

California Independent System Operator Corporation  
Fifth Replacement Tariff

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#### **44. Flexible Ramping Product**

##### **44.1 In General.**

The CAISO may enforce flexible ramping constraints in the Real-time Market to meet Forecasted Movement and Uncertainty Requirements, using tools as further described in the Business Practice Manual that estimate the Demand Forecast and Supply forecast error, as set forth in this Section 44.

##### **44.2 Uncertainty Awards**

###### **44.2.1 Optimization.**

###### **44.2.1.1 Generally.**

The CAISO will optimize the procurement of Uncertainty Awards in the Real-Time Market simultaneously with the procurement of Energy and Ancillary Services, as applicable. Uncertainty Awards do not overlap with Ancillary Services Awards or Available Balancing Capacity.

###### **44.2.1.2 Nodal Procurement of Uncertainty Awards**

The CAISO will optimize procurement of Uncertainty Awards such that, in the event modeled uncertainty arises fully for either the upward or downward directions, Energy that would be dispatched from resource capacity corresponding to the Uncertainty Awards would not result in flows exceeding Transmission Constraints and scheduling limits, including EIM transfer limits.

###### **44.2.1.3 Optimization for Balancing Authority Areas with Distinct Uncertainty Requirements**

For Balancing Authority Areas with a distinct Uncertainty Requirement per Section 44.2.4.1, the CAISO will optimize procurement of Uncertainty Awards assuming that the Balancing Authority Area would be limited to its final hourly Real-Time EIM Base Schedule or the CAISO equivalent in the event modeled uncertainty arises fully in the direction for which there is a distinct Uncertainty Requirement.

###### **44.2.2 Variable Energy Resources.**

The CAISO will use the CAISO's own forecast (Independent Third Party Forecast) to determine the Uncertainty Awards and Forecast Movement for Variable Energy Resources.

###### **44.2.3 Eligibility for Uncertainty Award.**

###### **44.2.3.1 Generally.**

All resources that have Economic Bids in the RTM that can be dispatched on a five-minute basis by RTD are eligible for receiving Uncertainty Awards.

**44.2.3.2 Suspension.**

If the CAISO deems the resource to be non-compliant, the CAISO will suspend the resource's eligibility as specified in Section 34.13.2.

**44.2.3.3 Ineligible Operating States.**

A resource is not eligible for an Uncertainty Award if it is in a Forbidden Operating Region or during an MSG Transition.

**44.2.4 Determination of Uncertainty Requirement.**

**44.2.4.1 Requirement.**

For each Real-Time Market run, the CAISO determines a distinct upward Uncertainty Requirement for each Balancing Authority Area that fails either the: (a) capacity test specified in Section 29.34(l) because the incremental offers in the Energy Bid range above the EIM Base Schedule (or equivalent for the CAISO) are not sufficient; or (b) flexibility test specified in Section 29.34(m) because of insufficient upward Ramping capacity. For each Real-Time Market run, the CAISO determines an upward Uncertainty Requirement for the group of Balancing Authority Areas that passes both the capacity test and flexibility tests in the upward direction.

For each Real-Time Market run, the CAISO determines a distinct downward Uncertainty Requirement for each Balancing Authority Area that fails either the: (a) capacity test specified in Section 29.34(l) because the decremental offers in the Energy Bid range below the EIM Base Schedule (or equivalent for the CAISO) are not sufficient; or (b) flexibility test specified in Section 29.34(m) because of insufficient downward Ramping capacity. For each Real-Time Market run, the CAISO determines a downward Uncertainty Requirement for the group of Balancing Authority Areas that passes both the capacity test and flexibility tests in the downward direction.

**44.2.4.2 Procurement Curve.**

- (a) **Generally.** Based on statistical analysis of the Uncertainty Requirement, the CAISO will calculate constraint relaxation parameters to ensure the total cost of the Uncertainty Awards will not exceed the cost of expected power balance violations in absence of the Uncertainty Award, by each Balancing Authority Area and for the EIM Area overall, as set forth in the Business Practice Manual.

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- (b) **Procurement Curve Cap.** The CAISO will establish in the Business Practice Manual a limit on the procurement curve –
- (1) at an amount less than the contingency relaxation penalty pricing parameter specified in the Business Practice Manual for market operations, in the case of an upward demand curve; and
  - (2) at an amount more than the regulation down relaxation penalty pricing parameter specified in the Business Practice Manual for market operations, in the case of a downward demand curve.

**44.2.4.3 Nodal Distribution of Requirements**

The CAISO will distribute the upward and downward Uncertainty Requirement to the Demand and Variable Energy Resources Locations within each Balancing Authority Area in the EIM Area based on allocation factors derived from historical and/or forecasted information that reflect the relative contributions of Demand and Variable Energy Resources to overall Uncertainty Requirement.

**44.3 Forecasted Movement**

**44.3.1 Generally**

The CAISO will determine the Forecasted Movement for each EIM Participating Resource, Generating Unit, System Resource, Pumped Storage, Pseudo-Tie, Non-generating Resource, PDR, Participating Load, and any other resource that has a schedule or dispatch change in the Day-Ahead Market or Real-Time Market as described below.

**44.3.2 RTD Forecasted Movement**

For the RTD, the Forecasted Movement for the resource is the MW difference between the resource's non-binding dispatch instruction in the first five-minute advisory RTD interval and its Dispatch Instruction in the financially binding RTD interval, in the same RTD run.

**44.3.3 FMM Forecasted Movement**

For FMM, the Forecasted Movement is the difference between the resource's advisory FMM schedule in the first advisory FMM interval and its FMM Schedule in the financially binding FMM interval for the same applicable FMM run.

**44.3.4 DAM Forecasted Movement**

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For DAM, the Forecasted Movement is the algebraic difference of the Day-Ahead Schedule between consecutive hours.

**44.3.5 Virtual Forecasted Movement**

For Virtual Awards, the Forecasted Movement is the algebraic difference of the Virtual Award between consecutive hours.

**44.3.6 Base Schedule Forecasted Movement**

For EIM Base Schedules, the Forecasted Movement is the algebraic difference of the submitted EIM Base Schedule, as adjusted in real time, between consecutive hours.