Settlements & Billing

**Configuration Guide: System Resource Deemed Delivered Energy Quantity**

**Version 5.7.0a**

Table of Contents

1. Purpose of Document 3

2.Introduction 3

2.1 Background 3

2.2 Description 3

3. Charge Code Requirements 5

3.1 Business Rules 5

3.4 Predecessor Charge Codes 8

3.5 Successor Charge Codes 8

3.6 Inputs - External Systems 9

3.7 Inputs - Predecessor Charge Codes or Pre-calculations 10

3.8 CAISO Formula 11

3.10 Outputs 16

4. Charge Code Effective Dates 21

# 1. Purpose of Document

The purpose of this document is to capture the requirements and design specification for a Pre-calculation in one document.

# 2.Introduction

## 2.1 Background

The interchange transaction scheduling system referred to as ITS is the system of record for Real-Time Interchange schedules. This System Resource Pre-calculation determines the Settlement Interval Real-Time Deemed Delivered MWh quantities for use by Billing & Settlements systems. The 5-minute MWh values are considered by Settlements as the “Deemed Delivered” quantities that actually flowed in Real-Time for an Interchange schedule (System Resource). The terms “Deemed Delivered” and “Real-Time Deemed Delivered” are used interchangeably in this document.

The System Resource Deemed Delivered Energy Pre-calculation generates the Deemed Delivered Energy for hourly Day Ahead Schedules and Real Time dispatched Interchange schedules for both Non-Dynamic and Dynamic System Resources. Dispatch Interval IIE quantities are generated by the Market Quality System (MQS) based upon market results while the Settlement Interval Deemed Delivered quantities are calculated by Settlements using ITS data. Because MQS is using market results rather than the recorded quantities in ITS that are subject to a control area check-out process, the sum of the Dispatch Interval IIE quantities may differ from the hourly quantities recorded in ITS. This difference will be captured by a successor Settlements calculation, the RT Energy Quantity Pre-calculation, as an Operational Adjustment (OA).

## 2.2 Description

The System Resource Deemed Delivered Energy pre-calculation determines the Settlement Interval Deemed Delivered MWh quantities for both Dynamic and Non-Dynamic System Resources. The Settlement Interval Deemed Delivered quantities for each Energy type expressed in MWh are derived from the Real Time scheduled quantity. The System Resource Deemed Delivered Energy pre-calculation performs the following functions:

* + For all non-Dynamic System Resource Energy, including Exceptional Dispatch Energy, for which ITS provides Real Time interchange schedules, the Settlement Interval Deemed Delivered quantity by Energy type calculated from the MW quantity recorded in ITS.
	+ For CAISO dynamic Real Time Interchange schedules (related to resources known as Tie-Generators, TGs) the 5-minute Logical Meter Value is derived.
	+ The System Resource Deemed Delivered Energy Pre-calculation generates a common output variable (in the form of a SaMC Charge Type) that expresses Real Time Interchange schedules for both dynamic Energy and non-dynamic Energy.

# 3. Charge Code Requirements

## 3.1 Business Rules

| Bus Req ID | Business Rule |
| --- | --- |
|  | This Charge Code shall be computed daily on a Settlement Interval basis. |
|  | For Energy schedules of Energy types ‘FIRM’, ‘NFRM’, ‘DYN’, ‘WHEEL’ and ‘EXCPDISP’, the System Resource Deemed Delivered Energy Pre-calculation shall calculate and present the Settlement Interval Deemed Delivered MWh and hourly Deemed Delivered MWh quantities for a System Resource. |
|  | The Pre-calculation process shall calculate the Settlement Interval Deemed Delivered MWh quantities for each of the twelve (12) Settlement Intervals of a Trading Hour. |
|  | Each calculated 5-minute value (in MWh) for non-TG resources shall be computed from ITS data to be 1/12 of the hourly scheduled Energy (in MW) for the Trading Hour added to 1/12 of the sum of the 5-minute scheduled MW for each Dispatch Interval of the Settlement Interval (where the multiplication allows for the conversion from MW to MWh). For TG resources, the System Resource Deemed Delivered Energy Pre-calculation shall use the MRI-S-provided data as well as the Settlements derivation for Logical Meter Value as the Settlement Interval Deemed Delivered Energy value (in MWh)  |
|  | For ITS-reported Real-Time Interchange Energy that is presented through the DispatchIntervalCheckedOutInterchangeQuantity input, for a non-dynamic System Resource the System Resource Deemed Delivered Energy Pre-calculation shall calculate for each Trading Hour the Settlement Interval Deemed Delivered MWh quantities for the 12 Settlement Intervals of the hour |
|  | For the ITS-reported Real-Time Interchange Energy the pre-calculation process shall calculate the Settlement Interval Deemed Delivered MWh quantities for each of the twelve (12) Settlement Intervals of a Trading Hour. |
|  | For the ITS-reported Real-Time Interchange Energy the pre-calculation process shall calculate the 5-minute Settlement Interval Deemed Delivered MWh quantities by dividing by 12 the resource’s DispatchIntervalCheckedOutInterchangeQuantity input (in MW) that is specific to each 5-minute interval (where the division allows for the conversion from MW to MWh). |
|  | The Pre-calculation process shall calculate the Hourly Deemed Delivered MWh quantity for the Trading Hour as the sum of the Energy calculated for each of the hour’s twelve (12) Settlement Intervals |
|  | The Pre-calculation process shall calculate the Hourly Deemed Delivered MWh quantity of a Dynamic System Resource for the Trading Hour as the sum of the Energy for each of the hour’s twelve (12) Settlement Intervals |
|  | For cases of a System Resource that is associated with Transmission Losses determined and settled under Operating Agreements (for which the Pre-calculation “Allocation of Transmission Losses under Operating Agreements” allocates the Transmission Losses), the System Resource Deemed Delivered Energy Pre-calculation shall output the Settlement Interval Deemed-Delivered MWh quantity for the System Resource on a pair of dedicated outputs, one output for the case where the Transmission Losses are associated with the same intertie as the System Resource, and the other output for the case where the Transmission Losses are associated with another intertie. |
|  | The pair of dedicated outputs that are associated with Transmission Losses subject to Operating Agreements concerning a System Resource shall be provided in addition to a single output on which the Settlement Interval Deemed Delivered Energy shall be presented for the System Resource. |
|  | Beginning 4/1/2019, DispatchIntervalCheckedOutDynamicInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif will solely reflect Pseudo Generators |
|  | System will retrieve and store latest final tagged quantity values (both ITIE and ETIE) from the enhanced InterchangeSchedulesData service payload for trade dates on or after the cutover date. Tagged quantities will apply for all Tie Gen resource types except Pseudo Generators (for TNGRs, it will reference the net tagged quantity value). |
|  | On a daily basis on or after the 4/1/2019, system shall retrieve and store for each 5-minute settlement interval of a given trade hour the following information from PISOA:• PI 5-minute telemetry output value (MWh)System shall validate/clean incoming interval telemetry data with the following business rules:• data shall not be retrieved for trade dates prior to the configurable cutover date\*• data shall only be retrieved for those Tie Gen resources defined as “Regular Tie Gen” resource type• data values that are received as zero and where Tag is Non-Zero for a five minute interval (Hourly MW) shall be automatically converted and stored as 0.00001 (may be handled in Settlements or DReAMS). |
|  | For trade dates on or after 4/1/2019, on a daily basis, system shall perform logical meter calculation for all ongoing settlement cycles using the following retrieved data:• Trade Date• Trade Hour• 5-minute Settlement Interval (1-12)• Resource id (source: MasterFile)• PI 5-minute telemetry value (source: PISOA)• Final Tagged Quantity (source: ITS) |
|  | System shall calculate logical meter values with the following business logic:• values will only be calculated for trade dates on or after 4/1/2019• values will only be calculated for Tie Gen resources defined as a “Regular Tie Gen” (ITIES/ETIES, dynamics) resource type• values will not be performed for EIM Dynamic System Resources• final tagged quantity to TG resources will be included in the ATF payload and map to the appropriate existing bill determinant• values will only be calculated for intervals within trade hours where a non-NULL Final Tagged Quantity value is received for resource and where the E-Tag was not curtailed and there was flow on the tag |
|  | For each 5-minute settlement interval of a given trade hour, system shall calculate an LMC Allocation Factor as the interval’s PI 5-minute telemetry divided by the sum of telemetry values for all twelve intervals of the trade hour where the E-Tag was not curtailed and there was flow on the tag. Wherein the following business logic is observed:• values will only be calculated for trade dates on or after 4/1/2019• values will only be calculated for Tie Gen resources defined as a “Regular Tie Gen” resource type• values will not be performed for EIM Dynamic System Resources |
|  | For each 5-minute settlement interval of a given trade hour, system shall compute Logical Meter Value as the interval’s LMC Allocation Factor multiplied by the sum total of all 12 intervals Tagged hourly Checkout Quantity and divide the outcome by 12.Wherein the following business logic is observed:• values will only be calculated for trade dates on or after 4/1/2019• values will only be calculated for Tie Gen resources defined as a “Regular Tie Gen” resource type• values will not be performed for EIM Dynamic System Resources• values will only be calculated for intervals within trade hours where a non-NULL Final Tagged Quantity value is received for resource and where the E-Tag was not curtailed and there was flow on the tag |

## 3.4 Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| None |

## 3.5 Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| Pre-calculation Allocation of Transmission Losses Under Operating Agreements |
| Pre-calculation Real Time Energy Quantity |
| Pre-calculation Measured Demand Over Control Area |
| Pre-calculation Measured Demand over Control Area Excluding MSS Energy |
| Pre-calculation Measured Demand Emissions over Control Area Excluding External Exports |
| Pre-calculation Measured Demand over Control Area Excluding Transmission Loss Adjustment |
| Pre-calculation MSS Netting |
| Pre-calculation Wheel Export Quantity |
| Pre-calculation ETC/TOR/CVR Quantity |
| Pre-calculation Metered Energy Adjustment Factor |
| Pre-calculation Ancillary Services |
| Pre-calculation Start-Up and Minimum Load Cost |
| CC 701 Forecasting Service Fee |

## 3.6 Inputs - External Systems

| Row # | Variable Name | Description |
| --- | --- | --- |
| 1 | DispatchIntervalCheckedOutInterchangeQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** | The input represents the final (Real Time) Checked Out Dispatch Interval Interchange Schedule quantity (in MW) for all CISO and EIM system resources except pseudo gensIncludes data for tags for EDAM legacy contracts, and TSR tags. Excludes mirror records for the part of a TSR pair that doesn’t tag. |
| 2 | DispatchIntervalCheckedOutInterchangeShadowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** | For cases of a System Resource that is associated with Transmission Losses determined and settled under Operating Agreements (for which the Pre-calculation “Allocation of Transmission Losses under Operating Agreements” allocates the Transmission Losses), this input reflects the case where the Transmission Losses are associated with another non-dynamic intertie.Excludes data for TSR tags, and tags for EDAM legacy contracts. |
| 3 | DispatchIntervalCheckedOutDynamicInterchangeQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** | Reflects ISO polled meter data for Pseudo Generators |
| 4 | DispatchIntervalCheckedOutDynamicInterchangeShadowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** | For cases of a System Resource that is associated with Transmission Losses determined and settled under Operating Agreements (for which the Pre-calculation “Allocation of Transmission Losses under Operating Agreements” allocates the Transmission Losses), this input reflects the case where the Transmission Losses are associated with another dynamic intertie. |
| 5 | BA5MResCheckedOutInterchangeEntityCompShadowIndicator **BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif** | For each combination of Business Associate **B**, resource ID **r** and resource type **t** for which inputs DispatchIntervalCheckedOutInterchangeQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** and DispatchIntervalCheckedOutDynamicInterchangeQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** are defined, the BA5MResCheckedOutInterchangeEntityCompShadowIndicator **BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif** input = 1 (as a flag value) and conveys the same attributes as the 3 base inputs, except that it presents the Entity Component Type **F’** and Entity Component Subtype **S’** attributes in lieu of the **q** and **q’** attributes and always represents 5-minute data. The input is not defined for any combination of **B**, **r** and **t** that is not associated with the 3 base inputs.  |
| 6 | BA5mResourceRegularTieGenPISOATelemetryQty rmdhif | Derived only for: 1) Regular Tie Gen 2) Dynamic VER Tie Gen3) Dynamic TNGRFact: Always CISO specificThis bill determinant is not reportable to SCs |

## 3.7 Inputs - Predecessor Charge Codes or Pre-calculations

|  |  |  |
| --- | --- | --- |
| Row # | Variable Name | Predecessor Charge Code/ Pre-calc Configuration |
|  | < None > |  |

## 3.8 CAISO Formula

1. * 1. Deemed-Delivered Interchange Energy by BA, Resource, Energy and Trading Hour

BAHourlyInterchangeDeemedDeliveredEnergyQuantity **BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdh**

=  BA10mResDeemedDeliveredInterchangeEnergyQuantity **BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhi**

* + 1. Deemed-Delivered Interchange Energy by BA, Resource, Energy and 10m Interval

Where

BA10mResDeemedDeliveredInterchangeEnergyQuantity **BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhi**

= SettlementIntervalDeemedDeliveredInterchangeEnergyQuantity **BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif**

* + 1. Deemed-Delivered Interchange Energy by BA, Resource, Energy and Settlemet Interval

Where

SettlementIntervalDeemedDeliveredInterchangeEnergyQuantity **BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif**

= BASettlementIntervalResInterchangeMapQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif + BASettlementIntervalResDynamicInterchangeMapQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

* + 1. BASettlementIntervalResDynamicInterchangeMapQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

= BAResSettlementIntervalDynamicInterchangeFlowQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhcif \* BA5MResCheckedOutInterchangeEntityCompShadowIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

* + 1. BAResSettlementIntervalDynamicInterchangeFlowQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhcif

=  DispatchIntervalRegularTieGenLogicalMeterCalculationQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif + DispatchIntervalVERandASTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif + DispatchIntervalCheckedOutDynamicInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif

* + 1. BASettlementIntervalResInterchangeMapQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

= BAResSettlementIntervalInterchangeFlowQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhcif \* BA5MResCheckedOutInterchangeEntityCompShadowIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

* + 1. BAResSettlementIntervalInterchangeFlowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhcif**
		=  DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeFinalQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif

* + 1. SettlementIntervalInterchangeFlowQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif = DispatchIntervalCheckedOutDynamicInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif + DispatchIntervalRegularTieGenLogicalMeterCalculationQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif  + DispatchIntervalVERandASTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif + DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeFinalQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif
		2. SettlementIntervalInterchangeFlowQuantityFiltered Brtmdhcif =

Sum (E, u, T’, I’ Q’, M’, A, A’, R’, p, P, W’, Q, d’, N, z’, O, V, v, H, n’, L’, q, q’)

 ABS
(SettlementIntervalInterchangeFlowQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif)

Where Q’ = ‘CISO’

* + 1. SettlementIntervalInterchangeShadowFlowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** = (DispatchIntervalCheckedOutInterchangeShadowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** / 12) + (DispatchIntervalCheckedOutDynamicInterchangeShadowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif**)
		2. LMC Quantity
			1. DispatchIntervalRegularTieGenLogicalMeterCalculationQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif =

 (INTDUPLICATE(HourlyRegularTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdh) \* BA5mResourceRegularTieGenAllocationFactor rmdhcif)/12

* + 1. HourlyRegularTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdh = Sum(if)DispatchIntervalRegularTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif
		2. Regular Tie Gen Quantity
			1. DispatchIntervalRegularTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif = DispatchIntervalCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif

Where BAL\_AUTHORITY\_AREA =’CISO’ AND ENERGY\_TYPE = ‘DYN’

* + 1. AS TG and Non Resource-Specific Resources that are certified as VER and can provide AS as well as non-resource specific TNGR
			1. DispatchIntervalVERandASTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif = DispatchIntervalCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif /12

Where BAL\_AUTHORITY\_AREA =’CISO’ AND RESOURCE\_SUBTYPE IN (‘HYD’,’T’) AND ENERGY\_TYPE = ‘FIRM’

* + 1. All EIM and CISO Intertie Quantity

### DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeFinalQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif = DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeSummationQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhif /12

### Note: Where DispatchIntervalCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif is the business driver

### DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeSummationQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhif = Sum(F’,S’) DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeNormalizedQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’F’S’mdhif

### DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeNormalizedQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’F’S’mdhif = DispatchIntervalAllCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhif

### Note: Where BA5MResCISOIntertieIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif and BA5MResAllEIMIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif are the business drivers

### BA5MResCISOIntertieIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif = BA5MResCheckedOutInterchangeEntityCompShadowIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

### Where (ENTITY\_COMPONENT\_TYPE (F’) = ‘INTERTIE’ And BAL\_AUTHORITY\_AREA =’CISO’)

### BA5MResAllEIMIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif = BA5MResCheckedOutInterchangeEntityCompShadowIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

### Where BAL\_AUTHORITY\_AREA <>’CISO’

### DispatchIntervalAllCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhif = Sum(q,q’) DispatchIntervalCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif

* + 1. LMC Allocation Factor
			1. BA5mResourceRegularTieGenAllocationFactor rmdhcif =BA5mResourceRegularTieGenPISOATelemetryZeroRevisedQuantity rmdhcif / BA5MResourceRegularTieGenPISOATelemetryQuantity rmdhif
			2. BA5MResourceRegularTieGenPISOATelemetryQuantity rmdhif = Intduplicate(BAHourlyResourceRegularTieGenPISOATelemetryQuantity rmdh)
			3. BAHourlyResourceRegularTieGenPISOATelemetryQuantity rmdh =

Sum (c,i,f) BA5mResourceRegularTieGenPISOATelemetryZeroRevisedQuantity rmdhcif

* + - 1. BA5mResourceRegularTieGenPISOATelemetryZeroRevisedQuantity rmdhcif = sum (BtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’) BA5MResCheckedOutInterchangeEntityCompShadowIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif

\* BA5mResourceRegularTieGenPISOATelemetryZeroConversionQuantity rmdhif

* + - 1. BA5mResourceRegularTieGenPISOATelemetryZeroConversionQuantity rmdhif =

IF

BA5mResourceRegularTieGenPISOATelemetryQty rmdhif = 0

AND

DispatchIntervalRegularTieGenCheckedOutInterchangeAttributeSummationQuantity rmdhif <> 0

THEN

BA5mResourceRegularTieGenPISOATelemetryZeroConversionQuantity rmdhif = 0.00001

ELSE

BA5mResourceRegularTieGenPISOATelemetryZeroConversionQuantity rmdhif = BA5mResourceRegularTieGenPISOATelemetryQty rmdhif

* + - 1. DispatchIntervalRegularTieGenCheckedOutInterchangeAttributeSummationQuantity rmdhif = Sum(BtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’) DispatchIntervalRegularTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif

## 3.10 Outputs

| Output ID | Name | Description |
| --- | --- | --- |
| 1 | In addition to any outputs listed below, all inputs shall be included as outputs. |  |
| 2 | BAHourlyInterchangeDeemedDeliveredEnergyQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdh  | Deemed Delivered Energy Quantity (in MWh with Generation as a positive number and Demand as a negative number)  |
| 3 | BA10mResDeemedDeliveredInterchangeEnergyQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhi   | Deemed Delivered Energy Quantity (in MWh with Generation as a positive number and Demand as a negative number) |
| 4 | SettlementIntervalDeemedDeliveredInterchangeEnergyQuantity **BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif** | Deemed Delivered Energy Quantity (in MWh with Generation as a positive number and Demand as a negative number) |
| 5 | BASettlementIntervalResDynamicInterchangeMapQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif | Deemed Delivered Energy Quantity (in MWh with Generation as a positive number and Demand as a negative number)  |
| 6 | BAResSettlementIntervalDynamicInterchangeFlowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhcif** | Deemed Delivered Energy Quantity (in MWh with Generation as a positive number and Demand as a negative number) |
| 7 | BASettlementIntervalResInterchangeMapQuantity BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif | Deemed Delivered Energy Quantity (in MWh with Generation as a positive number and Demand as a negative number) |
| 8 | BAResSettlementIntervalInterchangeFlowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhcif** | Deemed Delivered Energy Quantity (in MWh with Generation as a positive number and Demand as a negative number)  |
| 9 | SettlementIntervalInterchangeFlowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** | Interchange Flow Quantity (in MW with Generation as a positive number and Demand as a negative number) Values for the output’s **q** and **q’** attributes exist for combinations of Intertie ID **Q** and Loss Intertie ID **q** data, where **Q** = Loss Intertie ID(**q**) And FlowTypeQq = ‘Direct’ orthere is no standing data combination for a given **Q**. |
| 10 | SettlementIntervalInterchangeFlowQuantityFiltered Brtmdhcif | The absolute value of Interchange Flow Quantity for a given resource in the CISO BAA. |
| 11 | SettlementIntervalInterchangeShadowFlowQuantity **BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhcif** | Interchange Shadow Flow Quantity (in MW with Generation as a positive number and Demand as a negative number) Values for the output exist for combinations of Intertie ID **Q** and Loss Intertie ID **q** data, where **Q** = Loss Intertie ID(**q**) AndFlowTypeQq = ‘Shadow’ |
| 12 | DispatchIntervalRegularTieGenLogicalMeterCalculationQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif | For each 5-minute settlement interval of a given trade hour where the E-Tag was not curtailed and there was flow on the tag, system shall compute Logical Meter Value as the interval’s LMC Allocation Factor multiplied by the trade hour’s Final Tagged Quantity Values will only be calculated for Tie Gen resources defined as a “Regular Tie Gen” and Dynamic TNGR resource type and values will not be performed for EIM Dynamic System Resources |
| 13 | HourlyRegularTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdh | Hourly rollup of final Tagged Quantity for CISO Regular Tie Gen resource type (“Regular” Dynamic Tie Gens, and includes Dynamic Tie Gens that are certified as VER) as well as Dynamic TNGR |
| 14 | DispatchIntervalRegularTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif  | Final Tagged Quantity for CISO Regular Tie Gen resource type (“Regular” Dynamic Tie Gens, and includes Dynamic Tie Gens that are certified as VER) as well as Dynamic TNGRThe intent is to capture all CISO dynamic resources (except Psuedo Gens which the input BD is not mapped for in any case)The CISO filter is in place to ensure only those dynamics are incorporated ito the subsequent Logical Meter Calculation. Since we do not have PI data for EIM resources they cannot be incorporated into Logical Meter Calculation. |
| 15 | DispatchIntervalVERandASTieGenCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif  | Final Tagged Quantity for CISO AS Tie Gen resource type (includes Non Resource-Specific Resources that are certified as VER and can provide AS) and non-resource specific TNGRAll these Tie Gens have an Energy Type = ‘FIRM’ as well as a Resource Subtype of either Hydro or Thermal |
| 16 | DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeFinalQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’qq’mdhif | The single input to this equation reflects CISO resources where Entity Component Type was defined as ‘Intertie’ and all EIM resources. The selection of the single business driver will associate the required q and q’ attributes to the output.Note: It must be understood that the business driver reflects all EIM and CISO system resources except Pseudo Gens so it should be expected that all resources except CISO and EIM ITIE and ETIE resources where Entity Component Type was defined as ‘Intertie’ will reflect 0 on all intervals |
| 17 | DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeSummationQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhif | The input reflects CISO resources where Entity Component Type =’Intertie’ and all EIM resources. At this point the F’ and S’ attributes must be summed over so that those same attribute positions can be populated with q and q’ in a subsequent equation |
| 18 | DispatchIntervalAllEIMOrCISOIntertieCheckedOutInterchangeNormalizedQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’F’S’mdhif | The single input to this equation reflects multiple resource types other than the CISO resources where Entity Component Type (F’) = ‘Intertie’ and all the EIM resources which we want this formula to ultimately reflect. The two business drivers will ensure that the output meets expectations. In addition that same driver will populate the attribute positions previously held by q and q’ with F’ and S’  |
| 19 | BA5MResCISOIntertieIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif | The intent here is to filter for CISO resources where Entity Component Type (F’) = ‘Intertie’  |
| 20 | BA5MResAllEIMIndicator BrtEuT’I’Q’M’AA’F’R’pPW’QS’d’Nz’OVvHn’L’mdhcif | The intent here is to filter for all EIM system resources |
| 21 | DispatchIntervalAllCheckedOutInterchangeQuantity BrtEuT’I’Q’M’AA’R’pPW’Qd’Nz’OVvHn’L’mdhif | This formula exists to sum over the q and q’ attributes in order to make those attribute positions available for the F’ and S’ attributes in a subsequent equation |
| 22 | BA5mResourceRegularTieGenAllocationFactor rmdhcif | For each 5-minute settlement interval of a given trade hour where the E-Tag was not curtailed and there was flow on the tag, system shall calculate an LMC Allocation Factor as the interval’s PI 5-minute telemetry divided by the sum of telemetry values for all twelve intervals of the trade hour.Values will only be calculated for Tie Gen resources defined as “Regular Tie Gen” and Dynamic TNGR resource type and values will not be performed for EIM Dynamic System Resources.  |
| 23 | BA5MResourceRegularTieGenPISOATelemetryQuantity rmdhif | This formula exists in order to associate the hourly sum of 5 minute intervals for any given hour where the E-Tag was not curtailed and there was flow on the tag to each 5m interval within that same hour. |
| 24 | BAHourlyResourceRegularTieGenPISOATelemetryQuantity rmdh | The sum of telemetry values for all twelve intervals of the trade hour where the E-Tag was not curtailed and there was flow on the tag which will act as the denominator in the subsequent LMC Allocation Factor equation. |
|  | BA5mResourceRegularTieGenPISOATelemetryZeroRevisedQuantity rmdhcif | Reasoning behind this formula: It must be understood that if the E-Tag is curtailed, the energy did not flow on the tag. But the PI telemetry quantity would be populated with Generator’s Non-Zero telemetry value. We want to shape the LMC in a subsequent calculation only where there is flow on the e-tag. The PI value will only be retained if there is flow on the e-tag which will be determined by the Shadow indicator interval value being set to 1. A null or zero interval value signifies that that there was no flow on the tag and as such, results in the PI interval value being zeroed out. |
| 25 | BA5mResourceRegularTieGenPISOATelemetryZeroConversionQuantity rmdhif  | Data values that are received as zero and where Tag is Non-Zero for a five minute interval (Hourly MW) shall be automatically converted and stored as 0.00001 to facilitate subsequent allocations. |
| 26 | DispatchIntervalRegularTieGenCheckedOutInterchangeAttributeSummationQuantity rmdhif  | This charge type exists solely to sum over attributes which would otherwise conflict with a subsequent equation. Only CAISO dynamic sytem resources subject to the Logical Meter Calculation are reflected on output |

# 4. Charge Code Effective Dates

| Charge Code/Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Update Type |
| --- | --- | --- | --- | --- |
| Pre-calculation System Resource Deemed Delivered Energy | 5.0 | 04/01/09 | 4/30/2014 | Documentation Only |
| Pre-calculation System Resource Deemed Delivered Energy | 5.1 | 05/01/2014 | 4/30/2019 | Documentation and Configuration |
| Pre-calculation System Resource Deemed Delivered Energy | 5.2 | 5/1/2019  | 4/30/2019 | Documentation and Configuration |
| Pre-calculation System Resource Deemed Delivered Energy | 5.3 | 5/1/2019  | 12/31/2020 | Documentation and Configuration |
| Pre-calculation System Resource Deemed Delivered Energy | 5.4 | 1/1/2021  | 4/30/2021 | Documentation and Configuration |
| Pre-calculation System Resource Deemed Delivered Energy | 5.5 | 5/1/2021  | 6/30/2023 | Documentation and Configuration |
| Pre-calculation System Resource Deemed Delivered Energy | 5.6 | 7/1/2023 | 4/30/2026 | Documentation and Configuration |
| Pre-calculation System Resource Deemed Delivered Energy | 5.7.0a | 5/1/2026 | Open | Documentation Edits Only |