting Scheduling Point / System Resource r of resource type t, Entity Component Type F’, Entity Component Subtype S’, intertie constraint a’ in the export direction, for Business Associate B for Trading Hour h across all markets. (MW) |
| 14 | BA5minNoPayRegUpBidQuantityBrtuT’I’Q’M’VL’W’R’F’S’mdhcif | No Pay Regulation Up associated with Awarded Bid Capacity. (**MWh**) |
| 15 | BA10minNoPayRegUpBidQuantityBrtuT’I’Q’M’VL’W’R’F’S’mdhci | No Pay Regulation Up associated with Awarded Bid Capacity for Business Associate B, Resource ID r, Resource Type t, UDC Index u, Entity Type T’, Gross/Net Flag I’, MSS Subgroup M’, RUC Participation Flag V, Load Following Flag L’, MSS Emission Pay Flag W’, Penalty Resource R’, Entity Component Type F’, Entity Component Subtype S’, Trading Hour h, and Settlement Interval i. (MWh) |
| 16 | RegDownOffControlMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Down non-compliance quantity due to unit not under AGC control by CAISO. (MW) |
| 17 | RegDownCommunicationErrorMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Down non-compliance quantity due to communication error. (MW) |
| 18 | RegDownAvailableMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Down actual available capacity at real-time. (MW) |
| 19 | RegDownConstrainedMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Down non-compliance quantity due to unit having constrained capacity. (MW) |
| 20.0 | RegDownOutOfRangeMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Down non-compliance quantity due to unit regulating out of range. (MW) |
| 20.1 | RegDownOutageMW BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Down non-compliance quantity due to resource on outage from designated system for logging outages. (MW) |
| 21 | RegDownUnavailableCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Regulation Down Unavailable Capacity computed from the different non-compliance categories. (MW) |
| 22 | BA15minTotalAwardRegDownCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Fifteen Minute Total Regulation Down Awarded Bid capacity for Business Associate B resource r for Trading Day d, Trading Hour h, and AS Interval c. (MW)  Includes both Day-Ahead award and Real-Time incremental award. |
| 23 | NoPayRegDownBidCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Fifteen Minute Non Compliance Regulation Down Awarded Bid capacity for Business Associate B resource r for Trading Day d, Trading Hour h, and AS Interval c. (MW) |
| 24 | NoPayRegDownQSPCapacity BrtuT’I’Q’M’VL’W’R’F’S’mdhc | Fifteen Minute Non Compliance Regulation Down QSP capacity for Business Associate B resource r for Trading Day d, Trading Hour h, and AS Interval c. (MW) |
| 25 | HourlyTotalNoPayRegDownBid BrtT’uI’Q’M’R’W’F’S’VL'mdh | Hourly Total Non Compliance Regulation Down Awarded Bid capacity for Business Associate B resource r for Trading Day d and Trading Hour h (MW) |
| 26 | HourlyTotalNoPayRegDownQSP BrtT’uI’Q’M’R’W’F’S’VL'mdh | Hourly Total Non Compliance Regulation Down associated with Qualified Self-Provision for Business Associate B resource r for Trading Day d and Trading Hour h (MW) |
| 27 | BAHourlyNoPayRegDownBid\_DAImportCongQuantity BrtQ’F’S’mdh | Hourly Non-compliance Regulation Down Bid. This may contain the Undispatchable Capacity due to a transmission derate, affecting Scheduling Point / System Resource r of resource type t, Entity Component Type F’, Entity Component Subtype S’, intertie constraint a’ in the export direction, for Business Associate B for Trading Hour h across all markets. (MW) |
| 28 | BA5minNoPayRegDownBidQuantityBrtuT’I’Q’M’VL’W’R’F’S’mdhcif | No Pay Regulation Down associated with Awarded Bid Capacity. (**MWh**) |
| 29 | BA10minNoPayRegDownBidQuantityBrtuT’I’Q’M’VL’W’R’F’S’mdhci | No Pay Regulation Down associated with Awarded Bid Capacity for Business Associate B, Resource ID r, Resource Type t, UDC Index u, Entity Type T’, Gross/Net Flag I’, MSS Subgroup M’, RUC Participation Flag V, Load Following Flag L’, MSS Emission Pay Flag W’, Penalty Resource R’, Entity Component Type F’, Entity Component Subtype S’, Trading Hour h, and Settlement Interval i. (MWh) |
| 30 | FifteenMinuteDOTCalculationTag BrtQ’F’S’mdhc | Average DOT for fifteen minute interval coming from five minute interval values from instruction DOT.  (MW) |

# Charge Code Effective Dates

| Charge Code/  Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Downdate Type |
| --- | --- | --- | --- | --- |
| Regulation No Pay Quantity Pre-calculation | 5.0 | 12/1/12 | 4/30/13 | Configuration Impacted |
| Regulation No Pay Quantity Pre-calculation | 5.1 | 5/1/13 | 10/31/2013 | Configuration Impacted |
| Regulation No Pay Quantity Pre-calculation | 5.2 | 11/1/2013 | 1/31/2015 | Configuration Impacted |
| Regulation No Pay Quantity Pre-calculation | 5.2a | 2/1/2015 | 06/30/15 | Documentation Only |
| Regulation No Pay Quantity Pre-calculation | 5.3 | 07/01/2015 | 11/30/21 | Configuration Impacted |
| Regulation No Pay Quantity Pre-calculation | 5.4 | 12/01/2021 | TBD | Configuration Impacted |
| Regulation No Pay Quantity Pre-calculation | 5.5 | TBD | Open | Configuration Impacted |