Settlements & Billing

**Configuration Guide: Real Time Energy Quantity**

**Pre-calculation**

**Version 5.26**

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# Purpose of Document

The purpose of this document is to capture the business and functional requirements for the MRTU SaMC Real Time Energy Pre-calculation.

# Introduction

## Background

The CAISO calculates and accounts for Imbalance Energy for each Dispatch Interval and settles Imbalance Energy for each Settlement Interval for each resource within the EIM Area and all System Resources Dispatched in Real-Time.

Imbalance Energy consists of following:

* IIE – instructed imbalance energy
	+ FMM Instructed Imbalance Energy Settlement (CC 6460)
	+ FMM Instructed Imbalance Energy EIM Settlement (CC 64600)
	+ RTD Instructed Imbalance Energy Settlement (CC 6470)
	+ RTD Instructed Imbalance Energy EIM Settlement (CC 64700)
* UIE – Uninstructed Imbalance Energy
	+ Real Time Uninstructed Imbalance Energy Settlement (CC 6475)
	+ Real Time Uninstructed Imbalance Energy EIM Settlement (CC 64750)
* UFE – Unaccounted for Energy
	+ Real Time Unaccounted for Energy Settlement (CC 6474)
	+ Real Time Unaccounted for Energy EIM Settlement (CC 64740)
* GHG - Greenhouse Gas Emission Cost Revenue (CC 491)

To the extent that the sum of the Settlement Amounts for IIE, UIE, and UFE does not equal zero within the CAISO Balancing Authority Area, the CAISO will assess Charges or make Payments in Real Time Imbalance Energy Offset (CC 6477) and in Real Time Imbalance Energy Offset EIM (CC 64770)for the resulting differences to all Scheduling Coordinators based on a pro rata share of their Measured Demand for the relevant Settlement Interval. To the extent that the sum of the Settlement Amounts for IIE, UIE, UFE, and GHG does not equal zero within the EIM Balancing Authority Area, the CAISO will assess Charges or make Payments in Real Time Imbalance Energy Offset EIM (CC 64770)for the resulting differences to EIM Entity Scheduling Coordinator ID, respectively.

In the Real-Time Market, the negative and positive Congestion Charges associated with a valid post-Day-Ahead TOR and ETC schedule change (including changes submitted to the Hour-Ahead Scheduling Process and changes submitted closer to Real-Time where allowed by the contract) will be reversed in CC 6788 RTM Congestion Credit Settlement. Because Congestion Charges are implicitly collected by the CAISO in the Real-Time settlement and there are no holders of rights to receive Real-Time Congestion revenues, all charges for Real-Time Congestion will be accumulated in special and separate Balancing Authority Area neutrality accounts. The CAISO Real-Time Congestion Charges less Virtual Bid Adjustment shall be distributed back to non-ETC Control Area metered Demand and exports in Real Time Congestion Offset (CC 6774). The EIM Balancing Authority Area Real-Time Congestion Charges shall be distributed to the applicable EIM Entity Scheduling Coordinator in Real Time Congestion Offset EIM (CC 67740).

## Description

The Real Time Energy Quantity pre-calculation calculates various Real-Time Energy quantities that are used in settlement of Instructed Imbalance Energy (IIE) and Uninstructed Imbalance Energy (UIE). The calculation shall determine the following Energy quantities for each resource for each Settlement Interval:

* Settlement Interval Total FMM IIE 1, a subset of IIE that includes FMM Optimal, FMM Minimum Load, FMM Pumping Energy, and FMM Rerate Energy for the Settlement Interval.
* Real-Time UIE –Total Real-Time Uninstructed Imbalance Energy (UIE) for a Resource
* IIE Regulation – IIE Regulation is the derived imbalance energy quantity which is attributed to Regulating Energy for a Resource
* A subset of Total RTD IIE that includes RTD Optimal, RTD Minimum Load, Ramping Energy Deviation, RTD Rerate, Regulation, MSS Load Following Energy, Real-Time Pumping Energy and Exceptional Dispatch Energy for the Settlement Interval.
* Settlement Interval Total RTD IIE 1, a subset of IIE that includes RTD Optimal, RTD Minimum Load, Ramping Energy Deviation, RTD Rerate, RTD Pumping Energy, and Regulation Energy for the Settlement Interval.
* Real-Time Operational Adjustment (OA) – The energy difference accounted between Day Ahead Schedules, FMM Instructed Imbalance Energy and relevant Real Time Instructed Imbalnce Energy compared with its Real Time Interchange Schedule for System Resources.

#  Charge Code Requirements

## Business Rules

| Bus Req ID | Business Rule |
| --- | --- |
| 1.0 | A positive Energy value indicates incremental Energy. |
| 1.1 | A negative Energy value indicates decremental Energy.  |
| 1.2 | A positive Ramping Energy Deviation indicates positive deviation from Standard Ramping Energy and Scheduled Energy.  |
| 1.3 | A negative Ramping Energy Deviation indicates negative deviation from Standard Ramping Energy and Scheduled Energy |
| 1.4 | The Dispatch Interval Period is 5 minutes. |
| 1.5 | The Settlement Interval Period is 5 minutes. |
| 2.0 | The Settlement Interval Real-Time UIE shall be calculated by subtracting Settlement Interval Regulation Energy from Settlement Interval Energy Difference.  |
| 2.1 | The Settlement Interval Real-Time Energy Difference shall be calculated by subtracting from the Settlement Interval Real-Time Imbalance Energy the following quantities: (a) Settlement Interval RTD Total IIE Part 1, (b) Settlement Interval RTD Exceptional IIE, (c) Settlement Interval Residual Imbalance Energy, (d) MSS IIE, (e) Settlement Interval Standard Ramping Energy, (f) Settlement Interval OA Energy, (g) Settlement Interval FMM Total Part 1,(h) Settlement Interval FMM Exceptional Dispatch IIE, (i) Settlement Interval FMM Manual Dispatch Energy, and (j) Settlement Interval RTD Manual Dispatch Energy  |
| 2.1.1 | Settlement Interval Residual Imbalance Energy in the preceding context will additionally include the RIE for eligible intermittent resource that is above its forecasted output. |
| 2.2 | The Settlement Interval Real-Time Imbalance Energy shall be calculated by subtracting Settlement Interval Day Ahead Energy and Settlement Interval Base Schedule Energy from Settlement Interval Metered Energy for the resource.  |
| 2.3 | The Settlement Interval Day Ahead Energy for a resource shall be calculated by dividing Day Ahead Schedule by 12. |
| 2.4 | The Settlement Interval Total IIE Part 1 shall be calculated by adding the following IIE components: RTD Optimal Energy dispatched through the Real-Time Market optimization process which consists of one or more of the following Energy types (Real-Time Energy, Spinning, Non-Spinning) RTD Minimum Load Energy from units Dispatched in Real-TimeRamping Energy DeviationRTD Rerate EnergyRTD Pumping Energy |
| 2.6 | Settlement Interval Total RTD Instructed Imbalance Energy excluding Residual shall be calculated by adding the following IIE components: (3.8.8)Settlement Interval Total RTD IIE Part 1 Settlement Interval Regulation EnergySettlement Interval MSS IIE (Load Following Energy)Settlement Interval Exceptional IIE no including Voltage Support and Black Start |
| 2.7 | The Settlement Interval OA Energy shall be calculated by subtracting the following Energy components from Settlement Interval Metered Energy for the System Resource:Settlement Interval Day Ahead EnergySettlement Interval Total FMM IIE Part 1 EnergySettlement Interval FMM Exceptional Dispatch IIE EnergySettlement Interval RTD Optimal IIE Energy Settlement Interval RTD Exceptional Dispatch EnergySettlement Interval FMM Manual Dispatch EnergySettlement Interval RTD Manual Dispatch Energy  |
| 2.8 | For System Resources designated as MSS load following resources, the Settlement Interval FMM MSS Load Following Self Schedule Energy is calculated as the difference between Settlement Interval FMM Self Schedule and Settlement Interval Day Ahead Schedule.  |
| 2.9 | For System Resources designated as MSS load following resources, the Settlement Interval MSS Load Following Energy Difference is calculated the difference between MSS Load Following Metered Energy and MSS Load Following Total Expected Energy.  |
| 2.10 | For System Resources designated as MSS load following resources, the Settlement Interval MSS Load Following OA Energy is equal to the Settlement Interval OA Energy where Settlement Interval MSS Load Following Energy Difference is not equal to zero.  |
| 3.0 | The Settlement Interval Regulation Energy shall be calculated as:Minimum of Settlement Interval Regulation Up Capacity and Settlement Interval Energy Difference calculated above, if the Settlement Interval Energy Difference is greater or equal to zeroMaximum of negative of Settlement Interval Regulation Down Capacity and Settlement Interval Energy Difference calculated above, if the Settlement Interval Energy Difference is less than zero |
| 4.0 | The Settlement Interval Real-Time UIE for each resource for each Settlement Interval shall be calculated if the Hourly Predispatch Flag is not True.  |
| 5.0 | Proxy Demand Resource (PDR) and Reliability Demand Response Resource (RDRR) represent the demand response portions of the load from a Load Serving Entity.  |
| 5.1 | Demand Response Resources are eligible to participate in the day-ahead energy market, 5-minute real-time energy market, and ancillary services market.  |
| 5.2 | A Demand Response Resource bids to curtail load as a generator and will be assessed Real Time Charges like any other generator. |
| 6.0 | Balancing Authority Area EIM Transfer In Percentage is calculate as the Balancing Authority Area Transfer In Quantity divided by the Total EIM Area Transfer In Quantity |
| 7.0 | The Settlement System shall support FMM and RTD Instructed Energy (IIE), including Operating Adjustment (OA), settlement for a BASE EIM Transfer System Resource (Base ETSR). |
| 7.1 | A Master File - resident flag (value defaults as Yes) shall indicate an ETSR is required to participate in imbalance energy settlement. |
| 7.2 | Base ETSR FMM IIE shall be settled as BAAResourceSettlementIntervalFMMTransferToQuantity and BAAResourceSettlementIntervalFMMTransferFromQuantity by applying the FMM LMP price at the financial node of the resource, where the energy is based on the resource’s Base Schedule and the tagged real-time base schedule changes submitted later than 40 minutes prior to the start of the Trading Hour.  |
| 7.3 | Base ETSR RTD IIE and Base ETSR OA shall be settled as BAAResourceSettlementIntervalRTDTransferToQuantity and BAAResourceSettlementIntervalRTDTransferFromQuantity by applying the LMP price at the financial node of the resource, where the energy is based on the resource’s Base Schedule and the tagged real-time base schedule changes submitted later than 40 minutes prior to the start of the Trading Hour. |
| 7.4 | The Base ETSR settled amounts for an ETSR shall be excluded from the financial value transfer in the real-time imbalance offset. *(Fact)* |
| 8.0 | The following business rules pertain to the Hour-Ahead Scheduling Process (HASP): |
| 8.1 | The CAISO will take the following actions (through this charge code) regarding Schedules that clear the Day-Ahead Market (or the RUC Schedule if lower than DA Schedule) at the Interties and that a Scheduling Coordinator wholly or partially reverses prior to HASP solution availability. This is identified as the HASP reversal settlement rule and it applies to any import or export that clear the Day-Ahead Market (or the RUC Schedule if lower than DA Schedule) and is reduced prior to the HASP solution availability for which the Scheduling Coordinator has failed to submit an E-Tag consistent with the Scheduling Coordinator’s Day-Ahead Schedule (or the RUC Schedule if lower than DA Schedule). |
| 8.2 | For both imports and exports, the HASP reversal settlement rule shall not apply to Schedules that clear the Day-Ahead Market (or the RUC Schedule if lower than DA Schedule) at the Interties and that a Scheduling Coordinator wholly or partially reverses in the HASP to the extent such Schedules are valid and balanced ETC and TOR Self-Schedules in the Day-Ahead Market. |
| 8.3 | The quantity of any imports or exports that clear the Day-Ahead Market (or the RUC Schedule if lower than DA Schedule) that are reduced in the HASP for which the Scheduling Coordinator has failed to submit an E-Tag consistent with the Scheduling Coordinator’s Day-Ahead Schedule (or the RUC Schedule if lower than DA Schedule) and WECC scheduling requirements is the “un-tagged” MW, with the exception identified in the previous business rule. |
| 8.4 | For Import, the “un-tagged” MW up to FMM Scheduled Energy quantity will be charged the positive price difference between the Day Ahead LMP and the FMM LMP for the import resource. |
| 8.6 | For Export, the “un-tagged” MW up to FMM Scheduled Energy quantity will be charged the positive price difference between the FMM LMP and the Day Ahead LMP for the export resource. |
| 8.7 | The amount from the HASP reversal settlement rule shall always be a charge to an SC, never a payment to an SC. |
| 8.8 | The tagged MW value per resource ID as of the time when HASP solution is available must be captured for implementation of the HASP reversal settlement rule. |
| 8.9 | HASP reversal settlement shall not apply to Pseudo Tie resources as these are not considered imports or exports. These resources are those resources that use the pseudo-tie functionality by which the output of a generating unit physically interconnected to the electric grid in a Native Balancing Authority Area is telemetered to and deemed to be produced in an Attaining Balancing Authority Area that provides Balancing Authority services for and exercises Balancing Authority jurisdiction over the Pseudo-Tie generating unit. Therefore, the output of such resources are not considered to be imports or exports to the applicable balancing authority area. |
| 8.10 | The BA Resource RUC Capacity Total is calculated as the sum of the IFM schedule quantity and the difference between Reliability Capacity Up (RCU) Awarded Quantity and Reliability Capacity Down (RCD) Awarded Quantity. This applies to imports and exports only. |
| 9.0 | Market and Settlement shall model, manage, and value EIM Transfer System Resources as Dynamic Schedules  |
| 9.1 | EIM Transfers shall be valued as five minute dynamic schedules and not hourly interchange schedules |
| 9.2 | EIM BAA responsible for Settlement of the after-the-fact (ATF) Interchange Schedules of EIM Transfers between EIM BAA and EIM BAA shall submit the ATF Interchange Schedules as five minute dynamic schedules  |
| 9.3 | For ATF Interchange Schedules of EIM Transfers between EIM BAA and CISO BAA, Settlement shall calculate the five minute dynamic schedule |
| 9.4 | Settlements shall calculate the five minute dynamic schedule by applying a resource specific shaping factor to the hourly interchange schedule of the EIM Transfer System Resource.  |
| 9.5 | Settlement shall calculate the resource specific shaping factor each five minutes as the resource’s 5-minute Real Time Dispatch over the hourly sum of the resource’s 5-minute Real Time Dispatch  |
| 9.6 | Settlements shall distinguish pumped storage resources operating in the WEIM that are in pumping mode (serving as load) through designating specific base schedules for these resources. The WEIM pumped storage resource base schedules will be added to the BAAIntervalResourceBaseSchedule to calculate the SettlementIntervalResourceBaseSchedule. |
| 10.0 | When an eligible resource has an interval with a negative MWh meter, CAISO will not charge for the energy of those intervals. |
| 11.0 | Excess Behind the Meter Production (EBTMP) is a new type of energy measurement energy entry which accounts for any excess energy injected into the distribution system from rooftop solar. EBTMP will be reported to CAISO separately from Gross Load in MRI-S using measurement type EBTMP. |
| 11.1 | Gross Load shall be submitted through MRI-s under Measurement type ‘LOAD’ Excess Behind the Meter Load Production shall be submitted through MRI-S as measurement type ‘EBTMP” and shall be mapped a positive energy injected to distribution system reducing distribution Gross Load consumption. |
| 12 | CAISO will modify BCR Transfer adjustment amount to be based upon ETSR export over ETSR export plus measured demand. |

## Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| System Resource Deemed Delivered Energy Quantity Pre-calculation |
| MSS Netting Pre-calculation |
| Ancillary Services Pre-Calculation |
| Real Time Price Pre-calculation |
| Real Time Unaccounted for Energy Settlement (CC 6474) |
| Real Time Unaccounted for Energy EIM Settlement (CC 64740) |
| Day Ahead Energy, Congestion, Loss Settlement (CC 6011) |
| RUC Reliability Capacity Up Settlement (CC 8800) |
| RUC Reliability Capacity Down Settlement (CC 8810) |

## Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| Real Time Price Pre-calculation  |
| Day Ahead RUC Tier 1 Allocation (CC 6806) |
| Real Time Instructed Imbalance Energy Settlement (CC 6470) |
| Real Time Uninstructed Imbalance Energy Settlement (CC 6475) |
| Intermittent Resources Net Deviation Allocation (CC 721) |
| Intermittent Resources Net Deviation Settlement (CC 711) |
| Real Time Congestion Offset (CC 6774) |
| Metered Energy Adjustment Factor Pre-calculation |
| Declined Hourly Pre-Dispatch Penalty (CC 6455) |
| GMC Market Services Charge (CC 4560) |
| GMC System Operations Charge (CC 4561) |
| Real Time Instructed Imbalance Energy EIM Settlement (CC 64700) |
| Real Time Uninstructed Imbalance Energy EIM Settlement (CC 64750) |
| FMM Instruted Imbalance Energy Settlement (CC 6460) |
| FMM Instruted Imbalance Energy EIM Settlement (CC 64600) |
| Real Time Congestion Pre-Calcualtion |
| Real Time Imbalance Energy Offset (CC 6477) |
| Pre-calc – IFM Net Amount |
| Pre-calc – RTM Net Amount |
| Pre-calc – RUC Net Amount |
| Real Time Unaccounted for EIM Energy Settlement (CC 64740) |
| No Pay Residual Unit Commitment Settlement (CC 6824) |
| Exceptional Dispatch Uplift Settlement (CC 6488) |
| Real Time Excess Cost for Instructed Energy Settlement (CC 6482) |
| Real Time Unaccounted for Energy Settlement (CC 6474) |
| Day Ahead Energy, Congestion, Loss Settlement (CC 6011) |
| Pre-calc Bid Cost Recovery Sequential Netting |

## Inputs - External Systems

| Input Req ID | Variable Name | Description |
| --- | --- | --- |
|  | DispatchIntervalOptimalIIE BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif | Represents Incremental or Decremental RTD Optimal IIE for a dispatchable resourceIncremental IIE quantities are positiveDecremental IIE quantities are negative |
|  | DispatchIntervalRerateEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif  | RTD IIE Energy produced or consumed by a resource due to a rerated Pmin or derated Pmax (as logged in SLIC).  |
|  | DispatchIntervalIIEMinimumLoadEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | RTD Energy produced or consumed from resource in order to sustain a Minimum Load operating level. |
|  | DispatchIntervalRampingEnergyDeviation BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | Ramping Energy Deviation calculated for resource as the IIE Energy produced or consumed due to a deviation from Standard Ramping Energy because of ramp constraints, Start-UP instructions, or Shut Down instructions..  |
|  | ExceptionalDispatchIIE BrtuT’ObI’Q’M’AA’R’W’F’S’VL’Pmdhcif | RTD IIE produced or consumed by a resource in response to a manual Exceptional Dispatch instruction.  |
|  | DispatchIntervalResidualIIE BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif | Residual Imbalance Energy is calculated as Extra-marginal IIE produced or consumed by a resource at the start or end of a Trading Hour outside the hourly schedule-change band and not attributed to Exceptional Dispatch.This does not include eligible intermittent resource’s RIE above forecasted output. |
|  | DispatchIntervalRIEAboveForecast BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif | Residual Imbalance Energy that is classified to be above forecasted output for eligible intermittent resource. |
|  | DispatchIntervalMSSIIEBrtuT’bI’Q’M’R’W’F’S’VL’mdhcif  | MSS IIE (load following Energy) is energy produced or consumed by a MSS resource due to Load Following.  |
|  | DispatchIntervalRTPumpingEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | RTD Pumping Energy is the RTD IIE Energy from a Participating Load Pumped-Storage Unit or Pumping Load consumed or produced during pumping operation. |
|  | DAPumpingEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | DA Pumping Energy is the negative Day-Ahead Scheduled Energy consumed by Participating Load Pumped-Storage Hydro Unit or Pumping Load scheduled in pumping mode.  |
|  | DAGenSchedule BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif | DA Generation Schedule is the Expected Energy Allocation quantity provided by MQS as DA Schedule Energy. This quantity may represent DA Awarded Bid Energy or it may represent the total of Self-Schedule and Minimum Load. If the corresponding bid price (mapped as a separate bill determinant) is null, then DAGenSchedule is the total of Self-Schedule and Minimum. Otherwise, the quantity represents DA Awarded Bid Energy.  |
|  | DALoadSchedule BrtuT’I’Q’M’AA’R’W’F’S’vVL’pmdh | DA Load Schedule is the energy scheduled in Day-Ahead Market to be consumed by End-Use Customer. (Load Schedule quantity is a negative value). |
|  | DAImportSchedule BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif | DA Import Schedule is the DA Schedule Energy quantity for MQS Expected Energy Allocation, which represents the Energy schedule in IFM to be transferred into CAISO from another Balancing Authority Area.  |
|  | DAExportSchedule BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif | DA Export Schedule is the DA Schedule Energy quantity for MQS Expected Energy Allocation, which represents the Energy schedule in IFM to be transferred out of CAISO into another Balancing Authority Area. (Export Energy Schedule quantity is a negative value). |
|  | HourlyPredispatchFlag BrtQ’mdh | Energy bid flag that indicates the Resource r can only be pre-dispatched for the Trading Hour h.  |
|  | DispatchIntervalStandardRampingEnergy BrtuT’I’Q’M’R’W’F’S’VL'mdhcif  | Standard Ramping Energy is the IIE Energy schedule deviation along a linear symmetric 20 minute ramp across hourly boundaries. |
|  | DispatchIntervalTotalExpectedEnergy BrtEuT’I’Q’M’AA’W’R’pF’S’VL’mdhcif | Dispatch Interval Total IIE Energy (provided by MQS) that corresponds to the Energy under the DOP for a resource. Energy quantity can be either positive or negative value.  |
|  | DispatchIntervalFMMOptimalIIE BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif | Represents Incremental or Decremental FMM Optimal IIE for a dispatchable resource.Incremental IIE quantities are positiveDecremental IIE quantities are negative |
|  | DispatchIntervalFMMRerateEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | FMM IIE Energy produced or consumed by a resource due to a rerated Pmin or derated Pmax (as logged in SLIC). |
|  | DispatchIntervalFMMMinimumLoadEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | FMM Energy produced or consumed from resource in order to sustain a Minimum Load operating level. |
|  | FMMExceptionalDispatchIIE BrtuT’ObI’Q’M’AA’R’W’F’S’VL’Pmdhcif | FMM IIE produced or consumed by a resource in response to a manual Exceptional Dispatch instruction.  |
|  | DispatchIntervalFMMPumpingEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | FMM Pumping Energy is the FMM IIE Energy from a Participating Load Pumped-Storage Unit or Pumping Load consumed or produced during pumping operation. |
|  | 15MFMMSelfScheduleQuantity BrtuT’I’Q’M’F’S’VL’mdhc | 15 Minute Self Schedule submitted in FMM Market for MSS Load Following intertie resource. (MW) |
|  | 15MFMMLAPForecastQuantity AA’mdhc | The 15 Minute FMM forecast by DLAP/CLAP (MW) |
|  | 5MRTDLAPForecastQuantity AA’mdhcif | The 5 Minute RTD forecast by DLAP/CLAP (MW) |
|  | BAResBaseScheduleEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | The final Base Schedule for generation, import, and export resources in an EIM Balancing Authority Area (MWh). During intervals in which a pumped storage hydro resource located in the EIM Balancing Authority Area has a negative base schedule, the data will be under resource type = “LOAD”. |
|  | BAResBaseLoadSchedule BrtuT’I’Q’M’AA’R’W’F’S’VL’pmdhcif | The final Base Schedule for Load resources in an EIM Balancing Authority Area |
|  | BAAFMMIntertieEIMTransferFromQty BrQ’AA’Qpmdhc | Balancing Authority Transfer FMM EIM From Quantity for resource r and Pricing Node pThis value is incremental to Base Schedule. (MW) |
|  | BAAFMMIntertieEIMTransferToQty BrQ’AA’Qpmdhc | Balancing Authority Transfer FMM EIM To Quantity for resource r and Pricing Node pThis value is incremental to Base Schedule. (MW) |
|  | BAARTDIntertieEIMTransferFromQty BrQ’AA’Qpmdhcif | Balancing Authority Transfer RTD EIM From Quantity for resource r and Pricing Node pThis value is incremental to Base Schedule. (MW) |
|  | BAARTDIntertieEIMTransferToQty BrQ’AA’Qpmdhcif | Balancing Authority Transfer RTD EIM To Quantity for resource r and Pricing Node p This value is incremental to Base Schedule. (MW) |
|  | BAResourceFMMManualDispatchEnergyQty BrtuT’ObI’Q’M’F’S’mdhcif | FMM Manual Dispatch Energy for a resource and bid segment b in EIM Balancing Authority Area |
|  | BAResourceRTDManualDispatchEnergyQty BrtuT’ObI’Q’M’F’S’mdhcif | RTD Manual Dispatch Energy for a resource and bid segment b in EIM Balancing Authority Area |
|  | HourlyTotalABCRegUpQtyBrtT’uI’M’R’W’F’S’VL'mdh | Hourly Available Balancing Capacity Regulation Up for a resource in EIM Balancing Authority Area |
|  | HourlyTotalABCRegDownQtyBrtT’uI’M’R’W’F’S’VL'mdh | Hourly Available Balancing Capacity Regulation Down for a resource in EIM Balancing Authority Area |
|  | BAHourlyResourceIntertieBidOptionsFlag BrtQ’mdh | An integer-valued input that indicates the Intertie Bid Option for a the specified Balancing Authority Area, resource and Trading Hour as follows:1 – DYNAMIC: The resource is a dynamic resource.2 – EB15MIN: Economic bid with participation in 15-minute market.3 – EBHB: Economic bid hourly block.4 – EBHBCHG: Economic bid hourly block with single intra-hour economic schedule change.5 – SSHB: Self scheduled hourly block.6 – SSVER: Self-scheduled variable energy resource forecast. |
|  | BAAIntertieEIMBaseTransferFromQty BrQ’AA’Qpmdh | Balancing Authority EIM Transfer Base Schedules From Quantity for resource r and Pricing Node p |
|  | BAAIntertieEIMBaseTransferToQty BrQ’AA’Qpmdh | Balancing Authority EIM Transfer Base Schedules To Quantity for resource r and Pricing Node p |
|  | ResourceETSRElectSettlementFlag rmd | Flag (value defaults to be 1) that indicates that the specified ESTR resource is an EIM Transfer System Resource (ETSR) that is required to settle its ETSR IIE and OA at the real-time LMP. |
|  | BA5MEIMTransferToTaggedQty BrtQ’AA’pF’S’Qmdhcif | The Final Tagged To Quantity (in MW) for EIM Transfer Resources |
|  | BA5MEIMTransferFromTaggedQty BrtQ’AA’pF’S’Qmdhcif | The Final Tagged From Quantity (in MW) for EIM Transfer Resources |
|  | EIMTransferFlag BrQ’AA’Qpd | Resource Specific EIM Transfer Flag. Flag (1/Null) indentifies EIM Transfer System Resource between and EIM BAA and the CISO BAA.  |
|  | ResourceDailyApplyWholesaleChargeFlag rmd |  Resource Specific Exemption Flag. Flag (1/0) identifies resource eligible for Settlements Wholesale Charging Exemption |

## Inputs - Predecessor Charge Codes or Pre-calculations

| Input Req ID | Variable Name | Predecessor Charge Code/ Pre-calc Configuration |
| --- | --- | --- |
|  | SettlementIntervalDeemedDeliveredInterchangeEnergyQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif  | System Resource Deemed Delivered Energy Pre-calculation (Import quantity is a positive value, export quantity is a negative value). |
|  | BAHourlyInterchangeDeemedDeliveredEnergyQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdh | System Resource Deemed Delivered Energy Pre-calculation(Import quantity is a positive value, export quantity is a negative value). |
|  | BASettlementIntervalResEntityEIMAreaMeteredGenerationQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif  | MSS Netting Pre-calculation |
|  | BAResEntitySettlementIntervalOMARChannel1LoadQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhif | MSS Netting Pre-calculation |
|  | HourlyTotalAwardedRegUpBidCapacityBrtT’uI’M’R’W’F’S’VL'mdh |  Ancillary Service Pre-Calculation  |
|  | HourlyTotalAwardedRegDownBidCapacityBrtT’uI’M’R’W’F’S’VL'mdh | Ancillary Services Pre-Calculation  |
|  | HourlyTotalRegDownQSPBrtT’uI’M’R’W’F’S’VL'mdh | Ancillary Services Pre-Calculation  |
|  | HourlyTotalRegUpQSP BrtT’uI’M’R’W’F’S’VL'mdh  | Ancillary Services Pre-Calculation  |
|  | UDCSettlementIntervalUFEQuantity uT’I’Q’M’mdhcif | Unaccounted for Energy Settlement (CC 6474) |
|  | UDCEIMBAASettlementIntervalUFEQuantity uT’I’Q’M’mdhcif | Unaccounted for Energy EIM Settlement (CC 64740) |
|  | BASettlementIntervalResEIMEntityMeterLoadQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif | MSS Netting Pre-calculation |
|  | BAResDispatchEBTMPQuantity BrtuQ’Nz’mdhcif | MSS Netting Pre-calculation |
|  | BASettlementIntervalEIMAreaMeasuredDemand BuT’I’Q’M’AA’W’VL’mdhcif | MSS Netting Precalculation |
|  | HourlyDASchedule **Brtmdh** | CC 6011 - Day Ahead Energy, Congestion, Loss Settlement |
|  | BAHourlyResRCUAwardedQuantity BrtQ’F’S’mdh | CC 8800 – RUC Reliability Capacity Up Settlement |
|  | BAHourlyResRCDAwardedQuantity BrtQ’F’S’mdh | CC 8810 – RUC Reliability Capacity Down Settlement |

##  CAISO Formulas

### SettlementIntervalRealTimeUIE

IF

HourlyPredispatchFlag BrtQ’mdh <> 1

OR

HourlyIntertieDeviationFlag Brtmdh <> 1

THEN

SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif = (SettlementIntervalRealTimeEnergyDifference BrtuT’I’Q’M’F’S’mdhcif – BAResourceSettlementIntervalRegulationEnergy BrtuT’I’Q’M’F’S’mdhcif )

ELSE

SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif = 0

And Where Entity Component Type <> ‘INTERTIE’

### HourlyTotalRealTimeUIE

HourlyTotalRealTimeUIE BrtuT’I’M’F’S’mdh = Sum over (Q’, c, i, f) SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif

Note: The quantities are not introduced in a nested top-down hierarchical order, because of inter-dependency of quantities and to make them more readable. The calculation of SettlementIntervalRealTimeEnergyDifference is introduced in the same level as other main output quantities.

SettlementIntervalRealTimeEnergyDifference

SettlementIntervalRealTimeEnergyDifference BrtuT’I’Q’M’F’S’mdhcif = SettlementIntervalRealTimeImbalanceEnergy BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalTotalIIEPart1BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalTotalExceptionalIIE BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalResidualIIE BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalMSSIIEBrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalStandardRampingEnergy BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalTotalFMMPart1Qty BrtuT’I’Q’M’F’S’mdhcif –

SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif - SettlementIntervalTotalManualDispatchIIE BrtuT’I’Q’M’F’S’mdhcif

SettlementIntervalRealTimeImbalanceEnergy SettlementIntervalRealTimeImbalanceEnergy BrtuT’I’Q’M’F’S’mdhcif =

SettlementIntervalMeteredEnergy BrtuT’I’Q’M’F’S’mdhcif –

(SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif )

##### SettlementIntervalDayAheadEnergy

SettlementIntervalDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif =

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

#####  SettlementIntervalResourceBaseSchedule

SettlementIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif =

BAAIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif + WEIMPumpedStorageIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif

###### BAAIntervalResourceBaseSchedule

IF

Resource type (t) = Generator, ITIE, or ETIE

THEN

BAAIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif =

BAResBaseScheduleEnergyConversion BrtuT’I’Q’M’F’S’mdhcif

ELSE

IF Resource type (t) = Load

THEN

BAAIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif = BAResBaseLoadScheduleConversion BrtuT’I’Q’M’F’S’mdhcif

###### WEIMPumpedStorageIntervalResourceBaseSchedule

IF

 Resource type (t) = Load

 AND

 Entity Component Subtype (S’) = PL

 Then

 WEIMPumpedStorageIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif =

BAResBaseScheduleEnergyConversion BrtuT’I’Q’M’F’S’mdhcif

 ELSE

 0

###### BAResBaseScheduleEnergyConversion BrtuT’I’Q’M’F’S’mdhcif = Sum over (R’, W’, V, L’) BAResBaseScheduleEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif

###### BAResBaseLoadScheduleConversion BrtuT’I’Q’M’F’S’mdhcif = Sum over (A, A’, R’, p, W’, V, L’) BAResBaseLoadSchedule BrtuT’I’Q’M’AA’R’W’F’S’VL’pmdhcif

#####  SettlementIntervalResouceDayAheadEnergy

IF Resource type (t) = Generator THEN

SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif = (Sum over (b, R’, W’, V, L’) DAGenSchedule BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif ) + DAPumpingEnergyFiltered BrtuT’I’Q’M’F’S’mdhcif)

Else IF Resource type (t) = Load THEN

SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif = Sum over (A, A’, R’, p, W’, V, L’, v) DALoadSchedule BrtuT’I’Q’M’AA’R’pW’F’S’vVL’mdh / 12

Else IF Resource type (t) = ITIE THEN

SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif = Sum over (b, R’, W’, V, L’) DAImportScheduleBrtuT’bI’Q’M’R’W’F’S’VL’mdhcif

Else IF Resource type (t) = ETIE THEN

SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif = Sum over (b, R’, W’, V, L’) DAExportSchedule BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif

###### DAPumpingEnergyFiltered

#### DAPumpingEnergyFiltered BrtuT’I’Q’M’F’S’mdhcif= Sum over (R’, W’, V, L’) DAPumpingEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif

##### SettlementIntervalMeteredEnergy

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

##### = Sum over (A, A’, R’, p, P, W’, Q, d’, N, z’, V, v, H, n’, L’)

BASettlementIntervalResEntityEIMAreaMeteredGenerationQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif + Min (0, (BAResEntitySettlementIntervalOMARChannel1LoadQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif + BAResDispatchEBTMPQuantity BrtuQ’Nz’mdhcif)) + BASettlementIntervalResEIMEntityMeterLoadQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif +SettlementIntervalRTMeterDDEVENGYBrtuT’I’Q’M’AA’R’pPW’F’S’Qd’Nz’VvHn’L’mdhcif

Where Resource Type <> LI

##### SettlementIntervalRTMeterDDEVENGY

SettlementIntervalRTMeterDDEVENGYBrtuT’I’Q’M’AA’R’pPW’F’S’Qd’Nz’VvHn’L’mdhcif = Sum over (E, O) SettlementIntervalDeemedDeliveredInterchangeEnergyQuantityBrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

Where Resource type (t) = ITIE, ETIE

SettlementIntervalTotalIIEPart1

SettlementIntervalTotalIIEPart1BrtuT’I’Q’M’F’S’mdhcif =Sum over (R’, W’, V, L’)

(SettlementIntervalRTDOptimalIIE BrtuT’I’Q’M’R’W’F’S’VL’mdhcif +

DispatchIntervalIIEMinimumLoadEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif +

DispatchIntervalRampingEnergyDeviation BrtuT’I’Q’M’R’W’F’S’VL’mdhcif +

DispatchIntervalRerateEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif +

DispatchIntervalRTPumpingEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif )

SettlementIntervalRTDOptimalIIE

SettlementIntervalRTDOptimalIIE BrtuT’I’Q’M’R’W’F’S’VL’mdhcif = Sum over (b) DispatchIntervalOptimalIIE BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif

SettlementIntervalTotalManualDispatchIIE

SettlementIntervalTotalManualDispatchIIE BrtuT’I’Q’M’F’S’mdhcif = BA5MResourceTotalFMMManualDispatchEnergyQuantity BrtuT’I’Q’M’F’S’mdhcif *+* BA5MResourceTotalRTDManualDispatchEnergyQuantity BrtuT’I’Q’M’F’S’mdhcif

##### BA5MResourceTotalFMMManualDispatchEnergyQuantity

### BA5MResourceTotalFMMManualDispatchEnergyQuantity BrtuT’I’Q’M’F’S’mdhcif = Sum over (O, b) BAResourceFMMManualDispatchEnergyQty BrtuT’ObI’Q’M’F’S’mdhcif

##### BA5MResourceTotalRTDManualDispEngyQuantity

### BA5MResourceTotalRTDManualDispatchEnergyQuantity BrtuT’I’Q’M’F’S’mdhcif = Sum over (O, b) BAResourceRTDManualDispatchEnergyQty BrtuT’ObI’Q’M’F’S’mdhcif

 SettlementIntervalTotalExceptionalIIE

SettlementIntervalTotalExceptionalIIE BrtuT’I’Q’M’F’S’mdhcif = Sum over (O, b, A, A’, R’, W’, V, L’, P) (ExceptionalDispatchIIEBrtuT’ObI’Q’M’AA’R’W’F’S’VL’Pmdhcif + FMMExceptionalDispatchIIEBrtuT’ObI’Q’M’AA’R’W’F’S’VL’Pmdhcif)

SettlementIntervalResidualIIE

SettlementIntervalResidualIIEBrtuT’I’Q’M’F’S’mdhcif = Sum over (b, R’, W’, V, L’) (DispatchIntervalResidualIIEBrtuT’bI’Q’M’R’W’F’S’VL’mdhcif + DispatchIntervalRIEAboveForecastBrtuT’bI’Q’M’R’W’F’S’VL’mdhcif)

#### SettlementIntervalMSSIIE

#### SettlementIntervalMSSIIE BrtuTI’Q’M’F’S’mdhcif = Sum over (b, R’, W’, V, L’) DispatchIntervalMSSIIE BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif

SettlementIntervalStandardRampingEnergy

SettlementIntervalStandardRampingEnergy BrtuT’I’Q’M’F’S’mdhcif =Sum over (R’, W’, V, L’) DispatchIntervalStandardRampingEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif

SettlementIntervalOAEnergy

SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif = SettlementIntervalCISOOAEnergy BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalEIMOAEnergy BrtuT’I’Q’M’F’S’mdhcif

SettlementIntervalCISOOAEnergy

IF

HourlyPredispatchFlag BrtQ’mdh = 1

OR

HourlyIntertieDeviationFlag Brtmdh = 1

OR

BAHourlyResourceUnbidTagFlag Brtmdh = 1

THEN

SettlementIntervalCISOOAEnergy BrtuT’I’Q’M’F’S’mdhcif =

SettlementIntervalMeteredEnergy BrtuT’I’Q’M’F’S’mdhcif –

SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalTotalFMMPart1Qty BrtuT’I’Q’M’F’S’mdhcif – Sum over (R’, W’, V, L’ b) DispatchIntervalOptimalIIE BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif – SettlementIntervalTotalExceptionalIIE BrtuT’I’Q’M’F’S’mdhcif

Where Resource type (t) = ITIE or ETIE And Balancing Authority Area (Q) = ‘CISO’

ELSE

SettlementIntervalCISOOAEnergy BrtuT’I’Q’M’F’S’mdhcif = 0

BAHourlyResourceUnbidTagFlag

 BAHourlyResourceUnbidTagFlag Brtmdh = (0\* BAHourlyIntertieRTMeterDDEVENGY Brtmdh)+1

Note: In addition to the business driver BAHourlyIntertieRTMeterDDEVENGY Brtmdh, HourlyIntertieDeviationFlag Brtmdh will be included as an exclusionary business driver

BAHourlyIntertieRTMeterDDEVENGY

 BAHourlyIntertieRTMeterDDEVENGY Brtmdh = Sum over (u, T’, I’, Q’, M’, A, A’, R’. p, P, W’, F’, S’, Q, d’, N, z’, V, v, H, n’, L’, E, O) BAHourlyInterchangeDeemedDeliveredEnergyQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdh

Where Resource type (t) = ITIE or ETIE And Balancing Authority Area (Q) = ‘CISO’

And Energy Type (E) <> “DYN”

SettlementIntervalEIMOAEnergy

SettlementIntervalEIMOAEnergy BrtuT’I’Q’M’F’S’mdhcif =

SettlementIntervalMeteredEnergy BrtuT’I’Q’M’F’S’mdhcif –

SettlementIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif – SettlementIntervalTotalFMMPart1Qty BrtuT’I’Q’M’F’S’mdhcif – Sum over (R’, W’, V, L’, b) DispatchIntervalOptimalIIE BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif – SettlementIntervalTotalManualDispatchIIEBrtuT’I’Q’M’F’S’mdhcif

Where Resource type (t) = ITIE or ETIE And Balancing Authority Area (Q) <> ‘CISO’ and Entity Component Type = ‘INTERTIE’

### SettlementIntervalRegulationEnergy

### SettlementIntervalRegulationEnergy BrtuT’I’M’F’S’mdhcif = Sum over (Q’) BAResourceSettlementIntervalRegulationEnergy BrtuT’I’Q’M’F’S’mdhcif

### BAResourceSettlementIntervalRegulationEnergy

IF

SettlementIntervalRealTimeEnergyDifference BrtuT’I’Q’M’F’S’mdhcif >= 0

THEN

BAResourceSettlementIntervalRegulationEnergy BrtuT’I’Q’M’F’S’mdhcif =

Min (SettlementIntervalTotalRegUpCapacity BrtF’S’mdhcif , SettlementIntervalRealTimeEnergyDifference BrtuT’I’Q’M’F’S’mdhcif )

ELSE

BAResourceSettlementIntervalRegulationEnergy BrtuT’I’Q’M’F’S’mdhcif =

Max (-1\*SettlementIntervalTotalRegDownCapacity BrtF’S’mdhcif, SettlementIntervalRealTimeEnergyDifference BrtuT’I’Q’M’F’S’mdhcif )

SettlementIntervalTotalRegUpCapacity

SettlementIntervalTotalRegUpCapacity BrtF’S’mdhcif = Sum over (u, T’, I’, M’, R’, W’, V, L’) (HourlyTotalRegUpQSP BrtT’uI’M’R’W’F’S’VL'mdh + HourlyTotalAwardedRegUpBidCapacity BrtT’uI’M’R’W’F’S’VL'mdh + HourlyTotalABCRegUpQtyBrtT’uI’M’R’W’F’S’VL'mdh) / 12

SettlementIntervalTotalRegDownCapacity

SettlementIntervalTotalRegDownCapacity BrtF’S’mdhcif = Sum over (u, T’, I’, M’, R’, W’, V, L’) (HourlyTotalRegDownQSP BrtT’uI’M’R’W’F’S’VL'mdh + HourlyTotalAwardedRegDownBidCapacity BrtT’uI’M’R’W’F’S’VL'mdh + HourlyTotalABCRegDownQtyBrtT’uI’M’R’W’F’S’VL'mdh) /12

SettlementIntervalTotalIIENR

SettlementIntervalTotalIIENR BrtuT’I’Q’M’F’S’mdhcif = SettlementIntervalTotalIIEPart1BrtuT’I’Q’M’F’S’mdhcif + BAResourceSettlementIntervalRegulationEnergy BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalMSSIIEBrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalTotalExceptionalIIEnoVSBS BrtuT’I’Q’M’F’S’mdhcif

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

SettlementIntervalTotalExceptionalIIEnoVSBS

SettlementIntervalTotalExceptionalIIEnoVSBS BrtuT’I’Q’M’F’S’mdhcif = Sum over (O, b, A, A’, R’, W’, V, L’, P) ExceptionalDispatchIIE BrtuT’ObI’Q’M’AA’R’W’F’S’VL’Pmdhcif

Where: Exceptional Instruction Settlement type (O) is not one of (Voltage Support or Black Start)

### SettlementIntervalTotalFMMExceptionalIIEnoVSBS

SettlementIntervalTotalFMMExceptionalIIEnoVSBS BrtuT’I’Q’M’F’S’mdhcif = Sum over (O, b, A, A’, R’, W’, V, L’, P)

FMMExceptionalDispatchIIE BrtuT’ObI’Q’M’AA’R’W’F’S’VL’Pmdhcif

Where: Exceptional Instruction Settlement type (O) is not one of (Voltage Support or Black Start)

 SettlementIntervalTotalIIE1

SettlementIntervalTotalIIE1BrtuT’I’Q’M’F’S’mdhcif = SettlementIntervalTotalIIEPart1BrtuT’I’Q’M’F’S’mdhcif + BAResourceSettlementIntervalRegulationEnergy BrtuT’I’Q’M’F’S’mdhcif

*---- MSS System Resource Load Following Energy*

SettlementIntervalSystemResourceMSSLFEngy SettlementIntervalSystemResourceMSSLFEngy BrtuT’I’M’F’S’mdhcif = (SettlementIntervalMSSLFOAEnergy BrtuT’I’M’F’S’mdhcif + SettlementIntervalFMMMSSLFSelfSchdEngy BrtuT’I’M’F’S’mdhcif)

SettlementIntervalMSSLFOAEnergy

IF SettlementIntervalMSSLFMeteredEnergyDifference BrtuT’I’Q’M’F’S’mdhcif = 0

THEN

SettlementIntervalMSSLFOAEnergy BrtuT’I’M’F’S’mdhcif = 0

ELSE

SettlementIntervalMSSLFOAEnergy BrtuT’I’M’F’S’mdhcif = Sum over (Q’) SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif

SettlementIntervalMSSLFMeteredEnergyDifference SettlementIntervalMSSLFMeteredEnergyDifference BrtuT’I’Q’M’F’S’mdhcif = (SettlementIntervalMSSLFMeteredEnergy BrtuT’I’Q’M’F’S’mdhcif - SettlementIntervalSysResMSSTotalExpectedEngy BrtuT’I’Q’M’F’S’mdhcif)

SettlementIntervalMSSLFMeteredEnergy

SettlementIntervalMSSLFMeteredEnergy BrtuT’I’Q’M’F’S’mdhcif = Sum over (E, A, A’, R’, p, P, W’, Q, d’, N, z’, V, v, H, n’, L’, O) SettlementIntervalDeemedDeliveredInterchangeEnergyQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

Where resource type (t) = ‘ITIE’,’ETIE’ and Load Following Flag (L’) = ‘YES’

SettlementIntervalSysResMSSTotalExpectedEngy SettlementIntervalSysResMSSTotalExpectedEngy BrtuT’I’Q’M’F’S’mdhcif = Sum over (E, R’, W’, A, A’, p, V, L’) DispatchIntervalTotalExpectedEnergy BrtEuT’I’Q’M’AA’W’R’pF’S’VL’mdhcif

Where resource type (t) = ‘ITIE’,’ETIE’ and Load Following Flag (L’) = ‘YES’

SettlementIntervalFMMMSSLFSelfSchdEngy SettlementIntervalFMMMSSLFSelfSchdEngy BrtuT’I’M’F’S’mdhcif = Sum (Q’) SettlementIntervalFMMLoadFollowingSelfSchdQuantity BrtuT’I’Q’M’F’S’mdhcif - SettlementIntervalDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif

SettlementIntervalFMMLoadFollowingSelfSchdQuantity SettlementIntervalFMMLoadFollowingSelfSchdQuantity BrtuT’I’Q’M’F’S’hcif = Sum over (V, L’) (15MFMMSelfScheduleQuantity BrtuT’I’Q’M’F’S’VL’mdhc /12)

Where resource type t = ‘ITIE’ or ‘ETIE’ and Load Following Flag L’ = ‘YES’

Note: The equation above represents the conversion of MW into MWhs.

*---- Fifteen Minute Energy calculation*

SettlementIntervalTotalFMMPart1Qty

SettlementIntervalTotalFMMPart1Qty BrtuT’I’Q’M’F’S’mdhcif = Sum over (R’, W’, V, L’) (SettlementIntervalFMMOptimalIIE BrtuT’I’Q’M’R’W’F’S’VL’mdhcif + DispatchIntervalFMMRerateEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif + DispatchIntervalFMMMinimumLoadEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif + DispatchIntervalFMMPumpingEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif)

SettlementIntervalFMMOptimalIIE

SettlementIntervalFMMOptimalIIE BrtuT’I’Q’M’R’W’F’S’VL’mdhcif = Sum over (b) DispatchIntervalFMMOptimalIIE BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif

15MDAMFMMLAPChangeQuantity

15MDAMFMMLAPChangeQuantity AA’mdhc = (15MFMMLAPForecastQuantity AA’mdhc / 4) – 15MDAMLAPLoadScheduleQuantity AA’mdhc

15MDAMLAPLoadScheduleQuantity

15MDAMLAPLoadScheduleQuantity AA’mdhc = Sum over (B, r, t, u, T’, I’, M’, R’, p, W’, F’, S’, V, L’, Q’, v) ((DALoadSchedule BrtuT’I’Q’M’AA’R’pW’F’S’vVL’mdh + BAResBaseLoadSchedule BrtuT’I’Q’M’AA’R’W’F’S’VL’pmdhcif )/ 4)

5MFMMRTDLAPChangeQuantity

5MFMMRTDLAPChangeQuantity AA’mdhcif = 5MRTDLAPForecastQuantity AA’mdhcif – 5MFMMLAPForecastQuantity AA’mdhcif

5MFMMLAPForecastQuantity AA’mdhcif

5MFMMLAPForecastQuantity AA’mdhcif = (.25 \* 15MFMMLAPForecastQuantity AA’mdhc ) / 3

 Note: The equation above represents the conversion of MW into MWhs.

--*HASP Reversal Settlement Calculations*

HourlyTotalHASPPart1Quantity

 HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh = Sum over (c, i, f)

SettlementIntervalTotalFMMPart1Qty BrtuT’I’**Q’**M’F’S’mdhcif

where resource type (t) in ( “ITIE”, “ETIE”)

BAHourlyResourceImportHASPUntaggedMW

 BAHourlyResourceImportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh

IF

HourlyTotalHASPPart1Quantity BrtuQ’T’I’M’F’S’mdh < 0

THEN

BAHourlyResourceImportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh =

max(0,(min(HourlyDASchedule **Brtmdh** , BAResourceRUCCapacityTotalIncludingDayAheadSchedule **Brtmdh** ) - BAHourlyResourceCASTaggedDAEnergyMW Brtmdh ))

ELSE

BAHourlyResourceImportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh = 0

where resource type (t) = “ITIE”

Note: HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh is the business driver.

#### BAResourceRUCCapacityTotalIncludingDayAheadSchedule

####  BAResourceRUCCapacityTotalIncludingDayAheadSchedule Brtmdh = sum over (Q’, F’, S’) ResourceRCURCDDevCapacityTotal BrtQ’F’S’mdh

####  where resource type (t) in ( “ITIE”, “ETIE”)

#### ResourceRCURCDDevCapacityTotal

####  ResourceRCURCDDevCapacityTotal BrtQ’F’S’mdh = HourlyDASchedule Brtmdh + (BAHourlyResRCUAwardedQuantity BrtQ’F’S’mdh - BAHourlyResRCDAwardedQuantity BrtQ’F’S’mdh)

BAHourlyResourceImportHASPReductionMW BAHourlyResourceImportHASPReductionMW BrtuQ’T’I’M’F’S’mdh

IF

HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh < 0

THEN

BAHourlyResourceImportHASPReductionMW BrtuQ’T’I’M’F’S’mdh =

min (max(0, min(HourlyDASchedule **Brtmdh** ,BAResourceRUCCapacityTotalIncludingDayAheadSchedule **Brtmdh** ) - BAHourlyResourceDABalancedTotalContractUsage Brtmdh ) , (-1) \* HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh)

ELSE

BAHourlyResourceImportHASPReductionMW BrtuQ’T’I’M’F’S’mdh = 0

where resource type (t) = “ITIE”

Note: HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh is the business driver.

### BAHourlyResourceImportHASPReversalMW BAHourlyResourceImportHASPReversalMW BrtuQ’T’I’M’F’S’mdh =

###  min(BAHourlyResourceImportHASPReductionMW BrtuQ’T’I’M’F’S’mdh, BAHourlyResourceImportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh)

BAHourlyResourceExportHASPUntaggedMW BAHourlyResourceExportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh

IF

HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh > 0

THEN

BAHourlyResourceExportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh =

min(0, max(HourlyDASchedule **Brtmdh** , (-1)\*BAResourceRUCCapacityTotalIncludingDayAheadSchedule **Brtmdh** ) + BAHourlyResourceCASTaggedDAEnergyMW Brtmdh)

ELSE

BAHourlyResourceExportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh = 0

where resource type (t) = “ETIE”

Note: HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh is the business driver.

BAHourlyResExportHASPReductionMW

 BAHourlyResExportHASPReductionMW BrtuQ’T’I’M’F’S’mdh

IF HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh > 0

THEN

BAHourlyResExportHASPReductionMW BrtuQ’T’I’M’F’S’mdh =

min ((-1)\* min(0, max(HourlyDASchedule **Brtmdh** , (-1)\*BAResourceRUCCapacityTotalIncludingDayAheadSchedule **Brtmdh** ) - BAHourlyResourceDABalancedTotalContractUsage Brtmdh ) , HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh )

ELSE

BAHourlyResExportHASPReductionMW BrtuQ’T’I’M’F’S’mdh =0

where resource type (t) = “ETIE”

Note: HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh is the business driver.

### BAHourlyResourceExportHASPReversalMW

###  BAHourlyResourceExportHASPReversalMW BrtuQ’T’I’M’F’S’mdh = min(BAHourlyResExportHASPReductionMW BrtuQ’T’I’M’F’S’mdh , (-1) \* BAHourlyResourceExportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh)

*--10MinuteIntervalDayAheadEnergy*

10MinuteIntervalDayAheadEnergy

10MinuteIntervalDayAheadEnergy BrtuT’I’M’F’S’mdhi = sum over (Q’, c, f) SettlementIntervalDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif

Note: The equation above calculates a 10 Minute Day Energy Quantity for use in subsequent Charge Codes.

--EIM Transfer Percentage Calculations

BAAEIMTransferOutPercentage

BAAEIMTransferOutPercentage Q’mdhcif = BAATotalEIMTransferOutQuantity Q’mdhcif / (BAATotalGrossMDQuantity Q’mdhcif + BAATotalEIMTransferOutQuantity Q’mdhcif )

BAATotalGrossMDQuantity

BAATotalGrossMDQuantity Q’mdhcif = Sum over (B, u, T’, I’, M’, A, A’, W’, V’, L’) { Abs (

BASettlementIntervalEIMAreaMeasuredDemand BuT’I’Q’M’AA’W’VL’mdhcif) }

BAATotalEIMTransferOutQuantity

BAATotalEIMTransferOutQuantity Q’mdhcif = (-1) \* (Min (BAASettlementIntervalTotalTransferQuantity Q’mdhcif ,0)

### BAAResourceSettlementIntervalRTDTransferFromQuantity

BAAResourceSettlementIntervalRTDTransferFromQuantity BrQ’AA’Qpmdhcif = BAAResSettlementIntervalRTDTransferDevFromQuantity BrQ’AA’Qpmdhcif + BAAResourceRTDScheduleTransferFromQuantity BrQ’AA’Qpmdhcif

### BAAResSettlementIntervalRTDTransferDevFromQuantity

BAAResSettlementIntervalRTDTransferDevFromQuantity BrQ’AA’Qpmdhcif = BAA5MIntertieEIMTransferFromTaggedQuantity BrQ’AA’Qpmdhcif - (BAARTDIntertieEIMTransferFromQty BrQ’AA’Qpmdhcif/12)

### BAAResourceRTDScheduleTransferFromQuantity

BAAResourceRTDScheduleTransferFromQuantity BrQ’AA’Qpmdhcif = (BAARTDIntertieEIMTransferFromQty BrQ’AA’Qpmdhcif/12) - (BAAResourceSettlementIntervalFMMEIMTransferFromQuantity BrQ’AA’Qpmdhcif + BAAResourceSettlementIntervalEIMBaseTransferFromQuantity BrQ’AA’Qpmdhcif)

BAAResourceSettlementIntervalFMMEIMTransferFromQuantity

BAAResourceSettlementIntervalFMMEIMTransferFromQuantity BrQ’AA’Qpmdhcif = (INDUPLICATE(BAAFMMIntertieEIMTransferFromQty BrQ’AA’Qpmdhc) - INDUPLICATE(BAAIntertieEIMBaseTransferFromQty BrQ’AA’Qpmdh)) /12

BAAEIMTransferInPercentage

BAAEIMTransferInPercentage Q’mdhcif = BAATotalEIMTransferInQuantity Q’mdhcif / TotalEIMTransferInQuantity mdhcif

BAATotalEIMTransferInQuantity

BAATotalEIMTransferInQuantity Q’mdhcif = Max (BAASettlementIntervalTotalTransferQuantity Q’mdhcif,0)

TotalEIMTransferInQuantity

TotalEIMTransferInQuantity mdhcif = Sum over (Q’) (Max (BAASettlementIntervalTotalTransferQuantity Q’mdhcif,0))

BAASettlementIntervalTotalTransferQuantity

BAASettlementIntervalTotalTransferQuantity Q’mdhcif = sum over (B, r) BAASettlementIntervalETSRTotalTransferQuantity BrQ’mdhcif

BAASettlementIntervalETSRTotalTransferQuantity

IF

ResourceETSRElectSettlementFlag rmd = 1

THEN

BAASettlementIntervalETSRTotalTransferQuantity BrQ’mdhcif = 0

ELSE

BAASettlementIntervalETSRTotalTransferQuantity BrQ’mdhcif = Sum over (A, A’, Q, p) (BAA5MIntertieEIMTransferToTaggedQuantity BrQ’AA’Qpmdhcif

 - BAAResourceSettlementIntervalEIMBaseTransferToQuantity BrQ’AA’Qpmdhcif ) - (BAA5MIntertieEIMTransferFromTaggedQuantity BrQ’AA’Qpmdhcif  - BAAResourceSettlementIntervalEIMBaseTransferFromQuantity BrQ’AA’Qpmdhcif )

BAAResourceSettlementIntervalRTDTransferToQuantity

BAAResourceSettlementIntervalRTDTransferToQuantity BrQ’AA’Qpmdhcif = BAAResSettlementIntervalRTDTransferDevToQuantity BrQ’AA’Qpmdhcif + BAAResourceRTDScheduleTransferToQuantity BrQ’AA’Qpmdhcif

BAAResourceSettlementIntervalRTDTransferDevToQuantity

BAAResSettlementIntervalRTDTransferDevToQuantity BrQ’AA’Qpmdhcif = BAA5MIntertieEIMTransferToTaggedQuantity BrQ’AA’Qpmdhcif – (BAARTDIntertieEIMTransferToQty BrQ’AA’Qpmdhcif/12)

BAAResourceRTDScheduleTransferToQuantity

BAAResourceRTDScheduleTransferToQuantity BrQ’AA’Qpmdhcif = (BAARTDIntertieEIMTransferToQty BrQ’AA’Qpmdhcif/12) - (BAAResourceSettlementIntervalFMMEIMTransferToQuantity BrQ’AA’Qpmdhcif + BAAResourceSettlementIntervalEIMBaseTransferToQuantity BrQ’AA’Qpmdhcif)

BAAResourceSettlementIntervalFMMEIMTransferToQuantity

BAAResourceSettlementIntervalFMMEIMTransferToQuantity BrQ’AA’Qpmdhcif = (INDUPLICATE(BAAFMMIntertieEIMTransferToQty BrQ’AA’Qpmdhc) - INDUPLICATE(BAAIntertieEIMBaseTransferToQty BrQ’AA’Qpmdh)) /12

BAAResourceSettlementIntervalEIMBaseTransferToQuantity

BAAResourceSettlementIntervalEIMBaseTransferToQuantity BrQ’AA’Qpmdhcif = (BAAIntertieEIMBaseTransferToQty BrQ’AA’Qpmdh)

BAAResourceSettlementIntervalEIMBaseTransferFromQuantity

BAAResourceSettlementIntervalEIMBaseTransferFromQuantity BrQ’AA’Qpmdhcif = (BAAIntertieEIMBaseTransferFromQty BrQ’AA’Qpmdh)

### BAA5MIntertieEIMTransferFromTaggedQuantity

IF

EIMTransferFlag BrQ’AA’Qpd = 1

THEN

BAA5MIntertieEIMTransferFromTaggedQuantity BrQ’AA’Qpmdhcif = BAA5MEIMTransferDDEVAllocFromQuantity BrQ’AA’Qpmdhcif /12

ELSE

BAA5MIntertieEIMTransferFromTaggedQuantity BrQ’AA’Qpmdhcif = BAA5MEIMTransferRSRCFromTaggedQuantity BrQ’AA’Qpmdhcif /12

### BAA5MEIMTransferDDEVAllocFromQuantity

BAA5MEIMTransferDDEVAllocFromQuantity BrQ’AA’Qpmdhcif = BAAHourlyEIMTransferFromTaggedQuantity BrQ’AA’Qpmdh \* BAA5MRTDETSRAllocationRatio rmdhcif

### BAA5MRTDETSRAllocationRatio

BAA5MRTDETSRAllocationRatio rmdhcif = BAA5MRTDEIMTransferResourceQuantity rmdhcif / IntDuplicate(BAAHourlyRTDTotalEIMTransferResourceQuantity rmdh)

### BAAHourlyRTDTotalEIMTransferResourceQuantity

BAAHourlyRTDTotalEIMTransferResourceQuantity rmdh

Sum over (c,i,f) (BAA5MRTDEIMTransferResourceQuantity rmdhcif)

### BAA5MRTDEIMTransferResourceQuantity

IF

BAARTDIntertieEIMTransferFromQty BrQ’AA’Qpmdhcif = 0

And

ABS(BAAHourlyEIMTransferFromTaggedQuantity rQ’AA’Qpmdh) < 1

Then

BAA5MRTDEIMTransferResourceQuantity rmdhcif = 0.0001

ELSE

BAA5MRTDEIMTransferResourceQuantity rmdhcif = Sum over (B, Q’,A,A’,Q,p) (BAARTDIntertieEIMTransferFromQty BrQ’AA’Qpmdhcif)

Where EIMTransferFlag BrQ'AA’Qp exists

### BAAHourlyEIMTransferFromTaggedQuantity

BAAHourlyEIMTransferFromTaggedQuantity BrQ’AA’Qpmdh = Sum over (c,i,f) BAA5MEIMTransferRSRCFromTaggedQuantity BrQ’AA’Qpmdhcif

Where EIMTransferFlag BrQ'AA’Qp exists

### BAA5MEIMTransferFromTaggedQuantity

BAA5MEIMTransferRSRCFromTaggedQuantity BrQ’AA’Qpmdhcif = sum over (t, F’, S’) (BA5MEIMTransferFromTaggedQty BrtQ’AA’pF’S’Qmdhcif)

### BAA5MIntertieEIMTransferToTaggedQuantity

IF

EIMTransferFlag BrQ'AA’Qp = 1

THEN

BAA5MIntertieEIMTransferToTaggedQuantity BrQ’AA’Qpmdhcif = (BAA5MEIMTransferDDEVAllocToQuantity BrQ’AA’Qpmdhcif /12)

ELSE

BAA5MIntertieEIMTransferToTaggedQuantity BrQ’AA’Qpmdhcif = (BAA5MEIMTransferRSRCToTaggedQuantity BrQ’AA’Qpmdhcif /12)

### BAA5MEIMTransferDDEVAllocToQuantity

BAA5MEIMTransferDDEVAllocToQuantity BrQ’AA’Qpmdhcif = BAAHourlyEIMTransferToTaggedQuantity BrQ’AA’Qpmdh \* BAA5MRTDETSRAllocationRatio rmdhcif

### BAAHourlyEIMTransferToTaggedQuantity

BAAHourlyEIMTransferToTaggedQuantity BrQ’AA’Qpmdh = Sum over (c,i,f) BAA5MEIMTransferRSRCToTaggedQuantity BrQ’AA’Qpmdhcif

Where EIMTransferFlag BrQ'AA’Qp exists

### BAA5MEIMTransferRSRCToTaggedQuantity

BAA5MEIMTransferRSRCToTaggedQuantityBrQ’AA’Qpmdhcif*=* Sum over (t, F’, S’) (BA5MEIMTransferToTaggedQty BrtQ’AA’pF’S’Qmdhcif)

*Real Time Market Congestion and Losses*

BAANodalETSRTotalRTDIIEQuantity Q’AA’Qpmdhcif =

Sum(B, r)

(ResourceETSRElectSettlementFlag rmd) \*(BAAResourceSettlementIntervalRTDTransferToQuantity BrQ’AA’Qpmdhcif -BAAResourceSettlementIntervalRTDTransferFromQuantity BrQ’AA’Qpmdhcif)

BAANodalETSRTotalFMMIIEQuantity Q’AA’Qpmdhcif =

Sum(B, r)

(ResourceETSRElectSettlementFlag rmd) \*(BAAResourceSettlementIntervalFMMEIMTransferToQuantity BrQ’AA’Qpmdhcif - BAAResourceSettlementIntervalFMMEIMTransferFromQuantity BrQ’AA’Qpmdhcif)

### BAAUDCNodalQuantityFlag

### BAAUDCNodalQuantityFlag uM’Q’mdhcif = Sum over (B, r, t, T’, I’, R’, F’, S’, A, A’, Q, p) BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

### BAANodalQuantityFlag

### BAANodalQuantityFlag Q’AA’Qpmdhcif = Sum over (B, r, t, T’, u, I’, M’, R’, F’, S’) BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

APnode Type A’ = ‘Default’ or ‘Custom’

### BAResourceBAARTMeterQuantity

BAResourceBAARTMeterQuantity BrtuT’I’Q’M’AA’R’F’S’Qpmdhcif = Sum over (W’, P, d’, n’, N, z’, H, v, V, L’) ( BASettlementIntervalResEntityEIMAreaMeteredGenerationQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif + Min (0, (BAResEntitySettlementIntervalOMARChannel1LoadQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif + BAResDispatchEBTMPQuantity BrtuQ’Nz’mdhcif)) + BASettlementIntervalResEIMEntityMeterLoadQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif + SettlementIntervalRTMeterDDEVENGY BrtuT’I’Q’M’AA’R’pPW’F’S’Qd’Nz’VvHn’L’mdhcif)

Where resource type <> ‘LI’

NodalTotalFMMIIEQuantity

NodalTotalFMMIIEQuantity AA’Qpmdhcif = Sum over (Q’) BAANodalTotalFMMIIEandETSRQuantity Q’AA’Qpmdhcif

BAANodalTotalFMMIIEandETSRQuantity

BAANodalTotalFMMIIEandETSRQuantity Q’AA’Qpmdhcif =

BAANodalTotalFMMIIEQuantity Q’AA’Qpmdhcif + BAANodalETSRTotalFMMIIEQuantity Q’AA’Qpmdhcif

BAANodalTotalFMMIIEQuantity

BAANodalTotalFMMIIEQuantity Q’AA’Qpmdhcif = Sum over (B, r, t, u, T’, I’, M’, R’, F’, S’)

BAResourceTotalFMMIIEQuantity BrtuT’I’Q’M’F’S’mdhcif

Where T’ <> MSS or T’ = MSS and I’ = Gross

Note: This equation will be driven by Charge Type: BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

NodalTotalFMMNETMSSIIEQuantity

NodalTotalFMMNetMSSIIEQuantity M’mdhcif = Sum over (B, r, t, u, T’, I’, p, A, A’, R’, Q, F’, S’, Q’)
BAResourceTotalFMMIIEQuantity BrtuT’I’Q’M’F’S’mdhcif

Note: This equation will be driven by Charge Type: BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

Where T’ = MSS and I’ = Net

BAResourceTotalFMMIIEQuantity

BAResourceTotalFMMIIEQuantity BrtuT’I’Q’M’F’S’mdhcif = (SettlementIntervalTotalFMMPart1Qty BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalTotalFMMExceptionalIIEnoVSBS BrtuT’I’Q’M’F’S’mdhcif + BA5MResourceTotalFMMManualDispatchEnergyQuantity BrtuT’I’Q’M’F’S’mdhcif)

NodalTotalRTDIIEQuantity

NodalTotalRTDIIEQuantity AA’Qpmdhcif = Sum over (Q’) BAANodalTotalRTDIIEandETSRQuantity Q’AA’Qpmdhcif

BAANodalTotalRTDIIEandETSRQuantity Q’AA’Qpmdhcif

BAANodalTotalRTDIIEQuantity Q’AA’Qpmdhcif + BAANodalETSRTotalRTDIIEQuantity Q’AA’Qpmdhcif

BAANodalTotalRTDIIEQuantity

BAANodalTotalRTDIIEQuantity Q’AA’Qpmdhcif = Sum over (B, r, t, T’, u, I’, M’, R’, F’, S’) ( BAResourceTotalRTDIIEQuantity BrtuT’I’Q’M’F’S’mdhcif)

Where T’ <> MSS or T’ = MSS and I’ = Gross

Note: This equation will be driven by Charge Type: BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

NodalTotalRTDNETMSSIIEQuantity

NodalTotalRTDNETMSSIIEQuantity M’mdhcif = Sum over (B, r, t, u, T’, I’, p, A, A’, R’, Q, F’, S’, Q’) (BAResourceTotalRTDIIEQuantity BrtuT’I’Q’M’F’S’mdhcif)

Where T’ = MSS and I’ = Net

Note: This equation will be driven by Charge Type: BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

BAResourceTotalRTDIIEQuantity

BAResourceTotalRTDIIEQuantity BrtuT’I’Q’M’F’S’mdhcif = (SettlementIntervalTotalIIEPart1BrtuT’I’Q’M’F’S’mdhcif + BAResourceSettlementIntervalRegulationEnergy BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalMSSIIEBrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalTotalExceptionalIIEnoVSBS BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif + SettlementIntervalResidualIIE BrtuT’I’Q’M’F’S’mdhcif + BA5MResourceTotalRTDManualDispatchEnergyQuantity BrtuT’I’Q’M’F’S’mdhcif)

NodalTotalUIEQuantity

NodalTotalUIEQuantity AA’Qpmdhcif = Sum over (Q’) BAANodalTotalUIEQuantity Q’AA’Qpmdhcif

BAANodalTotalUIEQuantity

BAANodalTotalUIEQuantity Q’AA’Qpmdhcif = Sum over (B, r, t, T’, u, I’, M’, R’, F’, S’) ( SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif)

Where T’ <> MSS or T’ = MSS and I’ = Gross and APnode Type A’ <> ‘Default’ or ‘Custom’

Note: This equation will be driven by Charge Type: BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

NodalTotalLAPLoadUIEQuantity

NodalTotalLAPLoadUIEQuantity AA’mdhcif = Sum over (B, r, t, T’, u, I’, M’, R’, Q, p, F’, S’, Q’) (SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif)

Where T’ <> MSS or T’ = MSS and I’ = Gross and APnode Type A’ = ‘Default’ or ‘Custom’

Note: This equation will be driven by Charge Type: BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

NodalNETMSSUIEQuantity

NodalNETMSSUIEQuantity M’mdhcif = Sum over (B, r, t, u, T’, I’, p, A, A’, R’, Q, F’, S’, Q’) (SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif)

Where T’ = MSS and I’ = Net

Note: This equation will be driven by Charge Type: BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif

HourlyIntertieDeviationFlag

Where Resource Type = ‘ITIE’ or ‘ETIE’

IF

BAHourlyResourceIntertieBidOptionsFlag BrtQ’mdh= 6 (“SSVER”)

OR

BAHourlyResourceIntertieBidOptionsFlag BrtQ’mdh= 1 (“DYNAMIC”)

THEN

HourlyIntertieDeviationFlag Brtmdh = Sum over (Q’) 0

ELSE

HourlyIntertieDeviationFlag Brtmdh = Sum over (Q’) 1

### ResourceWholesaleExemptionFlag rmdhcif

Sum over (B,t,u,T’,I’,Q’,M’,A,A’,F’,R’,p,P,W’,Q,S’,d’,N,z’,V,v,H,n’,L’)

IF

ResourceDailyApplyWholesaleChargeFlag rmd = 1

AND

BASettlementIntervalResEntityEIMAreaMeteredGenerationQuantity BrtuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’VvHn’L’mdhcif < 0

THEN

ResourceWholesaleExemptionFlag rmdhcif = 1

ELSE

ResourceWholesaleExemptionFlag rmdhcif = 0

## Internal Design Variation

TotalDAScheduleQuantity BrtuT’I’Q’M’F’S’mdhcif = Sum over (b, R’, W’, V, L’) DAScheduleQuantity BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif

BAResSettlementIntervalDASchdLoadConversionQuantity BrtuT’I’Q’M’F’S’mdhcif = Sum over (A, A’, R’, p, W’, V, v, L’) DALoadSchedule BrtuT’I’Q’M’AA’R’pW’F’S’vVL’mdh

SettlementIntervalTotalOptimalIIE BrtuT’I’Q’M’F’S’mdhcif = Sum over (R’, W’, V, L’) SettlementIntervalRTDOptimalIIE BrtuT’I’Q’M’R’W’F’S’VL’mdhcif

BAResSettlementIntervalDASchdConversionQuantity BrtuT’I’Q’M’F’S’mdhcif = TotalDAScheduleQuantity BrtuT’I’Q’M’F’S’mdhcif + DAPumpingEnergyFiltered BrtuT’I’Q’M’F’S’mdhcif

## Outputs

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| Output ID | Name | Description |
| --- | --- | --- |
|  | In addition, all inputs are required to be accessible for review by analysts and report on Settlement statements. |  |
|  | SettlementIntervalRegulationEnergy BrtuT’I’M’F’S’mdhcif  | Settlement Interval Regulation energy calculated for Resource r. (MWh) |
|  | SettlementIntervalRealTimeUIE BrtuT’I’Q’M’F’S’mdhcif | Total Settlement Interval Real-Time UIE Quantity for Resource r. (MWh)  |
|  | SettlementIntervalTotalIIENR BrtuT’I’Q’M’F’S’mdhcif  | Settlement Interval Total IIE excluding Residual Imbalance (RTD Optimal, RTD Minimum Load, Ramping Energy Deviation, RTD Rerate, RTD Pumping Energy, MSS Load Following, Regulation, Exceptional Dispatch ) energy for Resource r. (MWh) |
|  | SettlementIntervalTotalIIE1BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Total IIE 1 (RTD Optimal, RTD Minimum Load, Ramping Energy Deviation, RTD Rerate, RTD Pumping Energy, Regulation) energy Resource r. (MWh) |
|  | SettlementIntervalResidualIIEBrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Residual Imbalance Energy Resource r. (MWh) |
|  | SettlementIntervalRealTimeEnergyDifference BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Real Time Energy Difference for Resource r. (MWh) |
|  | SettlementIntervalRealTimeImbalanceEnergy BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Real-Time Imbalance energy for Resource r. (MWh) |
|  | SettlementIntervalTotalIIEPart1BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Total IIE Part 1 (RTD Optimal, RTD Minimum Load, Ramping Energy Deviation, RTD Rerate, RTD Pumping Energy) energy for Resource r. (MWh) |
|  | SettlementIntervalStandardRampingEnergy BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Standard Ramping Energy for Resource r. (MWh) |
|  | SettlementIntervalTotalExceptionalIIE BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Total Exceptional Dispatch Energy (RTD Exception Dispatch and FMM Exception Dispatch) for Resource r. (MWh) |
|  | SettlementIntervalMSSIIE BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval MSS Instructed Imbalance Energy (Load Following) Resource r. (MWh) |
|  | SettlementIntervalTotalExceptionalIIEnoVSBS BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Total Exceptional Dispatch Energy excluding Voltage Support and Black Start, for Resource r. (MWh) |
|  | SettlementIntervalDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif  | Settlement Interval Day Ahead Scheduled Energy for Resource r. (MWh). Quantity representing the total of DA Awarded Bid Energy, Self-Schedule Energy, and Minimum Load. |
|  | SettlementIntervalMeteredEnergy BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval metered energy for Resource r. (MWh) |
|  | SettlementIntervalOAEnergy BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Operational Adjustment Energy for System Resource r. (MWh) |
|  | HourlyTotalRealTimeUIE BrtuT’I’M’F’S’mdh | Hourly Real Time Uninstructed Energy for Resource r. (MWh) |
|  | SettlementIntervalTotalRegUpCapacity BrtF’S’mdhcif | Settlement Interval Total Regulation Up Capacity for CISO BAA and Available Balancing Capacity Regulation Up for EIM BAA for Resource r. |
|  | SettlementIntervalTotalRegDownCapacity BrtF’S’mdhcif | Settlement Interval Total Regulation Down Capacity for CISO BAA and Available Balancing Capacity Regulation Down for EIM BAA for Resource r |
|  | SettlementIntervalRTMeterDDEVENGYBrtuT’I’Q’M’AA’R’pPW’F’S’Qd’Nz’VvHn’L’mdhcif  | Settlement Interval Real Time Metered Deemed Delivered Energy for Resource r. |
|  | DAPumpingEnergyFiltered BrtuT’I’Q’M’F’S’mdhcif | DA Pumping Energy Filtered for Resource r. |
|  | SettlementIntervalFMMLoadFollowingSelfSchdQuantity BrtuT’I’Q’M’F’S’mdhcif | FMM Load Following Self Schedule Quantity for resource r. |
|  | SettlementIntervalFMMMSSLFSelfSchdEngy BrtuT’I’M’F’S’mdhcif | FMM Load Following Self Schedule Energy for Resource r.Represents incremental and decremental Self Scheduled changes to the DASE for Load Following System Resources.  |
|  | SettlementIntervalSysResMSSTotalExpectedEngy BrtuT’I’Q’M’F’S’mdhcif | Total Expected Energy of MSS Load Following System Resources for Resource r.Where Resource Type in (‘ETIE’, ‘ITIE’) and Load Following Flag = ‘YES’ |
|  | SettlementIntervalMSSLFMeteredEnergy BrtuT’I’Q’M’F’S’mdhcif | Metered Energy of MSS Load Following System Resources for Resource r. |
|  | SettlementIntervalMSSLFMeteredEnergyDifference BrtuT’I’Q’M’F’S’mdhcif | Real Time Energy Difference of MSS Load Following System Resources r. |
|  | SettlementIntervalMSSLFOAEnergy BrtuT’I’M’F’S’mdhcif | Operational Adjustment Energy for MSS Load Following System Resources r. (MWh) |
|  | SettlementIntervalSystemResourceMSSLFEngy BrtuT’I’M’F’S’mdhcif | Total MSS Load Following Energy fof System r. (MWh) |
|  | SettlementIntervalTotalFMMPart1Qty BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Total FMM Part 1 Quantity (FMM Optimal, FMM Minimum Load, FMM Rerate, FMM Pumping Energy) for Resource r. (MWh) |
|  | SettlementIntervalFMMOptimalIIE BrtuT’I’Q’M’R’W’F’S’VL’mdhcif | Settlement Interval FMM Optimal Energy for Resource r. (MWh)  |
|  | 15MDAMFMMLAPChangeQuantity AA'mdhc | Represents the quantity difference between the Day Ahead LAP Load Schedules and the 15 minute FMM LAP Load Forecast |
|  | 15MDAMLAPLoadScheduleQuantity AA'mdhc | Represents the 15 Minute Day Ahead Market LAP Load Schedule Quantity |
|  | 5MFMMRTDLAPChangeQuantity AA'mdhcif | Represents the forecast quantity difference between the 15 minute FMM LAP Load Forecast and the 5 minute RTD LAP Load Forecast |
|  | 5MFMMLAPForecastQuantity AA’mdhcif | Represents the 5 Minute FMM LAP Load Forecast |
|  | HourlyTotalHASPPart1Quantity BrtuT’Q’I’M’F’S’mdh | Total hourly quantity for ITIE and ETIE. **(MW)** |
|  | BAHourlyResourceImportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh | The quantity of import that clear the Day-Ahead Market for which the Scheduling Coordinator has failed to submit an E-Tag prior to HASP solution availability. This is for a resource of type t = “ITIE”.**(MW)** |
|  | BAResourceRUCCapacityTotalIncludingDayAheadSchedule Brtmdh | Resource RUC Capacity Total Including Day Ahead Schedule. |
|  | ResourceRCURCDDevCapacityTotal BrtQ’F’S’mdh | The sum of the IFM energy schedule quantity and the difference between RCU an RCD quantities. |
|  | BAHourlyResourceImportHASPReductionMW BrtuQ’T’I’M’F’S’mdh | The HASP reduction MW from Day Ahead Schedules net of Contracts MW for a resource of type t = “ITIE”. (MW) |
|  | BAHourlyResourceImportHASPReversalMW BrtuQ’T’I’M’F’S’mdh | The MW basis for the FMM reversal settlement rule for a resource of type t = “ITIE”. **(MW)** |
|  | BAHourlyResourceExportHASPUntaggedMW BrtuQ’T’I’M’F’S’mdh | The quantity of import that clear the Day-Ahead Market for which the Scheduling Coordinator has failed to submit an E-Tag prior to HASP solution availability. This is for a resource of type t = “ETIE”.**(MW)** |
|  | BAHourlyResExportHASPReductionMW BrtuQ’T’I’M’F’S’mdh | The HASP Reduction MW from Day Ahead Schedules net of Contracts MW for a resource of type t = “ETIE”.(MW) |
|  | BAHourlyResourceExportHASPReversalMW BrtuQ’T’I’M’F’S’mdh | The MW basis for the HASP reversal settlement rule for a resource of type t = “ETIE”. **(MW)** |
|  | SettlementIntervalRTDOptimalIIE BrtuT’I’Q’M’R’W’F’S’VL’mdhcif  | Represents the Total RTD Optimal IIE Energy for resource r. (MWh) |
|  | 10MinuteIntervalDayAheadEnergy BrtuT’I’M’F’S’mdhi | Total 10 Minute Day Ahead Energy Quantity scheduled for resource r in the forward market |
|  | SettlementIntervalResouceDayAheadEnergy BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Resource Day Ahead Energy  |
|  | SettlementIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Resource base Schedule Energy |
|  | BAAIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Resource base Schedule Energy for resources not in the WEIM. |
|  | WEIMPumpedStorageIntervalResourceBaseSchedule BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Resource base Schedule Energy for pumped storage resources located in the WEIM BAA when those resources are in pumping mode (load). |
|  | BAResBaseScheduleEnergyConversion BrtuT’I’Q’M’F’S’mdhcif | The BAResBaseScheduleEnergy BrtuT’I’Q’M’R’W’F’S’VL’mdhcif taking the sum of Penalty Resource ID , MSS Emission Flag, RUC Participation Flag, and Load Following Flag. |
|  | BAResBaseLoadScheduleConversion BrtuT’I’Q’M’F’S’mdhcif  | The BAResBaseLoadSchedule BrtuT’I’Q’M’R’W’F’S’VL’mdhcif taking the sum of Penalty Resource ID , MSS Emission Flag, RUC Participation Flag, and Load Following Flag. |
|  | SettlementIntervalTotalManualDispatchIIE BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Total Manual Dispatch Energy for resource r |
|  | BAAEIMTransferOutPercentage Q’mdhcif | BAA EIM Transfer Out Percentage by Balancing Authority Area Q’ |
|  | BAATotalEIMTransferOutQuantity Q’mdhcif | BAA Total EIM Transfer Out Quantity by Balancing Authority Area Q’ |
|  | BAATotalGrossMDQuantity Q’mdhcif | BAA Total Gross EIM Measured Demand Quantity by Balancing Authority Area Q’ |
|  | BAAEIMTransferInPercentage Q’mdhcif | BAA EIM Transfer In Percentage by Balancing Authority Area Q’ |
|  | BAATotalEIMTransferInQuantity Q’mdhcif | BAA Total EIM Transfer In Quantity by Balancing Authority Area Q’ |
|  | BA5MResourceTotalFMMManualDispatchEnergyQuantity BrtuT’I’Q’M’F’S’mdhcif | Resource total FMM Manual Dispatch energy quantity |
|  | BA5MResourceTotalRTDManualDispatchEnergyQuantity BrtuT’I’Q’M’F’S’mdhcif | Resource total RTD Manual Dispatch energy quantity |
|  | BAResourceSettlementIntervalRegulationEnergy BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Regualtion Energy for Resource r |
|  | SettlementIntervalTotalFMMExceptionalIIEnoVSBS BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval Total FMM Exceptional Dispatch Energy excluding Black Start and Voltage Support EDE Dispatches |
|  | BAResourceBAARTMeterQuantity BrtQ’T’uI’M’AA’R’F’S’Qpmdhcif | Balancing Authority Area Real Time Meter Quantity plus Total Expected Energy. |
|  | NodalTotalFMMIIEQuantity AA’Qpmdhcif | The total FMM IIE Quantity for Aggregated Pnode A’ and Price Node p  |
|  | NodalTotalRTDIIEQuantity AA’Qpmdhcif | The total RTD IIE Quantity for Aggregated Pnode A’ and Price Node p  |
|  | NodalTotalUIEQuantity AA’Qpmdhcif | The total UIE Congestion Quantity for Aggregated Pnode A’ and Price Node p  |
|  | NodalTotalFMMNETMSSIIEQuantity M’mdhcif | The total FMM Net MSS IIE Quantity for MSS Subgroup M’  |
|  | NodalTotalRTDNETMSSIIEQuantity M’mdhcif | The total RTD Net MSS IIE Quantity for MSS Subgroup M’  |
|  | NodalTotalLAPLoadUIEQuantity AA’mdhcif | The total LAP Load UIE Quantity for Aggregated Pnode A’  |
|  | NodalNETMSSUIEQuantity M’mdhcif | The total Net MSS UIE Quantity for MSS Subgroup M’ |
|  | BAANodalQuantityFlag Q’AA’Qpmdhcif | The total Balancing Authority Area Nodal Quantity Flag for Balancing Authority Q’, APnode A, and Pnode p. |
|  | TotalEIMTransferInQuantity mdhcif | Total EIM Transfer In Quantity over all Balancing Authority Areas  |
|  | BAAUDCNodalQuantityFlag uM’Q’mdhcif | The total Balancing Authority Area UDC Nodal Flag for Balancing Authority Q’ , UDC ID u and MSS Subgroup M’ |
|  | HourlyIntertieDeviationFlag Brtmdh | The Hourly Intertie Deviation Flag for Resource r based upon the resource Hourly Bid Option.  |
|  | BAAResourceSettlementIntervalFMMEIMTransferFromQuantity BrQ’AA’Qpmdhcif | The Settlement Interval FMM EIM Transfer From Quantity for Resource r and Balancing Authority Q’ |
|  | BAAResourceSettlementIntervalRTDTransferFromQuantity BrQ’AA’Qpmdhcif | The Settlement Interval RTD EIM Transfer From Quantity for Resource r and Balancing Authority Q’This value is incremnental to the FMM EIM Transfer Quantity |
|  | BAAResSettlementIntervalRTDTransferDevFromQuantity BrQ’AA’Qpmdhcif | BAA Resource Settlement Interval RTD Transfer Deviation From Quantity. Difference between ETSR ATF value and RTD Schedule  |
|  | BAAResourceRTDScheduleTransferFromQuantity BrQ’AA’Qpmdhcif | BAA Resource Settlement Interval RTD Schedule Transfer From QuantityDifference between ETSR RTD Schedule and ETSR FMM Schedule |
|  | BAAResourceSettlementIntervalFMMEIMTransferToQuantity BrQ’AA’Qpmdhcif | The Settlement Interval FMM EIM Transfer To Quantity for Resource r and Balancing Authority Q’ |
|  | BAAResourceSettlementIntervalRTDTransferToQuantity BrQ’AA’Qpmdhcif | The Settlement Interval RTD EIM Transfer To Quantity for Resource r and Balancing Authority Q’This value is incremnental to the FMM EIM Transfer Quantity |
|  | BAAResourceSettlementIntervalRTDTransferDevToQuantity rQ’AA’Qpmdhcif | BAA Resource Settlement Interval RTD Transfer Deviation To Quantity. Difference between ETSR ATF value and RTD Schedule  |
|  | BAAResourceRTDScheduleTransferToQuantity rQ’AA’Qpmdhcif | BAA Resource Settlement Interval RTD Schedule Transfer To QuantityDifference between ETSR RTD Schedule and ETSR FMM Schedule |
|  | BAA5MIntertieEIMTransferFromTaggedQuantity BrQ’AA’Qpmdhcif | BAA EIM ETSR tagged Transfer Out Quantity by Balancing Authority Area Q’ |
|  | BAA5MEIMTransferDDEVAllocFromQuantity BrQ’AA’Qpmdhcif | BAA 5 Minute EIM Transfer Deemed Delivered Allocation From Quantity |
|  | BAA5MRTDETSRAllocationRatio rmdhcif | BAA 5 Minute RTD ETSR Allocation Ratio |
|  | BAAHourlyRTDTotalEIMTransferResourceQuantity rmdh | BAA Hourly RTD Total EIM Transfer Resource Quantity |
|  | BAA5MRTDEIMTransferResourceQuantity rmdhcif | BAA 5 Minute RTD Total EIM Transfer Resource Quantity |
|  | BAAHourlyEIMTransferFromTaggedQuantity rQ’AA’Qpmdh | BAA Hourly EIM Transfer Resource From After-The-Fact Quantity |
|  | BAA5MEIMTransferRSRCFromTaggedQuantity BrQ’AA’Qpmdhcif | BAA 5 Minute EIM Transfer RSRC From Tagged Quantity |
|  | BAA5MIntertieEIMTransferToTaggedQuantity BrQ’AA’Qpmdhcif | BAA EIM ETSR tagged Transfer In Quantity by Balancing Authority Area Q’ |
|  | BAA5MEIMTransferDDEVAllocToQuantity BrQ’AA’Qpmdhcif | BAA 5 Minute EIM Transfer Deemed Delivered Allocation To Quantity |
|  | BAAHourlyEIMTransferToTaggedQuantity BrQ’AA’Qpmdh | BAA Hourly EIM Transfer Resource To After-The-Fact Quantity |
|  | BAA5MEIMTransferRSRCToTaggedQuantity BrQ’AA’Qpmdhcif | BAA 5 Minute EIM Transfer RSRC To Tagged Quantity |
|  | BAANodalTotalFMMIIEQuantity Q’AA’Qpmdhcif | The Settlement Interval Balancing Authority Area Total FMM IIE Nodal Quantity |
|  | BAANodalTotalRTDIIEQuantity Q’AA’Qpmdhcif | The Settlement Interval Balancing Authority Area Total RTD IIE Nodal Quantity |
|  | BAANodalTotalUIEQuantity Q’AA’Qpmdhcif | The Settlement Interval Balancing Authority Area Total UIE Nodal Quantity |
|  | BAAResourceSettlementIntervalEIMBaseTransferToQuantity BrQ’AA’Qpmdhcif | The Settlement Interval EIM Base Transfer To Quantity for Resource r and Balancing Authority Q’ |
|  | BAAResourceSettlementIntervalEIMBaseTransferFromQuantity BrQ’AA’Qpmdhcif | The Settlement Interval EIM Base Transfer From Quantity for Resource r and Balancing Authority Q’ |
|  | BAHourlyIntertieRTMeterDDEVENGY Brtmdh | Input reflects any resource that tagged after the fact.5-minute Deemed Delivered Energy Quantity (in MWh)The input reflects both:1. Resources with awarded bids that submitted tags and as a result will be deemed delivered
2. Resources without bids or awards that submitted tags and as a result will be deemed delivered
 |
|  | BAHourlyResourceUnbidTagFlag Brtmdh | Since the input reflects scenario a) and b) explained belowThe intent is to capture on the output just:1. Resources without bids or awards that submitted tags and as a result will be deemed delivered

And to not include via an exclusionary business driver:1. Resources with awarded bids that submitted tags and as a result will be deemed delivered
 |
|  | SettlementIntervalCISOOAEnergy BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval CISO Operational Adjustment Energy for System Resource r. (MWh)OA derived for intertie and non-dynamic resources The intertie deviation flag reflects:Resources with awarded bids that submitted tags and as a result will be deemed deliveredThe unbid tag flag reflects:Resources without bids or awards that submitted tags and as a result will be deemed delivered |
|  | SettlementIntervalEIMOAEnergy BrtuT’I’Q’M’F’S’mdhcif | Settlement Interval EIM Operational Adjustment Energy for System Resource r. (MWh) |
|  | BAASettlementIntervalETSRTotalTransferQuantity BrQ’mdhcif | Settlement Interval EIM Transfer System Resource Quantity by resource r and Balancing Authority Area Q’This value is incremental to Base EIM Transfer Schedules |
|  | BAASettlementIntervalTotalTransferQuantity rQ’mdhcif | Settlement Interval EIM Transfer Quantity by Balancing Authority Area Q’This value is incremental to Base EIM Transfer Schedules |
|  | BAResourceTotalRTDIIEQuantity BrtuT’I’Q’M’F’S’mdhcif | Total Real Time Dispatch Instructed Imbalance Energy Quantity by Resource r |
|  | BAResourceTotalFMMIIEQuantity BrtuT’I’Q’M’F’S’mdhcif | Total Fifteen Minute Market Instructed Imbalance Energy Quantity by Resource r |
|  | ResourceWholesaleExemptionFlag rmdhcif | Flag that indicates if a resource will be exempt from settlements charges, (1 = Yes, 0 = No) |
|  | BAANodalETSRTotalRTDIIEQuantity Q’AA’Qpmdhcif | The Settlement Interval Balancing Authority Area Total RTD IIE Nodal Quantity of Base ETSRs that elect to settle |
|  | BAANodalETSRTotalFMMIIEQuantity Q’AA’Qpmdhcif | The Settlement Interval Balancing Authority Area Total FMM IIE Nodal Quantity of Base ETSRs that elect to settle |
|  | BAANodalTotalFMMIIEandETSRQuantity Q’AA’Qpmdhcif | The Settlement Interval Balancing Authority Area Total FMM IIE Nodal Quantity including FMM IIE of Base ETSRs that elect to settle |
|  | BAANodalTotalRTDIIEandETSRQuantity Q’AA’Qpmdhcif | The Settlement Interval Balancing Authority Area Total RTD IIE Nodal Quantity including RTD IIE of Base ETSRs that elect to settle |

# Charge Code Effective Dates

| Charge Code/Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Update Type |
| --- | --- | --- | --- | --- |
| Real-Time Energy Pre-calculation | 5.0a | 04/01/09 |  03/31/10 | Documentation Edits Only |
| Real-Time Energy Pre-Calculation | 5.1 | 04/01/10 |  07/31/10 | Configuration Change Required |
| Real-Time Energy Pre-calculation | 5.2 | 08/01/10 |  12/31/11 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.3 | 01/1/12 |  12/14/11 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.4 | 12/15/11 | 11/30/12 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.5 | 12/1/12 |  04/30/14 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.6 | 05/01/14 | 09/30/14 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.7 | 10/01/14 |  9/30/14 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.8 | 10/01/14 | 9/30/14 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.9 | 10/01/14 | 6/30/15 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.10 | 7/1/15 | 11/3/15 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.11 | 11/4/15 | 11/3/15 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.12 | 11/4/15 | 11/3/15 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.13 | 11/4/15 | 9/30/16 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.14 | 10/1/16 | 10/31/2017 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.15 | 11/1/2017 | 10/31/2017 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.16 | 11/1/2017 | 4/3/18 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.17 | 4/4/18 | 4/3/18 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.17.1 | 4/4/18 | 10/31/18 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.18 | 11/1/18 | 10/31/18 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.18.1 | 11/1/18 | 7/31/2019 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.19 | 8/1/19 | 11/12/19 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.20 | 11/13/19 | 9/30/20 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.21 | 10/1/20 | 12/31/20 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.22 | 1/1/21 | 1/31/21 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.22.1 | 2/1/21 | 4/30/21 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.23 | 5/1/21 | 2/28/23 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.24.0a | 3/1/23 | 2/28/23 | Documentation Edits Only |
| Real-Time Energy Pre-calculation | 5.25 | 3/1/23 | 4/30/26 | Configuration Impacted |
| Real-Time Energy Pre-calculation | 5.26 | 5/1/26 | Open | Configuration Impacted |