Changes/additions to EIM BPM sections 11.3.2 and 11.3.11 due to Summer Readiness 2021 initiative

### Resource Sufficiency Evaluation

The EIM does not include forward resource adequacy requirements or obligations for resources to submit bids, but instead includes several elements to ensure each EIM balancing authority has sufficient resources to serve its load while still realizing the benefits of increased resource diversity. Load conformance, transmission limit conformance and manual dispatch will not be considered in the Real Time Base Schedule Tests.  For dispatch and when base schedule tests are performed, it will be assumed that base schedules and bid in capacity are adjusted to account for generation outages and ancillary services.  *i.e.*, a 100 MW generator bids in full capacity, but has a 20 MW derate and 10 MW of SPIN.  The base schedule tests will only count 70 MW and the real time market will only dispatch up to 70 MW.

 The EIM design elements that ensure resource sufficiency include:

* **Load Base Schedule Adjustments:** If Base Schedules from generation and intertie resources in an EIM Resource Plan do not balance the load forecast, CAISO will adjust the load Base Schedule to equal the scheduled generation and interchange, reduced by transmission losses. The resulting difference will be settled through the EIM along with any applicable under-scheduling or over-scheduling penalties as applicable. The load Base Schedule is only used as a reference for calculating load imbalance energy for settlement. The market solution will use the applicable demand forecast for each interval in the market horizon.

The forecasted demand for the trading hour may change based on the system conditions, so this information is updated up to 60 minutes before the trading hour. At 40 minutes before the trading hour, the forecast demand updated at 60 minutes before the trading hour is used to evaluate under-scheduling and over-scheduling penalties.

* **Under-Scheduling and Over-Scheduling Penalties and Resource Balancing Provisions:** For each trade hour, the EIM Balancing Test determines whether the BAA’s sum of base schedules (generation and net scheduled interchange, including base transfers) is within a 1% margin (over or under) of the hourly demand forecast. The hourly imbalance values are calculated based on the absolute difference between the sum of base schedules and the hourly demand forecast in the over or under direction.If an EIM balancing authority elects to use the CAISO Demand Forecast and does not schedule resources within one percent of CAISO Demand Forecast or the EIM Entity elects their own demand forecast, then the EIM balancing authority will be subject to over-scheduling or under-scheduling assessment. If the over-scheduling or under-scheduling assessment determines the EIM balancing authority metered load is five percent more or less than its load Base Schedule for that hour, over-scheduling or under-scheduling penalties will be applied. If an EIM balancing authority does not use CAISO’s forecast, then it will be subject to over-scheduling or under-scheduling penalties for actual load imbalances. The penalties collected will be allocated to the other balancing authorities who have not incurred a scheduling penalty for the Operating Day.

Examples:

| **No.** | **Scenario Description** | **Expected Results** |
| --- | --- | --- |
| **1** | EIM Balancing Test result fails (over):* BAA sum of base schedules = 3500 MW
* BAA Hourly Demand Forecast = 3580 MW
 | Since absolute (3500 MW – 3580 MW) > 0.01 \* 3580 MW,CMRI results shall provide records as follows:* Test Result: Fail
* Imbalance Direction: UNDER
* Imbalance Amount (MW): 80.0
* Imbalance Percentage (%): 2.23
* Requirement Amount (MW): 3,580.0
 |
| **2** | EIM Balancing Test result fails (over):* BAA sum of base schedules = 3500 MW
* BAA Hourly Demand Forecast = 3400 MW
 | Since absolute (3500 MW – 3400 MW) > 0.01 \* 3400 MW,CMRI results shall provide records as follows:* Test Result: Fail
* Imbalance Direction: OVER
* Imbalance Amount (MW): 100.0
* Imbalance Percentage (%): 2.94
* Requirement Amount (MW): 3,400.0
 |
| **3** | EIM Balancing Test result passes (over or under):* BAA sum of base schedules = 3500 MW
* BAA Hourly Demand Forecast = 3480 MW
 | Since absolute (3500 MW – 3480 MW) < 0.01 \* 3480 MW,CMRI results shall provide records as follows:* Test Result: Pass
* Imbalance Direction: OVER
* Imbalance Amount (MW): 20.0
* Imbalance Percentage (%): 0.57
* Requirement Amount (MW): 3,480.0
 |

* CAISO shall set the histogram values described in Section 7.1.3 of the Market BPM to ensure the flexible ramp requirements stay within a reasonable level for a transitional period following implementation. This histogram value will be used until the ISO is able to collect sufficient production-quality data to accurately calculate the flexible requirements based on the historical information gathered from Production. These initial thresholds may be adjusted according to each balancing authority area’s conditions including factors and data observed during market simulation and parallel operations.  These thresholds will allow the Flexible Ramping Requirements to stay within a reasonable band during the transitional period until an accurate histogram can be calculated from Production data for the balancing authority area.
* **Capacity Test:** At T-75, T-55, and T-40 minutesprior to the start of the next trading hour, CAISO will independently evaluate all 15-minute intervals within the next trading hour for sufficient bid range capacity for both over and under capacity requirements. There must be a sufficient EIM Participating Resource capacity bid range in the EIM through incremental or decremental energy bids above or below the Base Schedules to meet the imbalance plus the adjusted uncertainty requirement, positive (represents insufficiency) or negative (represents sufficiency). The adjusted uncertainty requirement takes into account the flex ramp uncertainty requirements, net import transfer capability and net export transfer capability, diversity benefits and credits. An additional incremental and decremental requirement is added to the bid range capacity test to account for historical deviation in import and export, which is described in section 11.3.2.2.If the EIM balancing authority fails the capacity test for a 15-minute interval, it will automatically fail the flexible ramp sufficiency test for the same 15-minute interval in the same direction (Failed over capacity test will auto-fail upward flexible ramping sufficiency test. Failed under capacity test will auto-fail downward flexible ramping sufficiency test).The capacity test is applicable to the CAISO BAA.

Regardless of the capacity test pass/fail results, CAISO will publish the worst 15-minute interval results (i.e. interval with highest bid insufficiency amount, or lowest sufficient amount if all intervals are sufficient) of the trade hour for each insufficiency direction.

Examples:

| **No.** | **Scenario Description** | **Expected Results** |
| --- | --- | --- |
| **1** | BAA’s EIM Capacity Test result fails for a single 15-min interval, where the following conditions occur for trade hour:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Value | :15 | :30 | :45 | :60 |
| Sum of Base Schedules | 1100 | 1100 | 1100 | 1100 |
| 15-minute Demand Forecast | 975 | 1050 | 1125 | 1025 |
| Adjusted Uncertainty Up Requirement | 25 | 25 | 25 | 25 |
| Adjusted Uncertainty Down Requirement | 30 | 30 | 30 | 30 |
| Total Up Requirement | -100 | -25 | 50 | -50 |
| Total Down Requirement | 155 | 80 | 5 | 105 |
| Bid Range Capacity (Up) | 100 | 100 | 100 | 100 |
| Bid Range Capacity (Down) | 100 | 100 | 100 | 100 |

The adjusted uncertainty requirements take into account the uncertainty requirement, net imports and exports, diversity benefit, and credit.  | CMRI reports will now provide Bid Range Capacity test results for both over and under directions each trade hour. In each direction, the most-insufficient 15-minute interval result (presented in blue text) will displayed and broadcasted (e.g. :15 for the over direction, :45 for the under direction). Only the intervals’ trade hour will be identified in the report.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Value Description | :15 | :30 | :45 | :60 |
| Test Status (Over) | Fail | Pass | Pass | Fail |
| Insufficiency Direction (Over) | Over | Over | Over | Over |
| Insufficiency Percentage (%) | 55.0 | -20.0 | -95.0 | 5.0 |
| Insufficiency Amount (MW) | 55 | -20 | -95 | 5 |
| Test Status (Under) | Pass | Pass | Pass | Pass |
| Insufficiency Direction (Under) | Under | Under | Under | Under |
| Insufficiency Percentage (%) | -200.0 | -125.0 | -50.0 | -150.0 |
| Insufficiency Amount (MW) | -200 | -125 | -50 | -150 |

Since one of the 15-minute intervals failed the “over” capacity test, the BAA’s Flexible Ramping Sufficiency Test fails for the same 15-minute interval in the upward direction, reducing the BAA’s import EIM transfer limits |
| **2** | BAA’s EIM Capacity Test result fails for at least one 15-minute interval for each direction in same trade hour, where the following conditions occur:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Value | :15 | :30 | :45 | :60 |
| Sum of Base Schedules | 1100 | 1100 | 1100 | 1100 |
| 15-minute Demand Forecast | 975 | 950 | 1110 | 1225 |
| Adjusted Uncertain Up Requirement | 20 | 20 | 20 | 20 |
| Adjusted Uncertainty Down Requirement | 15 | 15 | 15 | 15 |
| Total Up Requirement | -105 | -130 | 30 | 145 |
| Total Down Requirement | 140 | 165 | 5 | -110 |
|  |  |  |  |  |
| Bid Range Capacity (Up) | 100 | 100 | 100 | 100 |
| Bid Range Capacity (Down) | 100 | 100 | 100 | 100 |

The adjusted uncertainty requirements take into account the uncertainty requirement, net imports and exports, diversity benefit, and credit. | For this scenario, CMRI shall report the most-insufficient 15-minute interval results (in blue text) for interval :30 results for the “over” direction, and interval :60 results for the “under” direction. Only the intervals’ trade hour will be identified in the report.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Description | :15 | :30 | :45 | :60 |
| Test Status (Over) | Fail | Fail | Pass | Pass |
| Insufficiency Direction (Over) | Over | Over | Over | Over |
| Insufficiency Percentage (%) | 40.0 | 65.0 | -95.0 | -210.0 |
| Insufficiency Amount (MW) | 40 | 65 | -95 | -210 |
| Test Status (Under) | Pass | Pass | Pass | Fail |
| Insufficiency Direction (Under) | Under | Under | Under | Under |
| Insufficiency Percentage (%) | -205.0 | -230.0 | -70.0 | 45.0 |
| Insufficiency Amount (MW) | -205 | -230 | -70 | 45 |

Since the 15-minute intervals failed the BAA’s capacity test (intervals :15 and :30 in over direction, interval :60 in under direction), the BAA’s Flexible Ramping Sufficiency Test (FRST) automatically fails for the same 15-minute intervals in the associated direction. Intervals :15 and :30 will fail in the upward direction (reducing the import EIM Transfer Limit), and Interval :60 in the downward direction (reducing the export EIM Transfer Limit). |
| **3** | BAA’s EIM Capacity Test result passes for all 15-minute interval for each direction in same trade hour, where the following conditions occur:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Value | :15 | :30 | :45 | :60 |
| Sum of Base Schedules | 1100 | 1100 | 1100 | 1100 |
| 15-minute Demand Forecast | 1050 | 1025 | 1125 | 1150 |
| Adjusted Uncertainty Up Requirement | 15 | 15 | 15 | 15 |
| Adjusted Uncertainty Down Requirement | 10 | 10 | 10 | 10 |
| Total Up Requirement | -35 | -10 | 40 | 65 |
| Total Down Requirement | 60 | 85 | -15 | -40 |
| Bid Range Capacity (Up) | 100 | 100 | 100 | 100 |
| Bid Range Capacity (Down) | 100 | 100 | 100 | 100 |

The adjusted uncertainty requirements take into account the uncertainty requirement, net imports and exports, diversity benefit, and credit. | For this scenario, CMRI shall report the most-insufficient 15-minute interval results (in blue text) (using interval :30 results for the over direction, interval :60 results for the under direction). Only the intervals’ trade hour will be identified in the report.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Description | :15 | :30 | :45 | :60 |
| Test Status (Over) | Pass | Pass | Pass | Pass |
| Insufficiency Direction (Over) | Over | Over | Over | Over |
| Insufficiency Percentage (%) | -40.0 | -15.0 | -115.0 | -140.0 |
| Insufficiency Amount (MW) | -40 | -15 | -115 | -140 |
| Test Status (Under) | Pass | Pass | Pass | Pass |
| Insufficiency Direction (Under) | Under | Under | Under | Under |
| Insufficiency Percentage (%) | -135.0 | -110.0 | -60.0 | -35 |
| Insufficiency Amount (MW) | -135 | -110 | -60 | -35 |

Since none of the 15-minute intervals failed the BAA’s capacity test, no EIM transfer limits will be reduced for any of the intervals within the trade hour in either the import or export direction. |

* **Flexible Ramping Sufficiency Test:** At T-75, T-55, and T-40 minutesprior to start of the next trading hour, CAISO will independently evaluate flexible ramping sufficiency test for each BAA within the EIM area for each 15-minute interval of that trading hour. The flexible ramping requirement is based on the historical error in the CAISO load forecast and the CAISO variable energy resource forecast. The test assesses whether there is sufficient ramping capability among all resources in the BAA to meet the forecasted demand change across intervals plus a high/low percentile of the historical uncertainty.

A 1% (one percent) tolerance band threshold or 1 MW (one MW) will be applied to the flexible ramping uncertainty requirement (both upward and downward) for a given 15-minute interval for each EIM BAA. Resulting amount (both upward and downward) is calculated as follows;

 The will be subtracted from for flexible ramping up

The will be subtracted from for flexible ramping down

Where:

εr Flexible Ramping sufficiency test relative tolerance (%).

εa Flexible Ramping sufficiency test absolute tolerance (MW).

FRURi is the flexible ramp up uncertainty requirement for a given 15-minute interval in the next hour for EIM Entity i without diversity benefit;

FRDRi is the flexible ramp down uncertainty requirement for a given 15-minute interval in the next hour for EIM Entity i without diversity benefit (negative);

FRUR'i is the cumulative flexible ramp up requirement from the last 15-minute interval of the current hour to a given 15-minute interval in the next hour for EIM Entity i; it includes the effects of EIM diversity benefit and credit; and

FRDR'i is the cumulative flexible ramp down requirement from the last 15-minute interval of the current hour to a given 15-minute interval in the next hour for EIM Entity i; it includes the effects of EIM diversity benefit and credit.

For each BAA in the EIM Area that fails its Flexible Ramping Up or Flexible Ramping Down sufficiency test for a 15-minute interval in the next trading hour, the market shall limit the net EIM transfer from below (import) for upward failure and from above (export) for downward failure, to the less-restrictive of the following values:

* Base Transfer Schedule for the failed 15-minute interval; or
* Net EIM transfer schedule for the interval prior to the failed 15-minute interval as provided by the last successful FMM market run (i.e. the “last previous” 15-minute interval)

In addition, the following rules will be applied to the 15-minute interval sufficiency test;

* For the sufficiency test at T-75, RUC schedule is used for assessing CISO BAA. For the sufficiency test performed at T-55 and T-40, the latest FMM results are used for assessing CISO BAA.
* The same EIM transfer limit applied to the failed 15-minute interval shall also apply to its three corresponding 5-minute market intervals
* The last previous 15-minute interval will be the last 15-minute interval of the current hour if the 15-minute interval that fails the FRU/FRD test is the first 15-minute interval of the next hour
* Likewise, the same is true if the 15-min interval that fails the FRU/FRD test is the second, third, or fourth 15-minute interval in the second hour of the HASP time horizon for which there is no previous solution for the immediately prior 15-minute interval
* If a FMM run, other than HASP, fails, the EIM Transfer schedules from the last FMM run that has succeeded shall be used to derive the EIM Transfer limits for the 15-minute intervals that fail the FRU/FRD test
* If HASP or all prior FMM runs fail, the base EIM Transfer will be used.

Examples:

This example shows how the EIM transfer limit will be curtailed for the 15-minute intervals and associated 5-minute intervals with failed FRU/FRD sufficiency test.

|  |  |
| --- | --- |
| **Market Run** | **15-min Interval** |
| **Market** | **Run Time** | **Result** | **0 (*T*–7.5')** | **1 (*T*+7.5')** | **2 (*T*+22.5')** | **3 (*T*+37.5')** | **4 (*T*+52.5')** |
| FMM | *T*–82.5' | EIM Transfer (MW) | –200 |  |  |  |  |
| **RTBS** | ***T*–75'** | Base Transfer (MW) |  | –300 | –300 | –300 | –300 |
| FRU Test |  | **Pass** | **Pass** | **Fail** | **Fail** |
| FMM | *T*–67.5' | Transfer Limit (MW) |  |  |  | **–300** | **–300** |
| EIM Transfer (MW) |  | –400 | –320 | –210 | –300 |
| **RTBS** | ***T*–55'** | Base Transfer (MW) |  | –100 | –100 | –100 | –100 |
| FRU Test |  | **Fail** | **Pass** | **Fail** | **Fail** |
| FMM | *T*–52.5' | Transfer Limit (MW) |  | **–200** |  | **–320** | **–210** |
| EIM Transfer (MW) |  | –200 | –270 | –180 | –210 |
| **RTBS** | ***T*–40'** | Base Transfer (MW) |  | –250 | –250 | –250 |  |
| FRU Test |  | **Fail** | **Pass** | **Fail** | **Fail** |
| FMM | *T*–37.5' | Transfer Limit (MW) |  | **–250** |  | **–270** | **–250** |
| EIM Transfer (MW) |  | –230 | –350 | –270 | –250 |
| FMM | *T*–22.5' | Transfer Limit (MW) |  | **–250** |  | **–350** | **–270** |
| EIM Transfer (MW) |  | –240 | –330 | –300 | –270 |
| FMM | *T*–7.5' | Transfer Limit (MW) |  |  |  | **–330** | **–300** |
| EIM Transfer (MW) |  |  | –280 | –330 | –300 |
| FMM | *T*+7.5' | Transfer Limit (MW) |  |  |  | **–280** | **–330** |
| EIM Transfer (MW) |  |  |  | –260 | –330 |
| FMM | *T*+22.5' | Transfer Limit (MW) |  |  |  |  | **–260** |
| EIM Transfer (MW) |  |  |  |  | –260 |

#### Flexible Ramp Sufficiency Test and Capacity Test Details

The individual EIM Entity BAA requirement for the flexible ramp sufficiency test will be calculated for the next hour (using algebraic notation) as follows:

The individual EIM entity BAA requirement for the capacity test will be calculated for the next hour (using algebraic notation) as follows:

Where:

|  |  |
| --- | --- |
| *i* | is the BAA index in the EIM Area; |
|  | is the flexible ramp up uncertainty requirement for a given 15-minute interval in the next hour for EIM Entity *i* without diversity benefit; |
|  | is the flexible ramp down uncertainty requirement for a given 15-minute interval in the next hour for EIM Entity *i* without diversity benefit (negative); |
|  | is the cumulative flexible ramp up requirement from the last 15-minute interval of the current hour to a given 15-minute interval in the next hour for EIM Entity *i*; it includes the effects of EIM diversity benefit and credit; |
|  | is the cumulative flexible ramp down requirement from the last 15-minute interval of the current hour to a given 15-minute interval in the next hour for EIM Entity *i*; it includes the effects of EIM diversity benefit and credit; |
|  | is the change in the demand forecast from the last 15-minute interval of the current hour to a given 15-minute interval in the next hour for EIM Entity *i*; |
|  | is the available net import transfer capability of EIM Entity *i* at the last 15-minute interval of the current hour (negative); |
|  | is the available net export transfer capability of EIM Entity *i* at the last 15-minute interval of the current hour (positive); |
| *FRUR* | is the flexible ramp up uncertainty requirement for a given 15-minute interval in the next hour for the entire EIM Area; |
| *FRDR* | is the flexible ramp down uncertainty requirement for a given 15-minute interval in the next hour for the entire EIM Area (negative); |
| *TFRUR* | is the sum of the flexible ramp up uncertainty requirements of all BAAs in the EIM Area for a given 15-minute interval in the next hour; |
| *TFRDR* | is the sum of the flexible ramp down uncertainty requirements of all BAAs in the EIM Area for a given 15-minute interval in the next hour (negative); |
|  | is the flexible ramp up credit for a given 15-minute interval in the next hour for EIM Entity *i*, equal to the net EIM export transfer at the last 15-minute interval of the current hour; and |
|  | is the flexible ramp down credit for a given 15-minute interval in the next hour for EIM Entity *i*, equal to the net EIM import transfer at the last 15-minute interval of the current hour (negative). |
|  | is the bid range capacity up requirement for a given 15-minute interval in the next hour for EIM Entity *i*. |
|  | is the bid range capacity down requirement for a given 15-minute interval in the next hour for EIM Entity *i*. |
|  | is the demand forecast for a given 15-minute interval in the next hour for EIM Entity *i*. |
|  | is the sum of all base schedules in the next hour for EIM Entity *i*, minus any applicable derates due to outages or exceptional dispatches. |

This requirement reflects a pro rata share of potential EIM Diversity Benefit and the flexible ramping credit, up to the available net import/export transfer capability. The EIM Diversity Benefit is the difference between the sum of the individual flexible ramping requirements of each BAA in the EIM Area and the flexible ramping requirement for the entire EIM Area taken as a whole.

The CAISO will perform a series of flexible ramping constraint sufficiency tests prior to each hour. The EIM Entity Scheduling Coordinator will have an opportunity to re-submit Base Schedules if it fails the flexible ramping constraint sufficiency test or to resolve congestion up to 40 minutes prior to the operating hour, which is just before the start of the first financially binding EIM 15-minute market for the operating hour. Thresholds are developed by the CAISO to cap the flexible ramp up and down uncertainty requirements to within historical bounds.

The flexible ramp sufficiency test is performed for each EIM Entity BAA after T-75’, T-55’, and T-40’ for the trading hour starting at T. The test uses the initial schedules at T-7.5’, variable energy resource (VER) forecast, EIM resources energy bids, ramp rates, manual dispatch constraints and operational de-rates. Since the VER forecast information is updated every five minutes, it is possible that VER forecast may change between the three flex ramp sufficiency tests. The VER forecast information is held fixed at the T-55’, and T-40’ such that the updated VER forecast information at T-55 is used for the T-40 flex ramp sufficiency test.

The test for meeting flexible ramp requirements is cumulative for each 15' interval of the hour. More specifically, for each interval, the flexible ramp requirement is the sum of the demand forecast change from T-7.5’ to the relevant interval plus the flexible ramp uncertainty requirement for that interval. Since the load forecast information may be updated between the three flex ramp sufficiency test, load forecast information used to calculate the net load movement is held fixed at the T-55’, and T-40’ such that the updated load forecast information at T-55 is used for the T-40 flex ramp sufficiency test. The net requirement for the flex ramp sufficiency test includes the effects of EIM diversity and credit, and it is calculated as:

* 15' ramp from T−7.5' to T+7.5' (1st 15' interval)
* 30' ramp from T−7.5' to T+22.5' (2nd 15' interval)
* 45' ramp from T−7.5' to T+37.5' (3rd 15' interval)
* 60' ramp from T−7.5' to T+52.5' (4th 15' interval)

The test passes if all four cumulative tests pass; the test fails if any of the four cumulative tests fail.

In Fifteen Minute Market and RTD, the flexible ramping capacity requirement constraints for the CAISO BAA, each EIM Entity BAA, and the total EIM footprint must be enforced:

* If the EIM Entity BAA fails the flexible ramp up sufficiency test or is deemed to have failed the test as specified in Section 10.3.2 because it failed the capacity (resource plan) test, the EIM Transfer during the next hour will be bounded from below at the lower of the base transfer for current hour or the optimal transfer at the last fifteen-minute interval of the current hour. Furthermore, the CAISO will enforce the individual EIM Entity BAA flexible ramp up uncertainty requirement in the EIM Entity BAA without diversity benefit, but the credit shall apply. If the EIM Entity BAA passes the flexible ramp up sufficiency test, the flexible ramp up uncertainty requirement without diversity benefit shall be reduced by the available net import transfer capability. The CAISO will enforce the constraint for each EIM Entity BAA, the CAISO BAA, and the total flexible ramp up uncertainty requirement for the EIM Area.
* If the EIM Entity BAA fails the flexible ramp down sufficiency test or is deemed to have failed the test as specified in Section 10.3.2 because it failed the capacity (resource plan) test, the EIM Transfer during the next hour will be bounded from above at the higher of the base transfer for current hour or the optimal transfer at the last fifteen-minute interval of the current hour. Furthermore, the CAISO will enforce the individual EIM Entity BAA flexible ramp down uncertainty requirement in the EIM Entity BAA without diversity benefit, but the credit shall apply. If the EIM Entity BAA passes the flexible ramp down sufficiency test, the flexible ramp down uncertainty requirement without diversity benefit shall be reduced by the available net export transfer capability. The CAISO will enforce the constraint for each EIM Entity BAA, the CAISO BAA, and the total flexible ramp down uncertainty requirement for the EIM Area.
* The market model will map the corresponding resources that can provide the flexible ramping capacity for the EIM Entity BAA.
* The flexible ramp requirements for total EIM footprint can be potentially lower than the sum of individual requirements of each BAA, reflecting the benefits of reduced uncertainty and volatility across the BAAs.
* For a period of six months following the Implementation Date of a new EIM Entity, the CAISO shall set the Flexible Ramping Constraint parameter specified in Section 27.10, for pricing purposes, for the new EIM Entity Balancing Authority Area, at an amount between and including $0 and $0.01 only for when the transmission or power balance constraints are relaxed in the corresponding new EIM Entity Balancing Authority Area.
* CAISO will broadcast the resource flexible ramping awards to the relevant SCs.
* CAISO will publish the shadow prices of each flexible ramping constraint and associated BAA, and total EIM footprint. The flexible ramping capacity shall be managed in corresponding RTD for EIM market in the same manner as the current CAISO RTM. The RTD shall enforce the flexible ramping capacity requirement constraints. The requirement of each five-minute interval in the RTD run horizon will be preserved according to the pre-defined attenuation percentage of each interval, currently as 0%, 25%, 50%, 75%, 100%, 100%... The same percentage will apply to the effective requirement (reduced by the available net import capacity) for each EIM Entity BAA and EIM footprint constraints.

**Example Assumptions**

* CAISO BAA and two EIM Entity BAAs
* All interties rated at 10MW
* Two generators and two loads in each BAA
* Zero base schedules; no transmission losses
* Real−Time Unit Commitment run at *T*−37.5'
* Only upward flexible ramp capacity
* Flexible ramp capacity requirement determined by demand forecast change and historical assessment of ramping capability to meet forecast uncertainty

**Example**





**Available Flexible Ramp Capacity**



**Case 1: Flexible Ramp Sufficiency Test Pass**



**Case 1: Flexible Ramp Capacity Constraints**

For *T*+7.5'

* FRC0 ≥ max(0, FRR0 − 20) = 0
* FRC1 ≥ max(0, FRR1 − 30) = 0
* FRC2 ≥ max(0, FRR2 − 10) = 20
* FRC0 + FRC1 + FRC2 ≥ FRR0,1,2 = 85

**Case 2: Flexible Ramp Sufficiency Test Fail**



**Case 2: Flexible Ramp Capacity Constraints**

For *T*+7.5'

* FRC0 ≥ max(0, FRR0 − 20) = 0
* FRC1 ≥ max(0, FRR1 − 30) = 0
* FRC2 ≥ FRR2 = 30
* NSI2 ≥ −10
* FRC0 + FRC1 + FRC2 ≥ FRR0,1,2 = 85

#### 11.3.11.1 In the Event of a Contingency in CAISO

* RTCD shall isolate the CAISO BAA from the rest of the EIM Area by fixing the EIM Transfer between the CAISO BAA and the EIM Entity BAAs at the last non-contingency market solution for binding and advisory intervals.
* The prior advisory interval results for EIM Participating Resources from the last RTD run prior to the contingency event are used while RTCD or RTDD is invoked for CAISO, unless curtailments of the EIM Transfer have occurred. In this case, the EIM Transfer will be capped at the minimum of the curtailed limit or the advisory dispatch from the last non-contingency market solution for the duration of the contingency status. The advisory results come from the last RTD before the contingency event, and shall be sent through the Automatic Dispatching System (ADS).
* This process will persist for the duration of the contingency status until RTD runs are reinstated.
* The contingency dispatch instructions for CAISO internal or CAISO dynamic resources shall be sent through ADS normally.
* Any contingency reserves dispatched in RTCD/RTDD from Intertie Resources shall be included in the CAISO BAA Net Scheduled Interchange.

#### 11.3.11.2 In the Event of a Contingency in an EIM Entity Area

Contingencies in an EIM Entity area are generally handled by that EIM Entity, since the EIM Entity manages their own operating reserves. Thus RTCD will not be used in this case. However, the regular market systems, RTUC and RTD, will adjust available resources within the affected area to help manage the contingency situation.

* In the event of a contingency, the EIM Entity Operator will electronically communicate the contingency status to RTM.
* The net transfers into the EIM BAA with the contingency event are not optimized by the real-time market. RTD will only optimize the internal participating resources of the EIM BAA. The net EIM transfers into the BAA are set during each RTD run, to the results of the solved advisory RTD solution prior to the balancing authority area entering into contingency operations. Should the contingency operation extend beyond the advisory horizon of the last pre-contingency RTD run, the net EIM transfers will still be retained as the last solved advisory RTD result.
* The contingency flag of the EIM Entity BAA shall be published through ADS.
* The EIM Entity Operator for the EIM Entity BAA that is under contingency may dispatch manually contingency reserves from resources (participating or not) in the BAA or Interchanges through interties with other BAAs outside the EIM Area; these manual dispatch instructions must be sent to RTM. Any interchange schedules changes shall be included in the EIM Entity BAA NSI.
* RTD shall be run with the latest operating conditions and any manual dispatch instructions. Within the affected EIM Entity area, RTD will adjust available resources and manually dispatched resources in order to help manage the contingency event.
* RTD/RTPD will set and broadcast Flex Ramp UP and Flex Ramp Down requirements to zero in the EIM BAA(s) undergoing contingency.
* RTD/RTPD will not procure any Flex Ramp UP and Flex Ramp Down awards from the EIM BAA(s) undergoing contingency.
* RTD/RTPD will subtract the Flex Ramp Up requirements from the EIM BAA(s) undergoing contingency with pro rata diversity factor from the overall EIM area requirement, such that the adjusted EIM area’s Flex Ramp UP and Flex Ramp Down requirement with one or more EIM BAA undergoing contingency is:

Adjusted EIM Area Requirement = max{M, [(Original EIM Area Requirement) – (Diversity Factor) \* Σ(Original Requirement of BAAs under contingency)]}

Where:

M = max(Original Requirement of BAAs without contingency)

Diversity Factor = (Original EIM Area Requirement) / Σ(Original BAA Requirement of all BAAs in the EIM Area)

* Designated interval(s) in which an EIM BAA(s) experienced a contingency event will be published on OASIS.

For EIM Entities that represent multiple EIM Entity BAAs, the functionality described above is supported for the individual BAA.