Settlements and Billing

Configuration Guide: Day Ahead

 Energy and Marginal Losses Offset

CC 8404

 Version 5.0

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# Purpose of Document

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

# Introduction

## Background

The CAISO calculates and accounts for Day Ahead Energy for each settlement interval and settles Day Ahead Energy for each Settlement Interval for each resource within the EDAM Area.

Day Ahead Energy consists of following:

* Day Ahead Energy, Congestion, Loss Settlement (CC 6011)
* Convergence Bidding DA Energy Congestion Loss Settlement (CC 6013)
* Day Ahead Transfer Revenue ( CC 8411)

To the extent that the sum of the Settlement Amounts for Day Ahead Energy does not equal zero within the EDAM Area, the CAISO will assess Charges or make Payments in Day Ahead Energy Offset (CC 8404) for the resulting differences to EDAM Entity Schedulting Coordinator ID, and sub-allocating differences within the CAISO Balancing Authority Area to all Scheduling Coordinators based on a pro rata share of their Measured Demand for the relevant Settlement Interval.

The Integrated Forward Market (IFM) design allows CAISO to make efficient use of resources by simultaneously optimizing Energy and AS Bids, which subsequently erases the time/price differential that can exist today. MRTU uses Locational Marginal Pricing (LMP), which is the industry’s preferred method of dealing with transmission traffic jams and determining the least cost method for meeting electricity demand.

MRTU addresses the currently “high” Congestion Costs brought about by bottlenecks from Energy schedules submitted the day before through the use of Full Network Model (FNM) and IFM by identifying lower-cost solutions for Congestion problems.

The CAISO definition of IFM is “a Forward Market for trading Energy, procuring Ancillary Services, determining Unit Commitments, and managing Congestion in a co-optimized fashion”. This charge code will deal only with the Energy portion of the IFM, specifically termed in this document as the Day Ahead Energy.

The LMP prices will consist of three components: Energy, Congestion, and loss. The System Marginal Energy Cost (SMEC) is the same for all nodes in the network. The Marginal Cost of Losses may be positive or negative depending on whether a power ejection at that node marginally increases or decreases losses. The Marginal Cost of Congestion may be positive or negative depending on whether a power ejection at that node marginally increases or decreases Congestion. Incorporating the Marginal Cost of Losses in the LMP is important both for assuring least-cost dispatch and for establishing nodal prices that accurately reflect the cost of supplying the Load at each node. Because marginal losses rise quadratically with transmission system flow, marginal losses will exceed average losses roughly by a factor of two, resulting in surplus collection for losses.

Business Associates with Day Ahead Schedules shall be paid or charged the LMP at the resource location in CC 6011 - Day Ahead Energy, Congestion, Loss Settlement (for IFM DA Schedules) and in CC 6013 - Convergence Bidding DA Energy, Congestion, Loss Settlement (for IFM Virtual Awards). The net of payments and charges for Day Ahead Schedules will comprise the net Congestion and loss revenues. The net Congestion revenues from Day-Ahead Schedules in CC 6011 and from DA Virtual Awards in CC 6013 shall be used to pay CRR entitlement amounts of CRR holders in CC 6700, and any balance or shortfall will be accounted for in CRR Balancing Account in CC 6790. The loss surplus in CC 6011 and CC 6013 will be allocated to Measured Demand through CC 8404, Day Ahead Energy and Marginal Losses Offset

As set in the Tariff, IFM Congestion Credits for ETC/TOR/CVR valid and balanced Self-Schedules as well as TOR loss credits shall be provided. These credits shall be embedded in the congestion revenue calculations of CC 6011.

## Description

The calculation of Day Ahead Energy Offset also includes additional adjustments calculated to subtract congestion and transmission losses, and adjust for participation in the Extended Day Ahead Market.

This Charge Code rebates to Scheduling Coordinators and EDAM entities any loss surplus in the hourly Energy charges in the Day Ahead Market.

For every Trading Hour, the marginal losses surplus (MLS) is computed as the total Net Hourly Energy Charge minus the total IFM Congestion Charge exclusive of Congestion Credits for ETC/TOR/CVR and contract Loss credits to TOR holders. The MLS amount, if any, is then allocated pro-rata to the different SCs or EDAM entities based on their Measured Demand in the EDAM Control Area, excluding TOR demand quantity for which IFM and RTM loss credits were provided.

Congestion Credits for CVRs are only applicable through the Transition Period (through 2010).

# Charge Code Requirements

## Business Rules

| Bus Req ID | Business Rule |
| --- | --- |
| 1.0 | This Charge Code shall be calculated and output on an hourly Settlement Interval basis. |
| 2.0 | The Day Ahead Energy and marginal losses Offset for each EDAM Balancing Authority Area in the EDAM Area as the sum of the financial value of EDAM Transfers and Settlement amounts for DA Energy, Convergence Bid Awards and LMP, less the Day Ahead Marginal Cost of Congestion Offset, Day Ahead Marginal Generation Costs Offset, and Day Ahead GHG Offset. |
| 3.0 | The Financial Value of EDAM Transfers shall be the product of the MW, and the System Marginal Economic Cost. (Fact) |
| 4.0 | The allocation of the Day Ahead Energy Offset for EDAM Entity Balancing Authority shall be to the EDAM Entity Scheduling Coordinator. |
| 4.1 | For the CAISO, allocation shall be to ISO measured demand. |
| 5.0 | The amount of loss surplus in the hourly Energy charges of the IFM to be rebated to each Scheduling Coordinator for each hour is the product of marginal losses surplus (MLS) rate and the non-IFM and non-RTM TOR Measured Demand in the CAISO Control Area for the SC for that hour. |
| 5.1 | Non-IFM and non-RTM TOR Measured Demand is the Measured Demand in the CAISO Control Area excluding TOR demand quantity for which IFM or RTM contract loss credits were provided.  |
| 5.2 | IFM and RTM TOR demand quantities for which contract loss credits were provided are calculated in a predecessor charge code. (Fact) |
| 5.3 | For every Trading Hour, the MLS (CAISO total loss surplus in the hourly Energy charge) is computed as the value of:1. CAISO total Net Hourly Energy Charge minus
2. CAISO total Hourly IFM Congestion Charge,

where both (a) and (b) excludes Congestion credits to ETC/TOR/CVR, and where value in (a) considers Loss credits to TOR. |
| 5.3.1 | The CAISO total Net Hourly Energy Charge is the total charges to all Demand minus the total payments to all Supply, both of which are based on the product of MWh amounts specified in all Day-Ahead Schedules and the relevant LMPs at the applicable PNodes or Aggregated Pricing Node. (Fact) |
| 5.4 | The MLS rate for the hour is the quotient of: (1) the CAISO MLS, and (2) the CAISO hourly non-IFM and non-RTM TOR Measured Demand over Control Area. |
| 5.4.1 | The CAISO hourly non-IFM and non-RTM TOR Measured Demand is the sum of all BA’s Non-IFM and non-RTM TOR Measured Demand. |
| 6.0 | The rounding amount equal to1. CAISOHourlyDAEnergyMLS **h** computed in this charge code (using inputs from CC 6011 and CC 6013) plus
2. the total among all BAs of MLSCreditAllocation output of CC 8404

shall be calculated at the charge group level and then allocated in CC 4989 or 4999, the Daily Rounding Adjustment Allocation.  |
| 7.0 | Advisory settlement from NPM resources: Marginal loss surplus allocation for each SC or BAA for each NPM BAA will be computed in this charge code. |

## Predecessor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
| CC 6011 – Day Ahead Energy, Congestion, Loss Settlement |
| CC 6013 – Convergence Bidding DA Energy, Congestion, Loss Settlement |
| Day Ahead Congestion PC |
| Measured Demand Over Control Area PC |
| ETC/TOR/CVR Quantity PC |
| NPM Pre-calculation |
|  |

## Successor Charge Codes

| Charge Code/ Pre-calc Name |
| --- |
|  |

## Inputs – External Systems

|  |  |  |
| --- | --- | --- |
| Row # | Variable Name | Description |
|  | BAHourlyDAVirtualAwardNodalQuantity BQ’AA’Qpay’mdh | The input provides the DA Virtual Award cleared Energy quantity in association with Business Associate. (MW)Mapping includes Balancing Authority Area associated with the nodal locations.  |
|  | BAAHourlyDANodalMCLPrc Q’AA’pmdh | Marginal Cost of Losses (MCL) for nodal location (Pnode p, APNode A) for Trading Hour h of the Day Ahead Market. This is mapped from Day-Ahead Energy MCL prices for nodal locations. ($/MWh)This input can include among others, APnodes of type A’ = ‘DEFAULT’ or ‘CUSTOM’. |
|  | HourlyDANodalMECPrc Q’AA'pmdh | Marginal Energy Cost (MEC) for nodal location (Pnode p, APNode A) for Trading Hour h of the Day Ahead Market. This is mapped from Day-Ahead Energy MEC prices for nodal locations. ($/MWh)This input can include among others, APnodes of type A’ = ‘DEFAULT’ or ‘CUSTOM’. |
|  | 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 EDAM BAA 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 EDAM BAA into another Balancing Authority Area. (Export Energy Schedule quantity is a negative value). |
|  | BAEDAMEntityFlag BQ’md | Flag indicating an EDAM Entity. |
|  | PTBBADayAheadEnergyOffsetSettlementAmount BQ’Jmdh | Hierarchy PTB |

## Inputs - Predecessor Charge Codes or Pre-calculations

| Row # | Variable Name | Predecessor Charge Code/ Pre-calc Configuration |
| --- | --- | --- |
|  | BAATotalNetHourlyDAEnergyAmount Q'mdh | CC 6011 Day Ahead Energy, Congestion, Loss Settlement |
|  | BAANetHourlyDAEnergyCongestionNetOfCreditsAmount **Q’mdh** | CC 6011 Day Ahead Energy, Congestion, Loss Settlement |
|  | BAAHourlyDAVirtualAwardMinusCongestionAmount Q’mdh | CC 6013 Convergence Bidding DA Energy, Congestion, Loss Settlement |
|  | BAMeasuredDemandRatio Bmdh | Measured Demand Over Control Area PC |
|  |  |  |
|  | BAHourlyEnergyLossCreditEligibleContractDemandQuantity Bmdh | ETC/TOR/CVR Quantity PC |
|  | BANPMHourlyMLSDAAllocationAmount Bmdh | NPM PC |
|  | BAANPMHourlyMLSDAAllocationAmount Q’mdh | NPM PC |
|  | HourlyDAScheduleNetOfContract **BrtQ’mdh** | CC 6011 Day Ahead Energy, Congestion, Loss Settlement |
|  | BAASettlementIntervalEIMAreaMeasuredDemandQuantity Q’mdhcif | MSS Netting PC |

## CAISO Formula

BADayAheadEnergyOffsetSettlementAmount BQ’mdh =

EDAMEntityDayAheadEnergyOffsetSettlementAmount BQ’mdh + BABAADayAheadEnergyOffsetSettlementAmount BQ’mdh + MLSCreditAllocation Bmdh + (EDAMMLSCreditAllocation Q’mdh \* BAEDAMEntityFlag BQ’md)

EDAMEntityDayAheadEnergyOffsetSettlementAmount BQ’mdh =

(-1) \* EDAMBAATotalDAEOSettlementAmount Q’mdh \* BAEDAMEntityFlag BQ’md

### EDAMBAATotalDAEOSettlementAmount Q’mdh =

### EDAMBAAInitialDayAheadEnergyOffsetSettlementAmount Q’mdh

Where Q’ <> CISO

### BABAADayAheadEnergyOffsetSettlementAmount BQ’mdh =

(-1) \* BAMeasuredDemandRatio Bmdh\* CAISOBAATotalDAEOSettlementAmount Q’mdh

### CAISOBAATotalDAEOSettlementAmount Q’mdh =

### EDAMBAAInitialDayAheadEnergyOffsetSettlementAmount Q’mdh

Where Q’ = CISO

### EDAMBAAInitialDayAheadEnergyOffsetSettlementAmount Q’mdh =

DayAheadEnergyMLCAmount Q’mdh + DayAheadVirtualAwardMLCAmount Q’mdh + DANetTransferEnergyAmount Q’mdh

### DANetTransferEnergyAmount Q’mdh = Sum (B,r,t,u,T’,b,I’,A,A’,M’,R’,W’,F’,S’,V,L’,cif) (DAExportSchedule *BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif* - DAImportSchedule *BrtuT’bI’Q’M’R’W’F’S’VL’mdhcif*)\* HourlyDANodalMECMLCPrice Q’AA’mdh

### DayAheadEnergyMLCAmount Q’mdh = Sum (B,r,t,A,A’) HourlyDAScheduleNetOfContract **BrtQ’mdh** \* (HourlyDANodalMECMLCPrice Q’AA’mdh)

### DayAheadVirtualAwardMLCAmount Q’mdh = Sum (A,A’) (BAAHourlyDAVirtualSupplyAwardNodalQuantity Q’AA’mdh - BAAHourlyDAVirtualDemandAwardNodalQuantity Q’AA’mdh)\*( HourlyDANodalMECMLCPrice Q’AA’mdh)

### HourlyDANodalMECMLCPrice Q’AA’mdh = Sum (p) HourlyDANodalMECPrc Q’AA’pmdh+ BAAHourlyDANodalMCLPrc Q’AA’pmdh

### BAAHourlyDAVirtualSupplyAwardNodalQuantity Q’AA’mdh = Sum (B,Q,p,a,y’) BAHourlyDAVirtualAwardNodalQuantity BQ’AA’Qpay’mdh

Where a = ‘SUP’

### BAAHourlyDAVirtualDemandAwardNodalQuantity Q’AA’mdh = Sum (B,Q,p,a,y’) BAHourlyDAVirtualAwardNodalQuantity BQ’AA’Qpay’mdh

Where a = ‘DMND’

**Marginal Losses Surplus Credit Allocation Calculation for CAISO**

### The pro-rata allocation of marginal loss surplus (MLS) to Scheduling Coordinator B for Trading Hour h

MLSCreditAllocation Bmdh = (IFMMLSRate mdh \* BAHourlyMeasuredDemandControlAreaQty\_MLS\_Credit\_BQ Bmdh ) + BANPMHourlyMLSDAAllocationAmount **Bmdh**

* + - 1. Where BAHourlyMeasuredDemandControlAreaQty\_MLS\_Credit\_BQ Bmdh =

(BAHourlyMeasuredDemandControlAreaQty Bmdh - BAHourlyEnergyLossCreditEligibleContractDemandQuantity Bmdh)

#### And Where

IF

(CAISOTotalHourlyMeasuredDemandControlAreaQty\_MLS\_Credit\_BQ mdh = 0)

THEN

IFMMLSRate mdh=0

ELSE

IFMMLSRate mdh = (-1)\*CAISOHourlyDAEnergyMLS mdh/ CAISOTotalHourlyMeasuredDemandControlAreaQty\_MLS\_Credit\_BQ mdh

##### Where

CAISOHourlyDAEnergyMLS mdh =

(CAISOBAATotalNetHourlyDAEnergyAmount **mdh** - CAISOTotalNetHourlyDAEnergyCongestionNetOfCreditsAmount mdh ) +CAISOHourlyDAVirtualAwardMinusCongestionAmount h

##### CAISOTotalNetHourlyDAEnergyCongestionNetOfCreditsAmount mdh = Sum (Q’)

BAANetHourlyDAEnergyCongestionNetOfCreditsAmount **Q’mdh**

Where Q’ = ‘CISO’

##### Where

CAISOTotalHourlyMeasuredDemandControlAreaQty\_MLS\_Credit\_BQ mdh =

*Sum (B)* BAHourlyMeasuredDemandControlAreaQty\_MLS\_Credit\_BQ Bmdh

**Marginal Losses Surplus Credit Allocation Calculation for EDAM ( Non-CAISO)**

### The pro-rata allocation of marginal loss surplus (MLS) to Scheduling Coordinator B for Trading Hour h

EDAMMLSCreditAllocation Q’mdh = (EDAMIFMMLSRate Q’mdh \* BAAHourlyMeasuredDemandControlAreaQuantity Q’mdh) + BAANPMHourlyMLSDAAllocationAmount **Q’mdh**

#### And Where

IF

(EDAMTotalHourlyMeasuredDemandControlAreaQuantity mdh = 0)

THEN

EDAMIFMMLSRate Q’mdh=0

ELSE

EDAMIFMMLSRate Q’mdh = (-1)\*EDAMHourlyDAEnergyMLS Q’mdh/ EDAMTotalHourlyMeasuredDemandControlAreaQuantity mdh

##### Where

EDAMHourlyDAEnergyMLS Q’mdh =

(EDAMBAATotalNetHourlyDAEnergyAmount Q’mdh- EDAMTotalNetHourlyDAEnergyCongestionNetOfCreditsAmount Q’mdh ) + BAAHourlyDAVirtualAwardMinusCongestionAmount Q’mdh

##### Where

EDAMBAATotalNetHourlyDAEnergyAmount Q’mdh = BAATotalNetHourlyDAEnergyAmount Q'mdh

Where Q’ <> ‘CISO’

##### Where

EDAMTotalNetHourlyDAEnergyCongestionNetOfCreditsAmount Q’mdh = BAANetHourlyDAEnergyCongestionNetOfCreditsAmount **Q’mdh**

Where Q’ <> ‘CISO’

##### Where

EDAMTotalHourlyMeasuredDemandControlAreaQuantity mdh =

*Sum (Q’)* BAAHourlyMeasuredDemandControlAreaQuantity Q’mdh

##### Where

BAAHourlyMeasuredDemandControlAreaQuantity Q’mdh = Sum (cif) BAASettlementIntervalEIMAreaMeasuredDemandQuantity Q’mdhcif

Where Q’ <> ‘CISO’

## Outputs

| Output ID | Name | Description |
| --- | --- | --- |
|  | In addition to any outputs listed below, all inputs shall be included as outputs. |  |
|  | BADayAheadEnergyOffsetSettlementAmount BQ’mdh | Day Ahead Energy Offset Settlement amount used for generating settlement statements |
|  | EDAMEntityDayAheadEnergyOffsetSettlementAmount BQ’mdh | Day Ahead Energy Offset amount by BA for EDAM BAAs |
|  | EDAMBAATotalDAEOSettlementAmount Q’mdh | Day Ahead Energy Offset amount by BAA excluding CAISO BAA |
|  | BABAADayAheadEnergyOffsetSettlementAmount BQ’mdh | Offset amount by BA within the CAISO BAA |
|  | BAMeasuredDemandRatio Bmdh | Load ratio share by BA within the CAISO BAA |
|  | CAISOBAATotalDAEOSettlementAmount Q’mdh | Day Ahead Energy Offset amount within the CAISO BAA |
|  | EDAMBAAInitialDayAheadEnergyOffsetSettlementAmount Q’mdh | Day Ahead Energy Offset amount by BAA (Q’) Amount excludes MCC and MGC. |
|  | DANetTransferEnergyAmount Q’mdh | Day Ahead Net Energy Transfer Amount considering MEC & MLC Prices. |
|  | DayAheadEnergyMLCAmount Q’mdh | Day Ahead Energy MLC Amount considering MEC & MLC Prices. |
|  | DayAheadVirtualAwardMLCAmount Q’mdh | Day Ahead Virtual Award Amount considering MEC & MLC Prices. |
|  | HourlyDANodalMECMLCPrice Q’AA’mdh | Hourly Day Ahead combined MEC and MLC Prices. |
|  | BAAHourlyDAVirtualSupplyAwardNodalQuantity Q’AA’mdh | Day Ahead Virtual Supply Awards by BAA Q’ and Trading Hour h. |
|  | BAAHourlyDAVirtualDemandAwardNodalQuantity Q’AA’mdh | Day Ahead Virtual Demand Awards by BAA Q’ and Trading Hour h. |
|  | IFMMLSRate mdh | The IFM Marginal Losses Surplus rate for the hour. |
|  | CAISOHourlyDAEnergyMLS mdh | The marginal loss surplus (MLS) credit for the hour to be allocated to SCs. |
|  | MLSCreditAllocation Bmdh | The pro-rata allocation of the MLS credit, to Business Associate B for Trading hour h. |
|  | BAHourlyMeasuredDemandControlAreaQty\_MLS\_Credit\_BQ Bmdh | The hourly Measured Demand quantity (excluding TOR demand quantities for which contract loss credits were provided) over the CAISO Control Area for Business Associate B and Trading Hour h. The value is used for the allocation of IFM Marginal Losses Surplus Credit to B. |
|  | CAISOTotalHourlyMeasuredDemandControlAreaQty\_MLS\_Credit\_BQ mdh | The hourly Measured Demand over the CAISO Control Area for Trading hour h. The quantity is accumulated over all Business Associates B. The value is used as the allocation base for allocating the total IFM Marginal Losses Surplus Credit. |
|  | EDAMMLSCreditAllocation Q’mdh | The pro-rata allocation of the MLS credit, to Balancing Authority Area Q’ for Trading hour h. Excluding CAISO. |
|  | EDAMIFMMLSRate Q’mdh | The IFM Marginal Losses Surplus rate for the hour. |
|  | EDAMHourlyDAEnergyMLS Q’mdh | The marginal loss surplus (MLS) credit for the hour to be allocated to EDAM entities. |
|  | EDAMBAATotalNetHourlyDAEnergyAmount Q’mdh | EDAMM Net Hourly Day Ahead Energy Amount by BAA Q’ and Trading Hour h. |
|  | EDAMTotalNetHourlyDAEnergyCongestionNetOfCreditsAmount Q’mdh | EDAM Day Ahead Energy Congestion Net of Credits Amount. |
|  | EDAMTotalHourlyMeasuredDemandControlAreaQuantity mdh  | The hourly Measured Demand for EDAM Area and Trading Hour h. |
|  | BAAHourlyMeasuredDemandControlAreaQuantity Q’mdh | The hourly Measured Demand for EDAM entity BAA Q’ and Trading Hour h. |

# Charge Code Effective Dates

| Charge Code/Pre-calc Name | Document Version | Effective Start Date | Effective End Date | Version Update Type |
| --- | --- | --- | --- | --- |
| CC 8404 – Day Ahead Energy and Marginal Losses Offset | 5.0 | 5/1/26 | Open | Initial Version |