

Puget Sound Energy, Inc. (PSE) appreciates the opportunity to comment on the CAISO draft Tariff language for the Flexible Ramping Product. PSE proposes several changes below and requests that CAISO clarify the relationship between Uncertainty Awards and Uncertainty Requirements in Section 44, taking into account our suggested language.

11.5.9 Flexible Ramping Product

The CAISO will settle the Flexible Ramping Product as set forth in Section 11.25.

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11.8.4 RTM Bid Cost Recovery

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11.8.4.2 RTM Market Revenue Calculations

The RTM Market Revenue calculations are subject to the Real-Time Performance Metric and the Persistent Deviation Metric as described in Sections 11.8.4.4 and 11.17, respectively.

11.8.4.2.1 For each Settlement Interval in a CAISO Real-Time Market Commitment Period, the RTM

Market Revenue for a Bid Cost Recovery Eligible Resource is the algebraic sum of the elements listed below in this Section. For Multi-Stage Generating Resources the RTM Market Revenue calculations will be made at the Generating Unit level.

- (a) The sum of the products of the FMM or RTD Instructed Imbalance Energy (including Energy from Minimum Load of the Bid Cost Recovery Eligible Resource committed in RUC and where for Pumped-Storage Hydro Units and Participating Load operating in the pumping mode or serving Load, the MWh is negative), except Standard Ramping Energy, Residual Imbalance Energy, Exceptional Dispatch Energy, Derate Energy, MSS Load following Energy, Ramping Energy Deviation and Regulation Energy, with the relevant FMM and RTD LMP, for each Dispatch Interval in the Settlement Interval.
- (b) The product of the Real-Time Market AS Award from each accepted Real-Time Market AS Bid in the Settlement Interval with the relevant ASMP, divided by the number of fifteen (15)-minute

Commitment Intervals in a Trading Hour (4), and prorated to the duration of the Settlement Interval.

- (c) The relevant tier-1 No Pay charges for that Bid Cost Recovery Eligible Resource in that Settlement Interval.

(d) The Forecasted Movement and Uncertainty Awards Settlement Amounts as calculated pursuant to Section 11.25 are included in the RTM Market Revenues calculation, not including:

(1) the amounts rescinded pursuant to Section 11.2.525.3;

(2) Forecasted Movement revenue when there are changes in Self-Schedules across consecutive Trading Hours; and

(3) Forecasted Movement revenue when there are changes in EIM Base Schedules across consecutive Trading Hours without Economic Bids.

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11.8.4.2.2 For each Settlement Interval in a non-CAISO Real-Time Market Commitment Period, the Real-Time Market Revenue for a Bid Cost Recovery Eligible Resource is subject to the Real-Time Performance Metric and is the algebraic sum of the following:

- (a) The sum of the products of the FMM or RTD Instructed Imbalance Energy (excluding the Energy from Minimum Load of Bid Cost Recovery Eligible Resources committed in RUC), except, Standard Ramping Energy, Residual Imbalance Energy, Exceptional Dispatch Energy, Derate Energy, MSS Load Following Energy, Ramping Energy Deviation and Regulating Energy, with the relevant FMM or RTD Market LMP, for each Dispatch Interval in the Settlement Interval;
- (b) The product of the Real-Time Market AS Award from each accepted Real-Time Market AS Bid in the Settlement Interval with the relevant ASMP, divided by the number of fifteen (15)-minute Commitment Intervals in a Trading Hour (4), and prorated to the duration of the Settlement Interval.
- (c) The relevant tier-1 No Pay charges for that Bid Cost Recovery Eligible Resource in that Settlement Interval.

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11.25 Flexible Ramping Constraint Compensation

11.25.1 Determination of Flexible Ramping Constraint Shadow Price

The CAISO will determine a Flexible Ramping Constraint Shadow Price as the reduction of the total Energy and Ancillary Services procurement cost associated with a marginal change at each constraint for the individual Balancing Authority Areas in the EIM Area and applicable groupings of those areas in which the constraint is enforced, which will be equal to zero (0) if the Flexible Ramping Constraint is not binding.

11.25.2 Compensation of Resources

- (a) The CAISO will award Flexible Ramping Constraint capacity to all resources identified as resolving the Flexible Ramping Constraint in the applicable RTUC interval and will pay the resource's Scheduling Coordinator, for each RTUC interval, whether or not the Flexible Ramping Constraint is binding, limited by the quantity of Flexible Ramping Constraint requirements.
- (b) The CAISO will calculate the payment as the product of
 - (1) the upward MW of capacity identified to satisfy the constraint(s) in the groupings and individual Balancing Authority Areas in the EIM Area in which it participates to relieve the constraints in the groupings and individual Balancing Authority Areas in the EIM Area in which it participates to relieve the constraint(s), multiplied by 0.25 hours, and
 - (2) the Flexible Ramping Constraint Derived Price calculated for each applicable fifteen-minute FMM interval.

11.25.2.1 Flexible Ramping Constraint Derived Price

- (a) For each applicable fifteen-minute FMM interval, the Flexible Ramping Constraint Derived Price is equal to the lesser of—
 - (1) \$800/MWh; or
 - (2) the greater of
 - (i) the Real Time ASMP for Spinning Reserves for the applicable fifteen-minute FMM interval; or
 - (ii) the total Flexible Ramping Constraint Shadow Price,

but not less than zero.

- (b) ~~The CAISO will determine the total Flexible Ramping Constraint Shadow Price as the sum of the Flexible Ramping Constraint Shadow Prices for the groupings and individual Balancing Authority Areas in the EIM Area in which the resource is deemed to have contributed to the constraint, minus seventy-five (75) percent of the greater of~~
- (1) ~~zero (0), or~~
 - (2) ~~the Real-Time System Marginal Energy Cost, calculated as the simple average of the System Marginal Energy Cost for each of the three five-minute RTD intervals in the applicable fifteen-minute FMM interval.~~

11.25.3 Rescission of Payment for Non-Performance

- (a) ~~The CAISO will rescind payments to Scheduling Coordinators for the quantity of MW of undelivered Flexible Ramping Constraint capacity determined as the 15-minute sum of the Settlement Interval amounts calculated as the minimum of—~~
- (1) ~~the Flexible Ramping Constraint capacity identified as having contributed to the relief of the Flexible Ramping Constraint, or~~
 - (2) ~~the difference between~~
 - (i) ~~the absolute value of the negative UIE and~~
 - (ii) ~~the upward MW identified as Undelivered Ancillary Services Capacity as required in Section 11.10.9.3 but not less than zero.~~
- (b) ~~The CAISO will determine rescinded amounts as the product of—~~
- (1) ~~the MW quantities to be rescinded determined as described in this Section 11.25.3; and~~
 - (2) ~~the Flexible Ramping Constraint Derived Price as described in Section 11.25.2.~~

11.25.4 Apportionment of Flexible Ramping Constraint Costs

- (a) ~~The CAISO will determine the Flexible Ramping Constraint costs for each constraint as the product of—~~

(1) ~~the resource-specific total Flexible Ramping Constraint costs, calculated as the total compensation in Section 11.25.2(b), net of rescission of payments, and~~

(2) ~~the ratio of each Flexible Ramping Constraint Shadow Price to the sum of the Flexible Ramping Constraint Shadow Prices for the groupings and individual Balancing Authority Areas in the EIM Area in which the resource is deemed to have contributed to the constraint.~~

(b) ~~For each constraint and each Balancing Authority Area in the EIM Area, the CAISO will determine the Flexible Ramping Constraint costs attributable to that Balancing Authority Area for which the applicable constraint(s) were binding in the applicable interval, based on the ratio of the Balancing Authority Area's requirement to its contribution to the individual constraint or group of constraints to which that Balancing Authority Area contributes.~~

(c) ~~The CAISO will determine each Balancing Authority Area's apportionment of Flexible Ramping Constraint costs as the sum for that Balancing Authority Area of the amounts determined in Section 11.25.4(b).~~

11.25.5 Allocation of Flexible Ramping Constraint Costs

(a) ~~For the CAISO Balancing Authority Area, the CAISO will allocate total Flexible Ramping Constraint costs described in Sections 11.25.5.1 and 11.25.5.2.~~

(b) ~~The CAISO will allocate total Flexible Ramping Constraint costs for each EIM Entity Balancing Authority Area to the applicable EIM Entity Scheduling Coordinator.~~

11.25.5.1 Allocation to Measured Demand

~~Seventy five (75) percent of the total Flexible Ramping Constraint costs apportioned to the CAISO Balancing Authority Area and netted as described in Section 11.25.4, are allocated to Scheduling Coordinators based on their Measured Demand for each applicable Trading Hour. Each Scheduling Coordinator is assessed a portion of seventy five (75) percent share of the total costs equal to the Scheduling Coordinator's Measured Demand for the applicable Trading Hour divided by total market~~

Measured Demand for the applicable Trading Hour.

11.25.5.2 Allocation to Supply Deviations

Twenty-five (25) percent of the total Flexible Ramping Constraint costs apportioned to the CAISO Balancing Authority Area and netted as described in Section 11.25.4, are allocated to Scheduling Coordinators based on their gross negative Supply deviations as follows, using a two-step process. First, on a daily basis, the CAISO determines a daily rate equal to twenty-five (25) percent of the total daily Flexible Ramping Constraint costs divided by total daily gross Supply negative deviations for the applicable Trading Day. Each Scheduling Coordinator is assessed its share of these daily costs based on its daily gross negative deviations calculated by resource as described below. Second, at the end of each Trading Month, the CAISO reverses the daily amounts assessed to Scheduling Coordinators and calculates a monthly rate equal to twenty-five (25) percent of the total monthly Flexible Ramping Constraint costs divided by the total monthly gross Supply negative deviations. Each Scheduling Coordinator is assessed its share of these monthly costs based on its monthly gross negative deviations calculated by resource as described below. The gross Supply negative deviations are determined by resource based on the sum of: (1) the resource's total negative Settlement Interval UIE deviations, which are determined as specified in Section 11.5.2, and (2) any negative import Operational Adjustments. Gross Supply negative deviations determined for this purpose are not netted across Settlement Intervals. The CAISO will provide the ability for Scheduling Coordinators to see daily or monthly Flexible Ramping Constraint cost allocation by resource for their resources in their regularly released Settlement Statements.

11.25. Settlement of Flexible Ramping Product

11.25.1 Settlement of Forecasted Movement

11.25.1.1 Upward Forecasted Movement

11.25.1.1.1 FMM. The CAISO will settle upward FMM Forecasted Movement with Scheduling Coordinators as follows:

- (a) the product of the Forecasted Movement calculated for each resource pursuant to Section 44.3 in MWhs and the FMM FRUP;
and

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(b) the product of the Forecasted Movement calculated for each resource pursuant to Section 44.3 in MWhs and the product of the FMM FRDP and negative one.

11.25.1.1.2 **RTD.** The CAISO will settle with Scheduling Coordinators upward RTD Forecasted Movement as follows:

(a) the product of the difference between the RTD Forecasted Movement and the FMM Forecasted Movement for the relevant Settlement Interval, both calculated for each resource pursuant to Section 44.3 in MWhs, and the RTD FRUP, less any rescission amounts pursuant to section 11.25.3; and

(b) the product of the difference between the RTD Forecasted Movement and the FMM Forecasted Movement for the relevant Settlement Interval, both calculated for each resource pursuant to Section 44.3 in MWhs, and the product of the RTD FRDP and negative one, less any rescission amounts pursuant to section 11.25.3.

11.25.1.2 **Downward Forecasted Movement**

11.25.1.2.1 **FMM.** The CAISO will settle downward FMM Forecasted Movement with Scheduling Coordinators as follows:

(a) the product of the Forecasted Movement calculated for each resource pursuant to Section 44.3 in MWhs and the FMM FRUP; and

(b) the product of the Forecasted Movement calculated for each resource pursuant to Section 44.3 in MWhs and the product of the FMM FRDP and negative one.

11.25.1.2.2 **RTD.** The CAISO will settle downward RTD Forecasted Movement with Scheduling Coordinators as follows:

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- (a) the product of the difference between the RTD Forecasted Movement and the FMM Forecasted Movement for the relevant Settlement Interval, both calculated for each resource pursuant to Section 44.3 in MWhs, and the RTD FRUP, less any rescission amounts pursuant to section 11.25.3; and
- (b) the product of the difference between the RTD Forecasted Movement and the FMM Forecasted Movement for the relevant Settlement Interval, both calculated for each resource pursuant to Section 44.3 in MWhs, and the product of the RTD FRDP and negative one, less any rescission amounts pursuant to section 11.25.3.

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11.25.1.3 Allocation of Residual Forecasted Movement Settlements.

The CAISO will settle amounts remaining after settlement of Forecasted Movement pursuant to the Section 11.25.1, to Scheduling Coordinator metered EIM Demand or metered CAISO Demand in proportion to its share the total metered EIM Demand and metered CAISO Demand.

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11.25.2 Settlement of Uncertainty Requirement.

11.25.2.1 Payment to Resources. On a daily basis, the CAISO will settle awards to resources for providing the Uncertainty Requirement at the applicable FRUP or FRDP less any payment rescission for each interval pursuant to ~~s~~Section 11.25.3.

11.25.2.3 Allocation of Costs of Uncertainty Movement Procured.

11.25.2.3.1 Settlement Process.

- (a) **Daily.** The CAISO will initially—
 - (1) allocate the cost of the Uncertainty Award within each Balancing Authority Area in the EIM Area and within the

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EIM Area on a daily basis according to the categories as set forth in this Section 11.25.2.3; and

(2) allocate the daily amounts to Scheduling Coordinators as set forth in this Section 11.25.2.3.

(b) **Monthly.** The CAISO will resettle the costs of the Uncertainty Awards by—

(1) reversing the daily allocation;

(2) assigning the monthly costs of the Uncertainty Awards to Peak Flexible Ramp Hours and Off-Peak Flexible Ramp Hours;

(3) separately allocating the monthly Peak Flexible Ramp Hours amounts and Off-Peak Flexible Ramp Hours amounts to the categories within each Balancing Authority Area in the EIM Area and within the EIM Area as set forth in this Section 11.25.2.3; and

(4) allocating the monthly amounts in each category to Scheduling Coordinators as set forth in this Section 11.25.2.3.

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11.25.2.3.2 Allocation of Charges to Categories.

(a) **Determination of Uncertainty Movement For Resources.** For each interval, the CAISO will calculate the net Uncertainty Movement of each resource according to the following categories:

(1) for Supply resources other than non-Dynamic System Resources as the difference between the Dispatch Instruction of the binding interval in the next RTD run and the first advisory RTD interval in the current run.

(2) for non-Dynamic System Resource and export schedule as the difference between the schedule used in the RTD (accounting for ramp) for the binding interval in the next RTD run and the scheduled use for the first advisory interval in the current RTD run.

(b) RTD Uncertainty Movement by Balancing Authority Area

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and by EIM Area. The CAISO will determine the total net RTD Uncertainty Movement for each category separately for each Balancing Authority Area in the EIM Area and by EIM Area—

(1) for the category of Supply resources, which shall not include non-Dynamic System Resources, as the net sum of the five-minute Uncertainty Movement determined pursuant to Section 11.25.2.3.2 of all the Supply resources in the category.

(2) for the category of Intertie resources, which shall comprise non-Dynamic System Resources and exports, as the net sum of the five-minute Uncertainty Movement determined pursuant to Section 11.25.3.2 of all the non-Dynamic System resources and export schedules.

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(3) for the non-Participating Load category, as the difference between-

(A) the CAISO Forecast of CAISO Demand, the CAISO forecast of Balancing Authority Area EIM Demand, or the CAISO forecast of EIM Area EIM Demand, as applicable, of the binding interval in the next RTD run; and

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(B) the CAISO Forecast of CAISO Demand, the CAISO forecast of Balancing Authority Area EIM

Demand, and/or the CAISO forecast of EIM Area
EIM Demand, as applicable, for the first advisory
interval in the current RTD run.

11.25.2.3.3 Assignment of Uncertainty Costs. to Categories. The CAISO

will allocate the total upward Uncertainty Award cost calculated pursuant
to this section 11.25.2.3 to each category described in Section

11.25.2.3.2(b) based on—

(a) for upward Uncertainty Award cost, the ratio of such category's
positive Uncertainty Movement to the sum of the positive
Uncertainty Movements of all categories with positive
Uncertainty Movement for each Balancing Authority Area in the
EIM Area and the EIM Area; and.

(b) for downward Uncertainty Award costs, the ratio of such
category's negative Uncertainty Movement to the sum of the
negative Uncertainty Movements of all categories with negative
Uncertainty Movement for each Balancing Authority Area in the
EIM Area and the EIM Area.

11.25.2.3.4 Allocation to Scheduling Coordinators.

(a) Non-Participating Load Category. The CAISO will allocate the
Uncertainty Awards costs of the non-Participating Load category
to Scheduling Coordinators—

(1) for upward Uncertainty Award cost in proportion to the
Scheduling Coordinator's negative non-Participating
Load UIE, excluding the non-Participating Load of an
MSS that has elected to load-follow according to an
MSS Agreement, without netting that UIE across
Settlement Intervals, to the total of such negative non-
Participating Load UIE, without netting that UIE across

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Settlement Intervals, in the Balancing Authority Area or EIM Area as applicable, and

(2) for downward Uncertainty Award cost calculated pursuant to Section 11.25, to in proportion to the Scheduling Coordinator's daily positive non-Participating Load UIE, excluding the non-Participating Load of an MSS that has elected to load-follow according to an MSS Agreement, without netting that UIE across Settlement Intervals, to the total of such positive non-Participating Load UIE, without netting that UIE across Settlement Intervals, in the BAA or EIM Area as applicable.

(b) Supply Category. The CAISO will allocate the Uncertainty Awards costs of the Supply category to Scheduling Coordinators for each resource in the Supply category based on the sum of the resource's Uncertainty Movement and UIE—

(1) for upward Uncertainty Award cost in proportion to the Scheduling Coordinator's positive sum of the resource's Uncertainty Movement and UIE, without netting that sum across Settlement Intervals, to the total positive sum of all resources' Uncertainty Movement and UIE, without netting that sum across Settlement Intervals, in the BAA or EIM Area as applicable; and

(2) for downward Uncertainty Award cost in proportion to the Scheduling Coordinator's negative sum of the resource's Uncertainty Movement and UIE, without netting that sum across Settlement Intervals, to the total negative sum of all resources' Uncertainty Movement and UIE, without

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netting that sum across Settlement Intervals, in the Balancing Authority Area or EIM Area as applicable; except that

(3) for the MSS that have elected to load follow pursuant to an MSS Agreement, the CAISO will calculate the positive and negative sums specified above for each Settlement Interval as the sum of MSS non-Participating Load UIE, Supply resources within the MSS UIE, MSS Load Following Energy, MSS Load Following Operational Adjustments, and Uncertainty Movement of resources within the MSS Aggregation.

(c) **Intertie Category.** The CAISO will allocate the Uncertainty Awards costs of the Intertie category to Scheduling Coordinators for each non-Dynamic System Resource and export based on the sum of the resource's Uncertainty Movement and Operational Adjustment—

(1) for upward Uncertainty Award cost in proportion to the Scheduling Coordinator's negative Operational Adjustment for non-Dynamic System Resources, or positive Operational Adjustment for export resources, to the sum of the absolute values of such Operational Adjustments in the Balancing Authority Area or EIM Area, without netting that sum across Settlement Intervals, to the total absolute value of such Operational Adjustments in the Balancing Authority Area or EIM area, without netting that sum across Settlement Intervals, in the Balancing Authority Area or EIM Area as applicable; and

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(2) for downward Uncertainty Award cost in proportion to the Scheduling Coordinator's positive Operational Adjustment for non-Dynamic System Resources, or negative Operational Adjustment for export resources, to the sum of the absolute values of such Operational Adjustments in the Balancing Authority Area or EIM Area, without netting that sum across Settlement Intervals, to the total absolute value of such Operational Adjustments in the Balancing Authority Area or EIM Area, without netting that sum across Settlement Intervals, in the Balancing Authority Area or EIM Area as applicable; and

(3) for the purposes of the allocations specified above, the MSS Load Following Operational Adjustment is excluded.

(d) **Uncertainty Award Cost Offset.** If the sum of the settlement of Uncertainty Awards and the charges to Scheduling Coordinators for Uncertainty Award costs is nonzero, the CAISO will allocate such amounts to Scheduling Coordinators based on the ration of its metered CAISO Demand and metered EIM Demand to the total EIM area metered demand.

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11.25.3. Rescission

11.25.3.1 **Amount of Rescission.** For each Settlement Interval in which a resource has either a UIE deviation or Operational Adjustment and a Flexible Ramping Product settlement, separately for upward and downward, the CAISO will rescind Settlement Amount for the overlap of the UIE or Operational Adjustment and the sum of RTD Forecasted Movement and Uncertainty Award, at the RTD FRUP or FRDP.

11.25.3.2 Order of Rescission. The CAISO will apply any rescission amount first to any Uncertainty Award, in the applicable direction, and then apply any remaining rescission amount to Forecasted Movement, in the applicable direction.

27.4.1 Security Constrained Unit Commitment

The CAISO uses SCUC to run the MPM process associated with the DAM and the RTM. SCUC is conducted over multiple varying intervals to commit and schedule resources as follows: (1) in the Day-Ahead time frame, to meet Demand reflected in Bids submitted in the Day-Ahead Market and considered in the MPM process and IFM, and to procure AS in the IFM; (2) to meet the CAISO Forecast Of CAISO Demand in the RUC, HASP, STUC and FMM, and in the MPM process utilized in the HASP and RTM; ~~and~~ (3) to procure any incremental AS in the RTM, and (4) to procure Flexible Ramping Product in the RTM. In the Day-Ahead MPM, IFM and RUC processes, the SCUC commits resources over the twenty-four (24) hourly intervals of the next Trading Day. In the FMM, which runs every fifteen (15) minutes and commits resources for the RTM, the SCUC optimizes over a number of 15-minute intervals corresponding to the Trading Hours for which the Real-Time Markets have closed. The Trading Hours for which the Real-Time Markets have closed consist of (a) the Trading Hour in which the applicable run is conducted and (b) all the fifteen-minute intervals of the entire subsequent Trading Hour. In the HASP, which runs once per hour, the SCUC: 1) accepts and awards HASP Block Intertie Schedules for Energy and Ancillary Services, respectively; 2) provides HASP Advisory Schedules to Economic Hourly Block Bids with Intra-Hour Option that will change for economic reasons at most once in the Trading Hour; and 3) provides HASP Advisory Schedules to all other participants in the RTM. In the STUC, which runs once an hour, the SCUC commits resources over the last fifteen (15) minutes of the imminent Trading Hour and the entire next four Trading Hours. The CAISO will commit Extremely Long Start Resources, for which commitment in the DAM does not provide sufficient time to Start-Up and be available to supply Energy during the next Trading Day as provided in Section 31.7.

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27.10— Flexible Ramping Constraint

~~The CAISO may enforce a Flexible Ramping Constraint in the RTM. Any flexible Dispatch capacity constrained to be available as a result of the Flexible Ramping Constraint in RTM will come from capacity that is not designated to provide Regulation or Operating Reserves, and will not offset the required procurement of Regulation or Operating Reserves in RTUC. To the extent a resource incurs an~~

opportunity cost for not providing Energy or Ancillary Services in the FMM or RTD interval as a result of a binding Flexible Ramping Constraint, all resources resolving that Flexible Ramping Constraint will be compensated pursuant to Section 11.25. In the FMM or RTD the resources identified as resolving the Flexible Ramping Constraint in the corresponding RTUC run will be the only resources used to resolve the Flexible Ramping Constraint enforced in FMM or RTD. The Flexible Ramping Constraint can be satisfied only by committed online dispatchable Generating Units, Participating Load, and Proxy Demand Response resources with ramping capability for which a Scheduling Coordinator has submitted Economic Bids for Energy for the applicable Trading Hour, and Dynamic System resources as specified below. This constraint cannot be satisfied by System Resources that are not Dynamic System Resources. Dynamic System Resources can become eligible to participate in relieving the Flexible Ramping Constraint if the Scheduling Coordinator scheduling that Resource can demonstrate that it has firm transmission service to the CAISO Balancing Authority Area intertie that allows the resource to deliver additional Energy in Real Time, consistent with the requirements of Section 1.5 of the Dynamic Scheduling Protocol in Appendix M. This Dynamic System Resource must demonstrate that the Dynamic System Resource has acquired sufficient firm transmission to support the total quantity of Energy and Ancillary Services offered in the Real Time Market by submitting an E-Tag with a transmission profile that reflects the necessary transmission reservation(s) outside the CAISO Balancing Authority Area.

Procurement of Flexible Ramping Constraint capacity from Dynamic System Resources is limited by the available capacity in Real Time for the applicable interval on the applicable intertie transmission constraint with which the Dynamic System Resource is associated. The quantity of the flexible ramping capacity for each applicable CAISO Market run will be determined by CAISO operators using tools that estimate the: 1) expected level of imbalance variability; 2) uncertainty due to forecast error; and 3) differences between the hourly, fifteen (15) minute average and historical five (5) minute Demand levels. The Flexible Ramping Constraint relaxation parameter is \$60.

29.11. Settlements And Billing For EIM Market Participants.

~~**(g) Flexible Ramping Constraint Allocation.**~~

~~(1) **Calculation.** The CAISO will calculate awards for Flexible Ramping Constraint capacity according to Section 11.25.2 and rescission for non-performance in accordance with 11.25.3, except that the Real-Time Ancillary Service Market Price for Spinning Reserves will be deemed to be zero in determining awards to EIM Participating Resources.~~

~~(2) **Apportionment of Costs.** The CAISO will apportion Flexible Ramping Constraint costs to each EIM Entity Balancing Authority Area and the CAISO Balancing Authority Area in accordance with Section 11.25.4.~~

~~(3) **Cost Allocation.** The CAISO will allocate each EIM Entity's Flexible Ramping Constraint costs to the applicable EIM Entity Scheduling Coordinator in accordance with Section 11.25.5(b).~~

(o) Flexible Ramping Product. The CAISO will allocate and settle payments and charges for the Flexible Ramping Product according to Section 11.25, where the CAISO will consider EIM Base Schedules of non-participating resources as Self-Schedules.

29.34. EIM Operations

(l) EIM Resource Plan Evaluation.

- (1) Requirement. The EIM Base Schedules for resources included in the EIM Resource Plan must balance the Demand Forecast for each EIM Entity Balancing Authority Area.
- (2) Insufficient Supply. An EIM Resource Plan shall be deemed to have insufficient Supply if the sum of EIM Base Schedules from non-participating resources and the sum of the highest quantity offers in the Energy Bid range from EIM Participating Resources, including Interchange with other Balancing Authority Areas, is less than the total Demand Forecast that the EIM Entity Scheduling Coordinator has decided to use for the associated EIM Entity Balancing Authority Area.

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(3) Excess Supply. An EIM Resource Plan shall be deemed to have excessive Supply if the sum of EIM Base Schedules from non-participating resources and the sum of the lowest quantity Bids in the Energy Bid range from EIM Participating Resources is greater than the total Demand Forecast that the EIM Entity Scheduling Coordinator has decided to use for the associated EIM Entity Balancing Authority Area.

(4) Additional Hourly Capacity Requirements.

(A) In General. If the CAISO determines under the procedures set forth in the Business Practice Manual for the Energy Imbalance Market that an Balancing Authority Area in the EIM Area has historically high import or export schedule changes between forty minute and twenty minutes before the start of the Trading Hour, the CAISO will add to the Balancing Authority Area in the EIM Area's capacity requirements an additional requirement.

(B) Additional Capacity Requirement. On a monthly basis, according to procedures set forth in the Business Practice Manual for the Energy Imbalance Market, the CAISO will calculate for each Balancing Authority Area in the EIM Area histograms of the percentage of the difference between imports and exports scheduled at forty minutes before the start of the Trading Hour and the final imports and exports at twenty minutes before the start of the Trading Hour based on the submitted E-Tags at those times and calculate additional upward and downward requirements for the capacity test component of the resource sufficiency evaluation.

(m) **Flexible Ramping ~~Constraint Requirement.~~**

~~(1) **Responsibility.** Each EIM Entity Balancing Authority Area and the CAISO Balancing Authority Area will be responsible for meeting its own portion of the combined Flexible Ramping Constraint capacity requirements for the next hour~~

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as determined by Section 29.34(m).

(2) ~~**Nature.** The Flexible Ramping Constraint capacity requirement is a minimum requirement for each Balancing Authority Area in the EIM Area and on a system wide basis based upon the EIM Transfer limit between Balancing Authority Areas.~~

(3) ~~**Determination.** Under the provisions of Section 29.34(m) and the procedures set forth in the Business Practice Manual for the Energy Imbalance Market, the CAISO will determine the Flexible Ramping Constraint capacity requirement using the CAISO Demand Forecast and CAISO Variable Energy Resource forecast for each Balancing Authority Area in the EIM Area and system wide.~~

(4) ~~**Sufficiency Determination.**~~

(1A) ~~**Review.**~~

(Ai) ~~**EIM Entity Balancing Authority Area.** The CAISO will review the EIM Resource Plan pursuant to the process set forth in the Business Practice Manual for the Energy Imbalance Market and verify that it has sufficient Bids for Ramping capability to meet the EIM Entity Balancing Authority Area upward and downward Flexible Ramping requirements ~~Constraint capacity requirement~~, as adjusted pursuant to Sections 29.34(m)(4)(~~2B~~), (~~3C~~), and (~~5E~~).~~

(Bii) ~~**CAISO Balancing Authority Area.** The CAISO will review the Day-Ahead Schedules in the CAISO Balancing Authority Area and verify that it has sufficient Bids for Ramping capability to meet the CAISO Balancing Authority Area upward and downward Flexible Ramping Constraint capacity requirements, as adjusted pursuant to Sections 29.34(m)(~~2~~), (~~3~~), and (~~5~~)(~~4~~)(~~B~~), (~~C~~), and (~~E~~).~~

(2B) ~~**Determination Pre-Rata Reduction and of EIM Diversity Benefit**~~

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Limit. The CAISO will calculate separately the upward and downward EIM diversity benefit as the difference between the sum of the upward and downward Uncertainty Requirements for all Balancing Authority Areas in the EIM Area, and the Uncertainty Requirement for the EIM Area.

(3) Effects of EIM Diversity Benefit. For each EIM Entity Balancing Authority Area in the EIM Area, the CAISO will reduce the upward and downward Uncertainty Flexible Ramping Constraint capacity Requirements shall be reduced by the Balancing Authority Area's pro-rata share of the upward and downward EIM diversity benefit in the EIM Area as may be limited by—

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(A) the available net import EIM Transfer capability into that EIM Entity Balancing Authority Area in the case of an upward Uncertainty Requirement; and

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(B) the available net export EIM Transfer capability from that Balancing Authority Area in the case of a downward Uncertainty Requirement.

(4C) Determination of Flexible Ramping Sufficiency Credit. The CAISO will calculate for each Balancing Authority Area in the EIM Area, the upward flexible Ramping sufficiency credit as the outgoing EIM Transfer from that area and the downward flexible Ramping sufficiency credit as the incoming EIM transfer into that area.

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(5) Effect of Flexible Ramping Sufficiency Credit of an EIM Entity Balancing Authority Area with a Net Outgoing EIM Transfer. If an EIM Entity Balancing Authority Area has a net outgoing EIM Transfer (net export with reference to the EIM Base Schedule) before the Operating Hour, then

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(1) The CAISO will reduce the upward Uncertainty Requirement of a

~~Balancing Authority Area in the EIM Area by its apply-a-upward Flexible Ramping sufficiency Constraint capacity requirement credit, in determining the sufficiency of the Flexible Ramping Constraint capacity for that EIM Entity Balancing Authority Area equal to the net outgoing EIM Transfer before the Operating Hour will reduce the downward Uncertainty Requirement of a Balancing Authority Area in the EIM Area by its downward flexible Ramping sufficiency credit.~~

~~(4D) **Sufficiency of an EIM Entity Balancing Authority Area with a Net Ingoing EIM Transfer.** If an EIM Entity Balancing Authority Area has a net incoming EIM Transfer (net import with reference to the EIM Base Schedule) before the Operating Hour, then—~~

~~(i) — the Flexible Ramping Constraint capacity for that EIM Entity Balancing Authority Area will be considered sufficient if it meets its own upward Flexible Ramping Constraint capacity requirement, irrespective of the incoming EIM Transfer that results from Real-Time Dispatch in the EIM Area.~~

~~(5) **System Wide Constraints.** The CAISO shall determine the Flexible Ramping Constraint capacity requirement system wide, including requirements for individual Balancing Authority Areas in the system wide constraint, by reducing the total Flexible Ramping Constraint capacity requirement for each Balancing Authority Area by the total amount of EIM Internal Intertie import capability to that Balancing Authority Area from each Balancing Authority Area in the EIM Area.~~

(n) **Effect of Resource Plan Insufficiency.**

(1) **Resource Plan Balance.** If, after the final opportunity for the EIM Entity to revise hourly Real-Time EIM Base Schedules as provided in Section 29.34(f)(1)(c), the EIM Resource Plan has insufficient supply as

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determined according to Section 29.34(l)—

(A) the CAISO will not include the EIM Entity Balancing Authority Area in ~~any the Uncertainty Requirement of the EIM Area~~ Flexible Ramping Constraints for any combination of Balancing Authority Areas;

~~(B) the CAISO will formulate only individual constraints for the EIM Entity Balancing Authority Area's individual Flexible Ramping Constraint capacity requirements; and~~

~~(B)~~ the CAISO will hold the EIM Transfer limit into ~~and/or from~~ the EIM Entity Balancing Authority Area ~~as specified in Section 29.34(n)(2)~~ at the value for the last 15-minute Trading Interval interval.

Comment [ZGS5]: Clarify language to limit transfer only in the direction corresponding to the direction of the flex test failure

(2) **Flexible Ramping Insufficiency.** If, after the final opportunity for the EIM Entity to revise hourly Real-Time EIM Base Schedules as provided in Section 29.34(f)(1)(c), the CAISO determines—

(i) ~~that an EIM Entity Balancing Authority Area has insufficient upward Flexible Ramping Constraint capacity according to Section 29.34(m), the CAISO will take the actions described in Section 29.34(n)(1)(A) and (B) in the upward and into the EIM Entity BAA direction; and~~

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(ii) ~~that an EIM Entity Balancing Authority Area has insufficient downward Ramping capacity according to Section 29.34(m), the CAISO will take the actions described in Section 29.34(n)(1)(A) and (B) in the downward and from the EIM Entity BAA direction.~~

29.44 Flexible Ramping Product. The CAISO will procure Flexible Ramping Product for the Energy Imbalance Market as set forth in Section 44, except that the CAISO will consider the EIM Base Schedules of non-participating resources as Self-Schedules for the calculation of Flexible Ramping Product requirements.

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34.4 Fifteen Minute Market

The CAISO conducts the Fifteen Minute Market using the second interval of each RTUC run horizon as follows: (1) at approximately 7.5 minutes prior to the first Trading Hour, for T-45 minutes to T+60 minutes where the binding interval is T-30 to T-15; (2) at approximately 7.5 minutes into the current hour for T-30 minutes to T+60 minutes where the binding interval is T-15 to T; (3) at approximately 22.5 minutes into the current hour for T-15 minutes to T+60 minutes for the binding interval T to T+15; and (4) at approximately 37.5 minutes into the current hour for T to T+60 minutes for the binding interval T+15 to T+30, where T is the beginning of the next Trading Hour. In these intervals the CAISO conducts the FMM to: (1) determine financially binding FMM Schedules and corresponding LMPs for all Pricing Nodes, including all Scheduling Points; (2) determine financially and operationally binding Ancillary Services Awards and corresponding ASMPs, procure required additional Ancillary Services, and calculate ASMP used for settling procured Ancillary Service capacity for the next fifteen-minute Real-Time Ancillary Service interval for all Pricing Nodes, including Scheduling Points; ~~and~~ (3) determine LAP LMPs that are the basis for settling Demand; and (4) determine FMM Uncertainty Awards. In any FMM interval that falls within a time period in which a Multi-Stage Generating Resource is transitioning from one MSG Configuration to another MSG Configuration, the CAISO: (1) will not award any incremental Ancillary Services; (2) will disqualify any Day-Ahead Ancillary Services Awards; (3) will disqualify Day-Ahead qualified Submissions to Self-Provide Ancillary Services Award, and (4) will disqualify Submissions to Self-Provide Ancillary Services in RTM. Each particular FMM market optimization produces binding settlement prices for Energy, Flexible Ramping Product, and Ancillary Services for the first FMM interval in the FMM horizon but the optimization considers the advisory results from subsequent market intervals within the FMM horizon. The CAISO settles Hourly Intertie Schedules and Hourly Ancillary Services Awards accepted in the HASP as FMM Schedules and FMM Ancillary Services Awards in accordance with Section 11.5 and 11.10.1.2, respectively. In the event that a FMM run fails, the CAISO reverts to Day-Ahead Market Ancillary Services Awards and RUC Schedules results corresponding to the same interval, or the corresponding interval from the previous RTUC. The FMM will clear Supply against the

CAISO Forecast Of CAISO Demand and exports. The FMM issues Energy Schedules and Ancillary Services Awards by twenty-two and a half minutes prior to the binding fifteen-minute interval.

34.5 Real-Time Dispatch

The RTED uses a Security Constrained Economic Dispatch (SCED) algorithm every five (5) minutes throughout the Trading Hour to determine optimal Dispatch Instructions to balance Supply and Demand [and determine Uncertainty Awards](#). The RTD can operate in three modes: RTED, RTCD and RTMD. In any given five-minute interval, the RTD optimization looks ahead over multiple five-minute intervals, but the CAISO issues Dispatch Instructions only for the next target five-minute interval. The CAISO will use the Real-Time Economic Dispatch (RTED) under most circumstances to optimally dispatch resources based on their Bids. The RTED can be used to Dispatch Contingency Only Operating Reserves, pursuant to Section 34.10, when needed to avoid an imminent System Emergency. The Real-Time Contingency Dispatch (RTCD) can be invoked in place of the RTED when a transmission or generation contingency occurs and will include all Contingency Only Operating Reserves in the optimization. If the CAISO awards a Non-Dynamic System Resource Ancillary Services in the IFM, HASP, or FMM and issues a Dispatch Instruction in the middle of the Trading Hour for Energy associated with its Ancillary Services (Operating Reserve) capacity, the CAISO will Dispatch the Non-Dynamic System Resource to operate at a constant level until the end of the Trading Hour. If the CAISO dispatches a Non-Dynamic System Resource such that the binding interval of the Dispatch is in the next Trading Hour, the CAISO will dispatch Energy from the Non-Dynamic System Resource at a constant level until the end of the next Trading Hour. The dispatched Energy will not exceed the awarded Operating Reserve capacity for the next Trading Hour and will be at a constant level for the entire next Trading Hour. The Real Time Manual Dispatch (RTMD) will be invoked as a fall-back mechanism only when the RTED or RTCD fails to provide a feasible Dispatch. These three (3) modes of the RTD are described in Sections 34.5.1, 34.5.2, and 34.5.3.

* * *

34.7 General Dispatch Principles

The CAISO shall conduct all Dispatch activities consistent with the following principles:

- (1) The CAISO shall issue AGC instructions electronically as often as every four (4) seconds from its Energy Management System (EMS) to resources providing Regulation and on Automatic Generation Control to meet NERC and WECC performance requirements;
- (2) In each run of the RTED or RTCD the objective will be to meet the projected Energy [requirements and Uncertainty R](#)requirements over the applicable forward-looking time period of that run, subject to transmission and resource operational constraints, taking into account the short term CAISO Forecast Of CAISO Demand [or forecast of EIM Demand](#), adjusted as necessary by the CAISO [or EIM Entity o](#)Operator to reflect scheduled changes to Interchange and non-dispatchable resources in subsequent Dispatch Intervals;
- (3) Dispatch Instructions will be based on Energy Bids for those resources that are capable of intra-hour adjustments and will be determined through the use of SCED except when the CAISO must utilize the RTDD and RTMD;
- (4) When dispatching Energy from awarded Ancillary Service capacity the CAISO will not differentiate between Ancillary Services procured by the CAISO and Submissions to Self-Provide an Ancillary Service;
- (5) The Dispatch Instructions of a resource for a subsequent Dispatch Interval shall take as a point of reference the actual output obtained from either the State Estimator solution or the last valid telemetry measurement and the resource's operational ramping capability. For Multi-Stage Generating Resources the determination of the point of reference is further affected by the MSG Configuration and the information contained in the Transition Matrix;
- (6) In determining the Dispatch Instructions for a target Dispatch Interval while at the same time achieving the objective to minimize Dispatch costs to meet the forecasted conditions of the entire forward-looking time period, the Dispatch for

the target Dispatch Interval will be affected by: (a) Dispatch Instructions in prior intervals, (b) actual output of the resource, (c) forecasted conditions in subsequent intervals within the forward-looking time period of the optimization, and (d) operational constraints of the resource, such that a resource may be dispatched in a direction for the immediate target Dispatch Interval that is different than the direction of change in Energy needs from the current Dispatch Interval to the next immediate Dispatch Interval, considering the applicable MSG Configuration;

- (7) Through Start-Up Instructions the CAISO may instruct resources to start up or shut down, or may reduce Load for Participating Loads, Reliability Demand Response Resources, and Proxy Demand Resources, over the forward-looking time period for the RTM based on submitted Bids, Start-Up Costs and Minimum Load Costs, Pumping Costs and Pump Shut-Down Costs, as appropriate for the resource, or for Multi-Stage Generating Resource as appropriate for the applicable MSG Configuration, consistent with operating characteristics of the resources that the SCED is able to enforce. In making Start-Up or Shut-Down decisions in the RTM, the CAISO may factor in limitations on number of run hours or Start-Ups of a resource to avoid exhausting its maximum number of run hours or Start-Ups during periods other than peak loading conditions;
- (8) The CAISO shall only start up resources that can start within the applicable time periods of the various CAISO Markets Processes that comprise the RTM;
- (9) The RTM optimization may result in resources being shut down consistent with their Bids and operating characteristics provided that: (a) the resource does not need to be on-line to provide Energy, (b) the resource is able to start up within the applicable time periods of the processes that comprise the RTM, (c) the Generating Unit is not providing Regulation or Spinning Reserve, and (d) Generating Units online providing Non-Spinning Reserve may be shut down if

they can be brought up within ten (10) minutes as such resources are needed to be online to provide Non-Spinning Reserves;

- (10) For resources that are both providing Regulation and have submitted Energy Bids for the RTM, Dispatch Instructions will be based on the Regulation Ramp Rate of the resource rather than the Operational Ramp Rate if the Dispatch Operating Point remains within the Regulating Range. The Regulating Range will limit the Ramping of Dispatch Instructions issued to resources that are providing Regulation;
- (11) For Multi-Stage Generating Resources the CAISO will issue Dispatch Instructions by Resource ID and Configuration ID;
- (12) The CAISO may issue Transition Instructions to instruct resources to transition from one MSG Configuration to another over the forward-looking time period for the RTM based on submitted Bids, Transition Costs and Minimum Load Costs, as appropriate for the MSG Configurations involved in the MSG Transition, consistent with Transition Matrix and operating characteristics of these MSG Configurations. The RTM optimization will factor in limitations on Minimum Run Time and Minimum Down Time defined for each MSG configuration and Minimum Run Time and Minimum Down Time at the Generating Unit.
- (13) The CAISO may make Reliability Demand Response Resources eligible for Dispatch in accordance with applicable Operating Procedures either: (a) after issuance of a warning notice and immediately prior to a need for the CAISO to attempt to obtain assistance from neighboring Balancing Authorities or imports; (b) during stage 1, stage 2, or stage 3 of a System Emergency; or (c) for a transmission-related System Emergency.

34.8 Dispatch Instructions to Units, Participating Loads, PDRs and RDRRs

The CAISO may issue Dispatch Instructions covering:

- (a) Ancillary Services;
- (b) Energy, which may be used for:
 - (i) Congestion relief;
 - (ii) provision of Imbalance Energy; or
 - (iii) replacement of an Ancillary Service;
- (c) agency operation of Generating Units, Participating Loads, Proxy Demand Resources, or Interconnection schedules, for example:
 - (i) output or Demand that can be Dispatched to meet Applicable Reliability Criteria;
 - (ii) Generating Units that can be Dispatched for Black Start;
 - (iii) Generating Units that can be Dispatched to maintain governor control regardless of their Energy schedules;
- (d) the operation of voltage control equipment applied on Generating Units as described in this CAISO Tariff;
- (e) MSS Load following instructions provided to the CAISO, which the CAISO incorporates to create their Dispatch Instructions;
- (f) Dispatch necessary to respond to a System Emergency or imminent emergency;
- (g) Transition Instructions; ~~or~~
- (h) Dispatch of Reliability Demand Response Resources pursuant to Section 34.18;
[or](#)
- (i) [Uncertainty Awards](#).

34.9 Utilization Of The Energy Bids

The CAISO uses Energy Bids for the following purposes: (i) satisfying Real-Time Energy needs; (ii) mitigating Congestion; (iii) maintaining aggregate Regulation reserve capability in Real-Time; (iv) allowing recovery of Operating Reserves utilized in Real-Time operations; (v) procuring Voltage Support required from resources beyond their power factor ranges in Real-Time; (vi) establishing LMPs; (vii) as the basis for Bid Cost Recovery; ~~and~~ (viii) to the extent a Real-Time Energy Bid Curve is submitted starting at minimum operating level for a Short Start Unit that is scheduled to be on-line, the RTM may Dispatch such a resource down to its minimum operating level and may issue a Shut-Down Instruction to the resource based on its Minimum Load Energy costs; [and \(ix\) satisfying Uncertainty Requirements.](#)

34.13.2 Failure To Conform To Dispatch Instructions

In the event that, in carrying out the Dispatch Instruction, an unforeseen problem arises (relating to plant operations or equipment, personnel or the public safety), the recipient of the Dispatch Instruction must notify the CAISO or, in the case of a Generator, the relevant Scheduling Coordinator immediately. The relevant Scheduling Coordinator shall notify the CAISO of the problem immediately. If a resource is unavailable or incapable of responding to a Dispatch Instruction, or fails to respond to a Dispatch Instruction in accordance with its terms, the resource shall be considered to be non-conforming to the Dispatch Instruction unless the resource has notified the CAISO of an event that prevents it from performing its obligations within thirty (30) minutes of the onset of such event through a SLIC log entry. Notification of non-compliance via the Automated Dispatch System (ADS) will not supplant nor serve as the official notification mechanism to the CAISO. If the resource is considered to be non-conforming as described above, the Scheduling Coordinator for the resource concerned shall be subject to Uninstructed Imbalance Energy as specified in Section 11.5.2 and Uninstructed Deviation Penalties as specified in Section 11.23. This applies whether any Ancillary Services concerned are contracted or Self-Provided. For a Non-Dynamic System Resource Dispatch Instruction prior to the Trading Hour, the Scheduling Coordinator shall inform the CAISO of its ability to conform to a Dispatch Instruction via ADS. The Non-Dynamic System Resource has the option to accept, partially accept, or decline the Dispatch Instruction,

but in any case must respond within the timeframe specified in a Business Practice Manual. The Non-Dynamic System Resource can change its response within the indicated timeframe. If a Non-Dynamic System Resource does not respond within the indicated timeframe, the Dispatch Instruction will be considered declined. A decline of such a Non-Dynamic System Resource for a Dispatch Instruction received at least forty (40) minutes prior to the Trading Hour will be subject to Uninstructed Deviation Penalties as specific in Section 11.23. A decline of such a Non-Dynamic System Resource for a Dispatch Instruction received less than forty (40) minutes prior to the Trading Hour will not be subject to Uninstructed Deviation Penalties. A Non-Dynamic System Resource that only partially accepts a Dispatch Instruction is subject to Uninstructed Deviation Penalties for the portion of the Dispatch Instruction that is declined.

When a resource demonstrates that it is not following Dispatch Instructions, the RTM will no longer assume that the resource will ramp from its current output level. The RTM assumes the resource to be "non-compliant" if it is deviating its five (5)-minute Ramping capability for more than N intervals by a magnitude determined by the CAISO based on its determination that it is necessary to improve the calculation of the expected Imbalance Energy as further defined in the BPM. When a resource is identified as "non-compliant," RTM will set the Dispatch operating target for that resource equal to its actual output in the Market Clearing software such that the persistent error does not cause excessive AGC action and consequently require CAISO to take additional action to comply with reliability requirements. Such a resource will be considered to have returned to compliance when the resource's State Estimator or telemetry value (whichever is applicable) is within the above specified criteria. During the time when the resource is "non-compliant", the last applicable Dispatch target shall be communicated to the Scheduling Coordinator as the Dispatch operating target. The last applicable Dispatch target may be (i) the last Dispatch operating target within the current Trading Hour that was instructed prior to the resource becoming "non-compliant," or (ii) the Day-Ahead Schedule, or (iii) awarded Self-Schedule Hourly Block depending on whether the resource submitted a Bid and the length of time the resource was "non-compliant," or (iv) for a Dynamic System Resource or a Pseudo-Tie Generating Unit that is an Eligible Intermittent Resource, the most recently available telemetry for the actual output. [During the time](#)

the resource is deemed to be “non-compliant” the CAISO will suspend the resource’s eligibility for Ancillary Services and Uncertainty Awards.

44. Flexible Ramping Product

44.1 In General. The Flexible Ramping Product consists of Uncertainty Awards and Forecasted Movement as described in this section 44.

44.2 Uncertainty Awards.

44.2.1 Optimization. The CAISO will optimize the procurement of Uncertainty Awards in the FMM and RTD simultaneously with the procurement of Energy and Ancillary Services, as applicable. Uncertainty Awards do not overlap with Ancillary Services Awards or Available Balancing Capacity.

44.2.2 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. ~~Each resources that havehas an Economic Bids in the RTM thatand can be dispatched on a five-minute basis by RTD areis eligible for receiving Uncertainty Awards satisfying the Uncertainty Requirement for the BAA in which the resource is located.~~

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.

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44.2.4.1 Requirement. The CAISO will determine the Uncertainty Requirement for each RTD and FMM, by each BAA and for the EIM Area overall, using tools as further described in the Business Practice Manual that estimate the Demand Forecast and Supply forecast error.

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44.2.4.2 Procurement Curve.

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(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.

(b) Procurement Curve Cap. The CAISO will establish in the Business Practice Manual a limit on the procurement curve—

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(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

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(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.

44.3 Forecasted Movement

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44.3.1 Generally. The CAISO will determine the Forecasted Movement for each Generating Unit, System Resources, Pumped Storage, Pseudo-Ties, Non-generating Resources, PDRs, Participating Load, and any other resource that has a schedule or dispatch change in the RTD or FMM as described below.

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44.3.1.1 RTD Forecasted Movement. For the RTD, the Forecasted Movement for the resource will be 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.

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

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Appendix A

-Peak Flexible Ramp Hours

Trading Hours from hour ending 7 through hour ending 22.

- Flexible Ramp Up Price (FRUP)

The Shadow Price of the upward Uncertainty Requirement constraint, which is the cost sensitivity of relaxing the upward Uncertainty Requirement constraint (\$/MWh).

-Flexible Ramp Down Price (FRDP)

The Shadow Price of the downward Uncertainty Requirement constraint, which is the cost sensitivity of relaxing the downward Uncertainty Requirement constraint (\$/MWh).

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-Off Peak Flexible Ramp Hours

Trading Hours from hour ending 1 through hour ending 6 and from hour ending 23 through hour ending 25.

Forecasted Movement

A resources change in forecasted output between market intervals as described in Section 44.3.

Uncertainty Award

A resource's awards for meeting Uncertainty Requirements as described in Section 44.2.

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Uncertainty Requirement

Flexible ramping capability to meet the requirements as specified in Section 44.2.4.

- Supply

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The Energy delivered from a Generating Unit, System Unit, Physical Scheduling Plant, System Resource, the Curtailable Demand provided by a Participating Load, ~~or~~ the Demand Response Services provided by a Proxy Demand Resource or a Reliability Demand Response Resource, or NGR.

