

California Independent System Operator Corporation
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30. Bid and Self-Schedule Submission for all CAISO Markets

30.1 Bids, Including Self-Schedules

Scheduling Coordinators shall submit Bids to participate in the CAISO Markets, as well as any Self-Schedules, ETC Self-Schedules, TOR Self-Schedules, or Self-Provided Ancillary Services. Bidding rules for each type of resource are contained in this Section 30 and additional specifications regarding bidding practices are contained in the Business Practice Manuals posted on the CAISO Website. Bids will consist of various components described in this Section 30 through which the Scheduling Coordinator provides information regarding the parameters and conditions pursuant to which the Bid may be optimized by the CAISO Markets.

30.1.1 Day-Ahead Market

Bids submitted in the DAM apply to the twenty-four (24) hours of the next Trading Day (23 or 25 hours on the Daylight Savings transition days) and are used in both the IFM and RUC. Bids for the Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve service in the Day-Ahead Market must be received by Market Close for the Day-Ahead Market. The Bids shall include information for each of the twenty-four (24) Settlement Periods of the Trading Day. Failure to provide the information within the stated time frame shall result in the Bids being declared invalid by the CAISO. Scheduling Coordinators may submit Bids for the DAM as early as seven (7) days ahead of the targeted Trading Day.

30.1.2 Real-Time Market

Economic Bids and Self-Schedules submitted in the RTM apply to a single Trading Hour and are used for all market processes of the RTM. The CAISO will require Scheduling Coordinators to honor their Day-Ahead Ancillary Services Awards when submitting Ancillary Services Bids in the RTM. Bids for Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve service for each Settlement Period must be received at least seventy-five minutes prior to the commencement of that Settlement Period. The Bids shall include information for only the relevant Settlement Period. Failure to provide the information within the stated timeframe shall result in the Bids being declared invalid and rejected by the CAISO.

30.2 Bid Types

There are three types of Bids: Energy Bids (which include Virtual Bids), Ancillary Services Bids, and RUC Availability Bids. Each Bid type can be submitted as either an Economic Bid or a Self-Schedule (except for RUC Availability Bids and Virtual Bids, which cannot be self-scheduled). Economic Bids specify prices for MW amounts of capacity or MWh amounts of Energy. Self-Schedules do not have any prices associated for MW or MWh. Energy Bids, including both Economic Bids and Self-Schedules (where Self-Schedules are otherwise permitted), may be either Supply Bids, Demand Bids, Virtual Supply Bids, or Virtual Demand Bids. Ancillary Services Bids and RUC Availability Bids are Supply Bids only. Ancillary Services may be self-provided by providing a Submission to Self-Provide an Ancillary Service and having that submission accepted by the CAISO. Rules for submitting the three types of Bids vary by the type of resource to which the Bid applies as described in Section 30.5 and as further required in each CAISO Markets process as specified in Sections 31, 33, and 34.

30.3 [Not Used]

30.4 Proxy Cost and Registered Cost Methodologies

Scheduling Coordinators for Generating Units and Resource-Specific System Resources must use the Proxy Cost methodology for their Start-Up Costs and Minimum Load Costs, as well as for Transition Costs in the case of Multi-Stage Generating Resources unless the resource has fewer than twelve (12) consecutive months of fifteen-minute LMPs for Energy at the resource's PNode or Aggregated PNode and meets the definition of a Use-Limited Resource. Scheduling Coordinators on behalf of Use-Limited Resources with fewer than 12 months of data can elect to use the Registered Cost methodology and remain on that methodology for a two-month period once 12 months of pricing data is collected, while the Scheduling Coordinator and the CAISO are going through the process of determining what Opportunity Costs, if any, apply to the Use-Limited Resource. Once this process concludes, all such Use-Limited Resources must be subject to the Proxy Cost methodology.

For Use-Limited Resources eligible for the Registered Cost methodology, Scheduling Coordinators may elect on a thirty (30) day basis to use either the Proxy Cost methodology or the Registered Cost methodology for specifying their Start-Up Costs and Minimum Load Costs to be used for those resources in the CAISO Markets Processes, as well as for Transition Costs in the case of Multi-Stage Generating

Resources. The elections are independent as to Start-Up Costs and Minimum Load Costs; that is, a Scheduling Coordinator for such a Use-Limited Resource may elect to use either the Proxy Cost methodology or the Registered Cost methodology for Start-Up Costs and may make a different election for Minimum Load Costs. However, in the case of Multi-Stage Generating Resources, the Scheduling Coordinator must make the same election (Proxy Cost methodology or Registered Cost methodology) for Transition Costs as it makes for Start-Up Costs. If a Scheduling Coordinator has not made an election, the CAISO will assume the Proxy Cost methodology as the default.

30.4.1 Start-Up and Minimum Load Costs

30.4.1.1 Proxy Cost Methodology

30.4.1.1.1 Natural Gas-Fired Resources

For each natural gas-fired resource, the Proxy Cost methodology uses formulas for Start-Up Costs and Minimum Load Costs based on the resource's actual unit-specific performance parameters. The Start-Up Cost and Minimum Load Cost values utilized for each such resource in the CAISO Markets Processes will be either (a), if the Scheduling Coordinator does not submit a Start-Up or Minimum Load Cost Bid, or (b) below:

- (a) Formulaic natural gas cost values adjusted for fuel-cost variation on a daily basis using the natural gas price calculated pursuant to Section 39.7.1.1.1.3.
Start-Up Costs also include: (i) the cost of auxiliary power calculated using the unit-specific MWh quantity of auxiliary power used for Start-Up multiplied by a resource-specific electricity price; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each Start-Up as the product of the resource's fuel requirement per Start-Up, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource, multiplied by 0.5; (iv) a resource-specific adder, if applicable, for major maintenance expenses (\$ per Start-Up) determined by the CAISO or Independent

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Entity selected by the CAISO to determine such major maintenance expenses; and (v) for a Use-Limited Resource, Start-Up Opportunity Costs determined pursuant to Section 30.4.1.1.6, if any.

Minimum Load Costs also include: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) a greenhouse gas cost adder for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, which is calculated for each run-hour as the product of the resource's fuel requirement at Minimum Load as registered in the Master File, the greenhouse gas emissions rate authorized by the California Air Resources Board, and the applicable Greenhouse Gas Allowance Price; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource as registered in the Master File; (iv) the Bid Segment Fee; (v) a resource-specific adder, if applicable, for major maintenance expenses (\$ per operating hour) determined pursuant to Section 30.4.1.1.4; and (vi) for a Use-Limited Resource, Minimum Load Opportunity Costs determined pursuant to Section 30.4.1.1.6, if any.

- (b) Start-Up or Minimum Load Cost Bids specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10, subject to the provisions applicable to Multi-Stage Generating Resources set forth in Section 30.4.1.1.3.

In the event that the Scheduling Coordinator for a resource other than a Multi-Stage Generating Resource or for a Multi-Stage Generating Resource in its lowest startable configuration does not provide sufficient data for the CAISO to determine the resource's Start-Up or Minimum Load Costs or one or more components of the resource's Start-Up or Minimum Load Costs, the CAISO will assume that the resource's Start-Up Costs or Minimum Load Costs, or the indeterminable component(s) of the resource's Start-Up Costs or Minimum Load Costs, are zero. In the event that the Scheduling Coordinator for a Multi-Stage Generating Resource does not provide such data for an MSG Configuration beyond its lowest startable configuration, Section 30.4.1.1.3 applies.

30.4.1.1.2 Non-Natural Gas-Fired Resources

For each non-natural gas-fired resource, Start-Up Cost and Minimum Load Cost values under the Proxy Cost methodology shall be based on either (a) if the Scheduling Coordinator does not submit a Start-Up or Minimum Load Cost Bid, or (b) below:

- (a) The Scheduling Coordinator for the resource will provide the fuel or fuel equivalent input costs, which the CAISO will maintain in the Master File.

For Start-Up Costs, the CAISO will also include, if applicable: (i) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (ii) the rates for the Market Services Charge and System Operations Charge multiplied by the shortest Start-Up Time listed for the resource in the Master File, multiplied by the PMin of the resource as registered in the Master File, multiplied by 0.5; (iii) a resource-specific adder, if applicable, for major maintenance expenses (\$ per Start-Up) determined by the CAISO or Independent Entity selected by the CAISO to determine such major maintenance expenses; and (iv) for a Use-Limited Resource, Start-Up Opportunity Costs determined pursuant to Section 30.4.1.1.6, if any. For Minimum Load Costs, the CAISO will also include, if applicable: (i) operation and maintenance costs as provided in Section 39.7.1.1.2; (ii) greenhouse gas allowance costs for each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, as provided to the CAISO by the Scheduling Coordinator; (iii) the rates for the Market Services Charge and System Operations Charge multiplied by the PMin of the resource as registered in the Master File; (iv) the Bid Segment Fee; (v) a resource-specific adder, if applicable, for major maintenance expenses (\$ per operating hour) determined by the CAISO or an Independent Entity selected by the CAISO; and (vi) for a Use-Limited Resource, Minimum Load Opportunity Costs determined pursuant to Section 30.4.1.1.6, if any.

For each resource registered with the California Air Resources Board as having a greenhouse gas compliance obligation, the information provided to the CAISO by the

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Scheduling Coordinator must be consistent with information submitted to the California Air Resources Board. Adders for major maintenance expenses will be determined pursuant to Section 30.4.1.1.4, if any.

- (b) Bids specified by Scheduling Coordinators pursuant to Sections 30.7.9 and 30.7.10, subject to the provisions applicable to Multi-Stage Generating Resources set forth in Section 30.4.1.1.3.

In the event that the Scheduling Coordinator for a resource other than a Multi-Stage Generating Resource or for a Multi-Stage Generating Resource in its lowest startable configuration does not provide sufficient data for the CAISO to determine the resource's Start-Up or Minimum Load Costs or one or more components of the resource Start-Up or Minimum Load Costs, the CAISO will assume that resource's Start-Up or Minimum Load Costs, or the indeterminable component(s) of the resource's Start-Up Costs or Minimum Load Costs, are zero. In the event that the Scheduling Coordinator for a Multi-Stage Generating Resource does not provide such data for an MSG Configuration beyond its lowest startable configuration, Section 30.4.1.1.3 applies.

30.4.1.1.3 Multi-Stage Generating Resources

The Proxy Cost methodology for calculating Start-Up Costs and Minimum Load Costs will apply to all the MSG Configurations for a Multi-Stage Generating Resource that is not a Use-Limited Resource and for a Multi-Stage Generating Resource that is a Use-Limited Resource and elects to use the Proxy Cost methodology. The Proxy Costs (Start-Up Cost, Transition Cost, and Minimum Load Cost) for Multi-Stage Generating Resources will be calculated for each specific MSG Configuration, including for each MSG Configuration that cannot be directly started. Notwithstanding the rules set forth in Sections 30.4.1.1.1(b) and 30.4.1.1.2(b), to the extent that a Scheduling Coordinator for a Multi-Stage Generating Resource, other than in its lowest startable configuration, does not provide sufficient data for the CAISO to determine a component of the Start-Up or Minimum Load Costs for a particular MSG Configuration, the CAISO will, if feasible, use the value for that component associated with the next-lowest MSG Configuration.

30.4.1.1.4 Adders for Major Maintenance Expenses

Scheduling Coordinators may propose adders for major maintenance expenses as a component of Start-Up Costs, Minimum Load Costs, or both. Such proposed adders must be based solely on resource-specific information derived from actual maintenance costs, when available, or estimated maintenance costs provided by the Scheduling Coordinators to the CAISO and the Independent Entity. Scheduling Coordinators may submit updated resource-specific major maintenance information for purposes of seeking a change to any major maintenance adder, no sooner than thirty (30) days after a major maintenance adder has been determined. The CAISO or Independent Entity will evaluate the information provided by Scheduling Coordinators, and may require Scheduling Coordinators to provide additional information, to enable the CAISO or Independent Entity to determine reasonable adders for major maintenance expenses or to conduct audits of major maintenance expenses. Within fifteen (15) days of receipt of the information or any requested additional information, the CAISO or Independent Entity will notify the Scheduling Coordinator in writing whether it has sufficient and accurate information to determine reasonable major maintenance adders to be included in Start-Up or Minimum Load Cost calculations or both. Within ten (10) days after providing written notification to the Scheduling Coordinator that the information is sufficient and accurate, the CAISO or Independent Entity will determine the reasonable adder for major maintenance expenses to be included in Start-Up or Minimum Load Costs or both and will so inform the Scheduling Coordinator in writing.

In the event of a dispute regarding the sufficiency or accuracy of the information provided by the Scheduling Coordinator, the CAISO or Independent Entity and the Scheduling Coordinator will enter a period of good faith negotiations that terminates sixty (60) days after the date the dispute began. If the CAISO or Independent Entity and the Scheduling Coordinator resolve the dispute during the 60-day negotiation period, within ten (10) days of such agreement, the CAISO or Independent Entity will determine the reasonable adder for major maintenance expenses and will provide the adder to the Scheduling Coordinator in writing. If the CAISO or Independent Entity and the Scheduling Coordinator fail to agree upon the sufficiency or accuracy of the information during the 60-day negotiation period, the Scheduling Coordinator has the right to petition FERC to resolve the dispute as to the sufficiency or accuracy of its information.

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In the event of a dispute regarding the CAISO's or Independent Entity's determination of adders for major maintenance expenses, the CAISO or Independent Entity and the Scheduling Coordinator will enter a period of good faith negotiations that terminates sixty (60) days after the date the dispute began. If the CAISO or Independent Entity and the Scheduling Coordinator resolve the dispute during the 60-day negotiation period, the agreed-upon values will be effective as of the first Business Day following the resolution date. If the CAISO or Independent Entity and the Scheduling Coordinator fail to agree on the major maintenance values for either Start-Up or Minimum Load Costs following the 60-day negotiation period, the Scheduling Coordinator has the right to file proposed values and supporting information for major maintenance adders for Start-Up or Minimum Load Costs with FERC pursuant to Section 205 of the Federal Power Act.

In the event of a dispute regarding the reasonableness of the adder for major maintenance expenses determined by the CAISO or Independent Entity, but not a dispute regarding the sufficiency or accuracy of the information provided by the Scheduling Coordinator, the CAISO or Independent Entity will determine a reasonable interim adder for major maintenance expenses until the adder for major maintenance expenses is determined by agreement between the CAISO or Independent Entity and the Scheduling Coordinator or by FERC. Any subsequent agreement or FERC order determining the adder for major maintenance expenses will be reflected in an adjustment to the interim adder for major maintenance expenses in the next applicable Settlement Statement.

30.4.1.1.5 Proxy Transition Cost

For each Multi-Stage Generating Resource under the Proxy Cost methodology, the CAISO will calculate the Transition Costs utilized for each feasible transition from a given MSG Configuration to a higher MSG Configuration based on the difference between the Start-Up Costs for the higher MSG Configuration, minus the Start-Up Costs for the lower MSG Configuration, as determined in accordance with the Start-Up Cost calculation methodology set forth in Section 30.4.1.1. If the result of this calculation is negative for any transition between two MSG Configurations, then the associated Transition Cost shall be zero. The Transition Costs calculated by the CAISO will be utilized in the CAISO Markets Processes unless the Scheduling Coordinator submits Transition Costs for the Multi-Stage Generating Resource in the form of daily Bids that are not negative and are less than or equal to the sum of (i) one hundred twenty-five (125)

percent of the Transition Costs other than the portion of the Transition Costs that consist of Start-Up Opportunity Costs determined by the CAISO, if any; and (ii) one hundred (100) percent of the portion of the Transition Costs that consist of Start-Up Opportunity Costs determined by the CAISO, in which case the Transition Costs submitted in the form of daily Bids will be utilized in the CAISO Markets Processes.

30.4.1.1.6 Use Limited Resources

A Scheduling Coordinator seeking to obtain Use-Limited Resource status for resource(s) will follow the registration and validation process set forth in this CAISO Tariff and the Business Practice Manual. The registration and validation process requires each Scheduling Coordinator to demonstrate on an annual basis that the resource has one or more limits that meet the Use-Limited Resource criteria as set forth in Section 30.4.1.1.6.1.1 and the Business Practice Manual, and allows each Scheduling Coordinator to seek to recover Opportunity Costs for Use-Limited Resources by making the demonstration set forth in Section 30.4.1.1.6.1.2.

30.4.1.1.6.1.1 Use-Limited Resource Criteria

In order for a resource to be considered a Use-Limited Resource, a Scheduling Coordinator must provide sufficient documentation demonstrating that the resource has one or more limit that meet all three of the following criteria:

- (1) The resource has one or more limitations affecting its number of starts, its number of run-hours, or its Energy output due to (a) design considerations, (b) environmental restrictions, or (c) qualifying contractual limitations;
- (2) The CAISO Market Process used to dispatch the resource cannot recognize the resource's limitation(s); and
- (3) The resource's ability to select hours of operation is not dependent on an energy source outside of the resource's control being available during such hours but the resource's usage needs to be rationed.

Design considerations that satisfy the requirements of this Section are those resulting from physical equipment limitations. A non-exhaustive list of such physical equipment limitations includes restrictions documented in original equipment manufacturer recommendations or bulletins, or limiting equipment such as storage capability for hydroelectric generating resources. Other design considerations that satisfy the

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requirements of this Section are those resulting from performance criteria for Demand Response Resources established pursuant to programs or contracts approved by Local Regulatory Authorities. Environmental restrictions that satisfy the requirements of this Section are those imposed by regulatory bodies, legislation, or courts. A non-exhaustive list of such environmental restrictions includes limits on emissions, water use restrictions, run-hour limitations in operating permits or other environmental limits that directly or indirectly limit starts, run hours, or MWh limits, but excludes restrictions with soft caps that allow the resource to increase production above the soft caps through the purchase of additional compliance instruments. Qualifying contractual limitations that satisfy the requirements of this Section are those contained in long-term contracts that: (i) were reviewed and approved by a Local Regulatory Authority on or before January 1, 2015, or were pending approval by a Local Regulatory Authority on or before January 1, 2015 and were later approved; and (ii) were evaluated by the Local Regulatory Authority for the overall cost-benefit of those contracts taking into consideration the overall benefits and burdens, including the limitations on such resources' numbers of starts, numbers of run-hours, or Energy output. Contracts limits that provide for higher payments when start-up, run-hour, or Energy output thresholds are exceeded are not qualifying contractual limitations. Effective April 1, 2022, no contractual limitations will constitute qualifying contractual limitations that satisfy the requirements of this Section. Pursuant to a process set forth in the Business Practice Manual, the CAISO will review the limits and the supporting documentation provided by the Scheduling Coordinator as well as any translation of indirect limits to determine whether the Scheduling Coordinator has made the required showing under this Section. Any dispute regarding the CAISO's determination will be subject to the generally applicable CAISO ADR Procedures set forth in Section 13, which apply except where a CAISO Tariff provision expressly provides for a different means of resolving disputes.

The following types of resources are not eligible to register as Use-Limited Resources: Reliability Demand Response Resources, Regulatory Must-Take Generation, where 100% of the capacity is regulatory must-take, Combined Heat and Power Resources where 100% of the capacity is dedicated to a host industrial process, and Variable Energy Resources.

30.4.1.1.6.1.2 Establishing Opportunity Cost Adders

A Scheduling Coordinator for a Use-Limited Resource that elects the Proxy Cost methodology may seek to establish Opportunity Cost adders for any limitation(s) that meet all three (3) of the following criteria:

- (1) Satisfy the requirements of Section 30.4.1.1.6.1.1;
- (2) Apply for period(s) longer than the time horizon considered in the applicable Day-Ahead Market process; and
- (3) Can be reflected in a monthly, annual, and/or rolling twelve (12) month period.

The CAISO will review the documentation provided by the Scheduling Coordinator and determine whether the CAISO can calculate an Opportunity Cost pursuant to the methodology set forth in Section 30.4.1.1.6.2 using the Opportunity Cost calculator, or whether the Opportunity Cost for the limitation must instead be established pursuant to the negotiation process set forth in Section 30.4.1.1.6.3. Resources with limits that can be modelled using the Opportunity Cost calculator, are not eligible for a negotiated Opportunity Cost. Any Opportunity Cost formula rate resulting from either through the calculated or negotiated process, will remain in place unless and until the formula rate is modified or terminated by the CAISO. Opportunity Costs determined pursuant to a formula rate will remain in place until updated pursuant to Section 30.4.1.1.6.2.1 or Section 30.4.1.1.6.3 to reflect any changes in input values to the formula rate. Any Opportunity Cost bid adder will not be available until the first day of the month following the effective date of this tariff section.

A Scheduling Coordinator may submit documentation, either to establish a new limitation or to modify an existing limitation, in which case the Scheduling Coordinator can request reconsideration that may result in a new formula rate. In addition, Scheduling Coordinators must demonstrate on an annual basis that the resource has one or more limits that meet the Use-Limited Resource criteria as required pursuant to Section 30.4.1.1.6.1. In accordance with Section 39.7.1.3.2.2, the CAISO will make informational filings with FERC of any new, modified, or terminated Opportunity Cost formula rate developed pursuant to Section 30.4.1.1.6.2 or negotiated pursuant to Section 30.4.1.1.6.3.

A Use-Limited Resource to the extent it has a limitation that satisfies the requirements of Section 30.4.1.1.6.1 but applies for a period less than or equal to the time horizon considered in the Day-Ahead Market, is not eligible for an Opportunity Cost for any limitation.

30.4.1.1.6.2 Calculation of Opportunity Cost Adders

30.4.1.1.6.2.1 Calculation Schedule

The CAISO will calculate, and will update the most recent calculations of, Start-Up Opportunity Costs for each validated limitation on a Use-Limited Resource's number of starts, Minimum Load Opportunity Costs for each validated limitation on a Use-Limited Resource's number of run-hours, and Variable Energy Opportunity Costs for each validated limitation on a Use-Limited Resource's Energy output for which the Scheduling Coordinator has made the required showing under Section 30.4.1.1.6.1.2. Such calculations or updated calculations will actually be used to set the adder for each validated limitation that can be reflected in a monthly or a rolling twelve (12) month period and will be advisory for each validated limitation that can be reflected in an annual period. The CAISO plans to perform the calculations and updated calculations once a month. It is possible that circumstances may prevent the CAISO from performing the calculations on a monthly basis, in which case the CAISO will prioritize the workload based on Opportunity Costs most likely to need updating. The CAISO will provide the results of the calculations or updated calculations for a Use-Limited Resource to its Scheduling Coordinator.

In the event that the CAISO is unable to perform such calculations or updated calculations for all Use-Limited Resources, the CAISO will give priority to performing such calculations or updated calculations for those Use-Limited Resources that are currently on pace to reach their maximum allowed numbers of starts, maximum allowed numbers of run-hours, or maximum allowed Energy output more quickly than the most recent calculations of Opportunity Costs indicated. To the extent that the CAISO is unable to perform such calculations or updated calculations for a Use-Limited Resource, the CAISO will utilize the most recently calculated or updated Opportunity Costs that have been set or are advisory for the Use-Limited Resource.

30.4.1.1.6.2.2 Methodology for Opportunity Cost Calculator

For the Opportunity Cost calculator developed by the CAISO, each calculation of Opportunity Costs will equal the estimated profits foregone if the Use-Limited Resource had one fewer unit of starts, run-hours, or Energy output, whichever is applicable, in the future time period of the validated limitation. With regard to each validated limitation of the Use-Limited Resource, the calculation will take into account a margin set forth in the Business Practice Manual. The calculation will also take into account the effect of any

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validated limitation on a Use-Limited Resource's number of starts, number of run-hours, or Energy output in the monthly and annual and/or rolling twelve month periods. For MSG Transitions, the Opportunity Cost for each transition will be derivative of the number of Start-Ups required for the MSG Resource to achieve a specific MSG Configuration.

The CAISO will calculate the estimated profits for each validated limitation over the future time period of the limitation based on the following estimated inputs: (a) the forecasted hourly average of fifteen-minute LMPs for Energy at the Use-Limited Resource's PNode or Aggregated PNode multiplied by (b) the optimal hourly dispatch of the Use-Limited Resource, minus (c) the estimated monthly Start-Up Cost of the Use-Limited Resource, minus (d) the estimated monthly Minimum Load Cost of the Use-Limited Resource, minus (e) the estimated monthly variable Energy cost of the Use-Limited Resource multiplied by the difference between (f) the optimal hourly commitment and dispatch of the Use-Limited Resource and (g) the PMin of the Use-Limited Resource, minus (h) the estimated monthly Transition Cost of the Use-Limited Resource.

The CAISO will calculate input (a) listed above by executing the following steps in the order shown below:

- (1) For each future hour, calculate an hourly implied heat rate at each applicable PNode or Aggregated PNode for a Use-Limited Resource based on the hourly average of the fifteen-minute Real-Time LMPs (reflecting the gas price index used in the Real-Time Market calculated pursuant to Section 39.7.1.1.1.3) from the same hour of the previous year, the Greenhouse Gas Allowance Price, calculated pursuant to Section 39.7.1.1.1.4, from the same day of the previous year, and the gas price index of the applicable fuel region from the same day of the previous year.
- (2) For each future month, calculate a monthly future implied heat rate based on the applicable wholesale future power price of the applicable power trading hub as published by Intercontinental Exchange, the most recent Greenhouse Gas Allowance Price calculated pursuant to Section 39.7.1.1.1.4, and the natural gas future commodity price of the applicable fuel region. The CAISO determines the natural gas futures commodity price by fuel region averaging available prices from the following vendors:
Intercontinental Exchange, Natural Gas Intelligence, and SNL Energy/BTU's Daily Gas

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Wire.

- (3) For each future month, calculate a monthly historical implied heat rate based on the wholesale historic power price of the applicable power trading hub as published by Intercontinental Exchange for the same month of the previous year, the average Greenhouse Gas Allowance Price calculated pursuant to Section 39.7.1.1.1.4 for the same month of the previous year, and the average natural gas commodity price, reflecting the gas price index used in the Real-Time Market calculated pursuant to Section 39.7.1.1.1.3, of the applicable fuel region for the same month of the previous year.
- (4) For each future month, calculate a monthly power price conversion factor as the ratio of the future implied heat rate calculated under (2) above and the historical implied heat rate calculated under (3) above.
- (5) For each future hour, scale the hourly implied heat rate calculated under (1) above by the power price conversion factor calculated under (4) above.
- (6) For each future hour, calculate the LMPs by applying the gas price index of the future month and the most recent Greenhouse Gas Allowance Price calculated pursuant to Section 39.7.1.1.1.4 to the scaled implied heat rates calculated under (5) above.

For a Use-Limited Resource that has twelve (12) or fewer months of LMP data at its PNode or Aggregated PNode, the CAISO will calculate input (a) listed above using LMP data from a comparable PNode or Aggregated PNode.

Additional detail regarding the calculation of Opportunity Costs is provided in Appendix N to the Business Practice Manual for Market Instruments. Any dispute regarding the calculation of Opportunity Costs will be subject to the CAISO ADR Procedures set forth in Section 13.

30.4.1.1.6.3 Negotiation of Opportunity Costs

If, after receipt of the documentation required pursuant to Section 30.4.1.1.6.1.2, the CAISO determines that it cannot rely on the Opportunity Cost calculator to calculate Opportunity Costs for an eligible limitation pursuant to Section 30.4.1.1.6.2, the CAISO will establish the Opportunity Costs for the limitation pursuant to this Section. Upon making this determination, the CAISO will notify the Scheduling

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Coordinator for the resource and request that the Scheduling Coordinator provide the CAISO with a proposed methodology for determining Start-Up Opportunity Costs, Minimum Load Opportunity Costs, and/or Variable Energy Opportunity Costs for the limitation along with documentation supporting the methodology, and a proposed schedule for the CAISO to update such Opportunity Cost(s) under the methodology. The CAISO will either approve the submitted Opportunity Cost methodology or enter into good-faith negotiations with the Scheduling Coordinator to establish an agreed-upon Opportunity Cost methodology and the schedule for updating the Opportunity Costs under the methodology.

If the CAISO and the Scheduling Coordinator enter into good-faith negotiations, the negotiation period will be a minimum of sixty (60) days following the provision of all required documentation by the Scheduling Coordinator. Following the 60-day period, the parties can agree to continue good-faith negotiations or the Scheduling Coordinator can exercise its right to file with FERC as described below. In the event that the CAISO and the Scheduling Coordinator are unable to agree upon negotiated Opportunity Costs before the negotiation period terminates, the CAISO may propose reasonable interim Opportunity Cost value(s) that will apply to the Use-Limited Resource until the CAISO and the Scheduling Coordinator agree upon negotiated Opportunity Costs. The Scheduling Coordinator may accept or reject the proposed interim Opportunity Cost value(s). If the Scheduling Coordinator rejects the proposed interim Opportunity Cost value(s), the Use-Limited Resource will not receive Opportunity Costs unless and until the CAISO and the Scheduling Coordinator agree upon negotiated Opportunity Costs, or such costs are established by an order issued by FERC. In the event that the negotiation period terminates without the CAISO and the Scheduling Coordinator reaching agreement upon negotiated Opportunity Costs, and the Scheduling Coordinator declines to continue negotiations, the Scheduling Coordinator may file proposed Opportunity Costs and supporting documentation with FERC pursuant to Section 205 of the Federal Power Act. Any updates to the negotiated Opportunity Costs adders established pursuant to this Section will consist solely of updates to the Opportunity Cost values themselves, and shall not affect the methodology for establishing those values. Any change in methodology would require the Scheduling Coordinator to initiate a new request pursuant to Section 30.4.1.1.6.1.2.

30.4.1.2 Registered Cost Methodology

Under the Registered Cost methodology, the Scheduling Coordinator for a Use-Limited Resource that is eligible for Opportunity Costs and either (i) does not have at least twelve (12) consecutive months of fifteen-minute LMPs for Energy at the Use-Limited Resource's PNode or Aggregated PNode; or (ii) has at least twelve (12) consecutive months of such LMPs but has not yet reached the start of the second month after the end of the twelfth consecutive month of having such LMPs, may register values of its choosing for Start-Up Costs and/or Minimum Load Costs in the Master File subject to the maximum limit specified in Section 39.6.1.6. A Scheduling Coordinator for a Multi-Stage Generating Resource that is a Use-Limited Resource registering a Start-Up Cost must also register Transition Costs for each feasible MSG Transition, subject to the maximum limit specified in Section 39.6.1.7. For a Use-Limited Resource to be eligible for the Registered Cost methodology there must be sufficient information in the Master File to calculate the value pursuant to the Proxy Cost methodology, which will be used to validate the specific value registered using the Registered Cost methodology. Any such values will be fixed for a minimum of 30 days in the Master File unless: (a) the resource's costs for any such value, as calculated pursuant to the Proxy Cost methodology, exceed the value registered using the Registered Cost methodology, in which case the Scheduling Coordinator may elect to switch to the Proxy Cost methodology for the balance of any 30-day period, except as set forth in Section 30.4.1.2(b); or (b) any cost registered in the Master File exceeds the maximum limit specified in Section 39.6.1.6 or Section 39.6.1.7 after this minimum 30-day period, in which case the value will be lowered to the maximum limit specified in Section 39.6.1.6 or Section 39.6.1.7. If a Multi-Stage Generating Resource elects to use the Registered Cost methodology, that election will apply to all the MSG Configurations for that resource. The cap for the Registered Cost values for each MSG Configuration will be based on the Proxy Cost values calculated for each MSG Configuration, including for each MSG Configuration that cannot be directly started, which are also subject to the maximum limits specified in Sections 39.6.1.6 and 39.6.1.7.

30.5 Bidding Rules

30.5.1 General Bidding Rules

- (a) All Energy and Ancillary Services Bids of each Scheduling Coordinator submitted to the DAM for the following Trading Day shall be submitted at or prior to 10:00 a.m. on the day

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preceding the Trading Day, but no sooner than seven (7) days prior to the Trading Day.

All Energy and Ancillary Services Bids of each Scheduling Coordinator submitted to the RTM for the following Trading Day shall be submitted starting from the time of publication, at 1:00 p.m. on the day preceding the Trading Day, of DAM results for the Trading Day, and ending seventy-five (75) minutes prior to each applicable Trading Hour in the RTM. Scheduling Coordinators may submit only one set of Bids to the RTM for a given Trading Hour, which the CAISO uses for all Real-Time Market processes. The CAISO will not accept any Energy or Ancillary Services Bids for the following Trading Day between 10:00 a.m. on the day preceding the Trading Day and the publication, at 1:00 p.m. on the day preceding the Trading Day, of DAM results for the Trading Day;

- (b) Bid prices submitted by a Scheduling Coordinator for Energy accepted and cleared in the IFM and scheduled in the Day-Ahead Schedule may be increased or decreased in the RTM. Bid prices for Energy submitted but not scheduled in the Day-Ahead Schedule may be increased or decreased in the RTM. Incremental Bid prices for Energy associated with Day-Ahead AS or RUC Awards in Bids submitted to the RTM may be revised. A Scheduling Coordinator may submit in the Real-Time Market new daily Bids for Start-Up Costs, Minimum Load Costs, and Transition Costs for resources and MSG Configurations for which the Scheduling Coordinator previously submitted such Bids in the Day-Ahead Market, except for: (1) Trading Hours in which a resource or MSG Configuration has received a Day-Ahead Schedule or has received a Start-Up Instruction in RUC; and (2) Trading Hours that span the Minimum Run Time of the resource or MSG Configuration after the CAISO has committed the resource or the Scheduling Coordinator has self-committed the resource in the RTM. Scheduling Coordinators may revise ETC Self-Schedules for Supply in the RTM to the extent such a change is consistent with TRTC Instructions provided to the CAISO by the Participating TO in accordance with Section 16. Scheduling Coordinators may revise TOR Self-Schedules for Supply only in the HASP to the extent such a change is consistent with TRTC Instructions provided to the CAISO by the Non-Participating TO in accordance with Section 17. Energy

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associated with awarded Ancillary Services capacity cannot be offered in the Real-Time Market separate and apart from the awarded Ancillary Services capacity;

- (c) Scheduling Coordinators may submit Energy, AS and RUC Bids in the DAM that are different for each Trading Hour of the Trading Day;
- (d) Bids for Energy or capacity that are submitted to one CAISO Market, but are not accepted in that market are no longer a binding commitment and Scheduling Coordinators may submit Bids in a subsequent CAISO Market at a different price;
- (e) The CAISO shall be entitled to take all reasonable measures to verify that Scheduling Coordinators meet the technical and financial criteria set forth in Section 4.5.1 and the accuracy of information submitted to the CAISO pursuant to this Section 30; and
- (f) In order to retain the priorities specified in Section 31.4 and 34.12 for scheduled amounts in the Day-Ahead Schedule associated with ETC and TOR Self-Schedules or Self-Schedules associated with Regulatory Must-Take Generation, a Scheduling Coordinator must submit to the Real-Time Market ETC or TOR Self-Schedules, or Self-Schedules associated with Regulatory Must-Take Generation, at or below the Day-Ahead Schedule quantities associated with the scheduled ETC, TOR or Regulatory Must-Take Generation Self-Schedules. If the Scheduling Coordinator fails to submit such Real-Time Market ETC, TOR or Regulatory Must-Take Generation Self-Schedules, the defined scheduling priorities of the ETC, TOR, or Regulatory Must-Take Generation Day-Ahead Schedule quantities may be subject to adjustment in the HASP and the Real-Time Market as further provided in Section 31.4 and 34.12 in order to meet operating conditions.
- (g) For Multi-Stage Generating Resources that receive a Day-Ahead Schedule, are awarded a RUC Schedule, or receive an Ancillary Services Award the Scheduling Coordinator must submit an Energy Bid in the Real-Time Market for the same Trading Hour(s). If the Scheduling Coordinator submits an Economic Bid for such Trading Hour(s), the Economic Bid must be for either: the same MSG Configuration scheduled or awarded in the Integrated Forward Market, or the MSG Configuration committed in RUC. If the Scheduling Coordinator submits a Self-Schedule in the Real-Time Market for such

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Trading Hour(s), then the Energy Self-Schedule may be submitted in any registered MSG Configuration, including the MSG Configuration awarded in the Day-Ahead Market, that can support the awarded Ancillary Services (as further required by Section 8).

Scheduling Coordinators for Multi-Stage Generating Resources may submit into the Real-Time Market bids from up to six (6) MSG Configurations in addition to the MSG Configuration scheduled or awarded in the Integrated Forward Market and Residual Unit Commitment, provided that the MSG Transitions between the MSG Configurations bid into the Real-Time Market are feasible and the transition from the previous Trading Hour are also feasible.

- (h) For the Trading Hours that Multi-Stage Generating Resources do not have a CAISO Schedule or award from a prior CAISO Market run, the Scheduling Coordinator can submit up to six (6) MSG Configurations into the RTM.
- (i) A Scheduling Coordinator cannot submit a Bid to the CAISO Markets for a MSG Configuration into which the Multi-Stage Generating Resource cannot transition due to lack of Bids for the specific Multi-Stage Generating Resource in other MSG Configurations that are required for the requisite MSG Transition.
- (j) In order for Multi-Stage Generating Resource to meet any Resource Adequacy must-offer obligations, the responsible Scheduling Coordinator must submit either an Economic Bid or Self-Schedule for at least one MSG Configuration into the Day-Ahead Market and Real-Time Market that is capable of fulfilling that Resource Adequacy obligation, as feasible. The Economic Bid shall cover the entire capacity range between the maximum bid-in Energy MW and the higher of Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin as registered in the Master File.
- (k) For any given Trading Hour, a Scheduling Coordinator may submit Self-Schedules and/or Submissions to Self-Provide Ancillary Services in only one MSG Configuration for each Generating Unit.
- (l) In any given Trading Hour in which a Scheduling Coordinator has submitted a Self-Schedule for a Multi-Stage Generating Resource, the Scheduling Coordinator may also

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submit Bids for other MSG Configurations provided that they concurrently submit Bids that enable the applicable CAISO Market to transition the Multi-Stage Generating Resource to other MSG Configurations.

- (m) If in any given Trading Hour the Multi-Stage Generating Resource was awarded Regulation or Operating Reserves in the IFM, any Self-Schedules or Submissions to Self-Provide Ancillary Services the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be for the same MSG Configuration for which Regulation or Operating Reserve is Awarded in IFM for that Multi-Stage Generating Resource in that given Trading Hour.
- (n) If a Multi-Stage Generating Resource has received a binding RUC Start-Up Instruction as provided in Section 31, any Self-Schedule or Submission to Self-Provide Ancillary Services in the RTM must be in the same MSG Configuration committed in RUC.
- (o) If in any given Trading Hour the Multi-Stage Generating Resource is scheduled for Energy in the IFM, any Self-Schedules the Scheduling Coordinator submits for that Multi-Stage Generating Resource in the RTM must be for the same MSG Configuration for which Energy is scheduled in IFM for that Multi-Stage Generating Resource in that given Trading Hour.
- (p) For a Multi-Stage Generating Resource, the Bid(s) submitted for the resource's configuration(s) shall collectively cover the entire capacity range between the maximum bid-in Energy MW and the higher of the Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin as registered in the Master File. This rule shall apply separately to the Day-Ahead Market and the Real-Time Market.
- (q) A Scheduling Coordinator may submit a Self-Schedule Hourly Block for the RTM as an import to or an export from the CAISO Balancing Authority Area and may also submit Self-Scheduled Hourly Blocks for Ancillary Services imports. Such a Bid shall be for the same MWh quantity for each of the four fifteen (15)-minute intervals that make up the applicable Trading Hour.
- (r) A Scheduling Coordinator may submit a Variable Energy Resource Self-Schedule for the

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RTM can be submitted from a Variable Energy Resource. A Scheduling Coordinator can use either the CAISO forecast for Expected Energy in the RTM or can provide its own forecast for Expected Energy pursuant to the requirements specified in Section 4.8.2. The Scheduling Coordinator must indicate in the Master File whether it is using its own forecast or the CAISO forecast for its resource in support of the Variable Energy Self-Schedule. The Scheduling Coordinator is not required to include the same MWh quantity for each of the four fifteen (15)-minute intervals that make up the applicable Trading Hour for the Variable Energy Resource Self-Schedule include. If an external Variable Energy Resource that is not using a forecast of its output provided by the CAISO submits a Variable Energy Resource Self-Schedule and the Expected Energy is not delivered in the FMM, the Scheduling Coordinator for the Variable Energy Resource will be subject to the Decline Potential Charge as described in Section 11.31. Scheduling Coordinators for Dynamically Scheduled Variable Energy Resources that provide the CAISO with a two-hour rolling forecast with five-minute granularity can submit Variable Energy Resource Self-Schedules.

- (s) Scheduling Coordinators can submit Economic Hourly Block Bids to be considered in the HASP and to be accepted as binding Schedules with the same MWh award for each of the four FMM intervals. Scheduling Coordinator can also submit Economic Hourly Block Bids for Ancillary Services. As specified in Section 11, a cleared Economic Hourly Block Bid is not eligible for Bid Cost Recovery.
- (t) Scheduling Coordinators can submit Economic Hourly Block Bids with Intra-Hour Option. If accepted in the HASP, such a Bid creates a bindingschedule with same MWh awards for each of the four FMM intervals. After that, the RTM can optimize such schedules for economic reasons once through an FMM during the Trading Hour. As specified in Section 11, a cleared Economic Hourly Block Bid with Intra-Hour Option is not eligible for Bid Cost Recovery.
- (u) A Scheduling Coordinator submitting Bids to the RTM is not required to submit a Self-Schedule Hourly Block, a Variable Energy Resource Self-Schedule, an Economic Hourly

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Block Bid, or an Economic Hourly Block Bid with Intra-Hour Option, and may instead choose to participate in the RTM through Economic Bids or Self-Schedules.

30.5.2 Supply Bids

30.5.2.1 Common Elements for Supply Bids

In addition to the resource-specific Bid requirements of this Section, all Supply Bids must contain the following components: Scheduling Coordinator ID Code; Resource Location or Resource ID, as appropriate; MSG Configuration ID, as applicable; PNode or Aggregated Pricing Node as applicable; Energy Bid Curve; Self-Schedule component; Ancillary Services Bid; RUC Availability Bid as applicable, the CAISO Market to which the Bid applies; Trading Day to which the Bid applies; Priority Type (if any), and a Transaction ID as created by the CAISO. Supply Bids offered in the CAISO Markets must be monotonically increasing. Energy Bids in the RTM must also contain a Bid for Ancillary Services to the extent the resource is certified and capable of providing Ancillary Service in the RTM up to the registered certified capacity for that Ancillary Service less any Day-Ahead Ancillary Services Awards.

Scheduling Coordinators must submit the applicable Supply Bid components, including Self-Schedules, for the submitted MSG Configuration.

Scheduling Coordinators submitting Bids for Scheduling Points must adhere to the e-Tagging requirements outlined in Section 30.5.7.

30.5.2.2 Supply Bids for Participating Generators

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for Participating Generators shall contain the following components as applicable: Start-Up Bid, Minimum Load Bid, Ramp Rate, Minimum and Maximum Operating Limits; Energy Limit, Regulatory Must-Take/Must-Run Generation; Contingency Flag; and Contract Reference Number (if any). Scheduling Coordinators submitting these Bid components for a Multi-Stage Generating Resource must do so for the submitted MSG Configuration. Scheduling quantities that a Scheduling Coordinator schedules as Regulatory Must-Take Generation for a CHP Resource shall be limited to the quantity necessary in any hour to meet the reasonably anticipated industrial host's thermal requirements and shall not exceed any established RMTMax values. The CHP Resource owner or operator shall provide its Scheduling Coordinator with the Regulatory Must-Take Generation values and is solely responsible for the accuracy of the information. The Scheduling

Coordinator for the CHP Resource will schedule the quantities consistent with information provided subject to any contract rights between the CHP Resource Generating Unit owner or operator and its counter-party to any power purchase agreement regarding curtailment or dispatchability of the CHP Resource. If the CHP Resource Generating Unit has a power purchase agreement and its counter-party is not the Scheduling Coordinator for the resource, the parties to the agreement share the responsibility for ensuring that the Scheduling Coordinator schedules the resource consistent with contractual rights of the counter-parties. A Scheduling Coordinator for a Physical Scheduling Plant or a System Unit may include Generation Distribution Factors as part of its Supply Bid. If the Scheduling Coordinator has not submitted the Generation Distribution Factors applicable for the Bid, the CAISO will use default Generation Distribution Factors stored in the Master File. All Generation Distribution Factors used by the CAISO will be normalized based on Outage data that is available to the automated market systems. A Multi-Stage Generating Resource and its MSG Configurations are registered under a single Resource ID and Scheduling Coordinator for the Multi-Stage Generating Resource must submit all Bids for the resource's MSG Configurations under the same Resource ID. For a Multi-Stage Generating Resources Scheduling Coordinators may submit bid curves for up to ten individual MSG Configurations of their Multi-Stage Generating Resources into the Day-Ahead Market and up to three individual MSG Configurations into the Real-Time Market. Scheduling Coordinators for Multi-Stage Generating Resources must submit a single Operational Ramp Rate for each MSG Configuration for which it submits a supply Bid either in the Day-Ahead Market or Real-Time Market. For Multi-Stage Generating Resources the Scheduling Coordinator may submit the Transition Times, which cannot be greater than the maximum Transition Time registered in the Master File. To the extent the Scheduling Coordinator does not submit the Transition Time that is a registered feasible transition the CAISO will use the registered maximum Transition Time for that MSG Transition for the specific Multi-Stage Generating Resource.

30.5.2.3 Supply Bids for Participating Loads, Including Pumped-Storage Hydro Units and Aggregated Participating Loads

In addition to the common elements listed in Section 30.5.2.1, Scheduling Coordinators submitting Supply Bids for Participating Loads, which includes Pumping Load or Pumped-Storage Hydro Units, may include the following components: Pumping Level (MW), Minimum Load Bid (Generation mode only of a Pumped-

Storage Hydro Unit), Load Distribution Factor, Ramp Rate, Energy Limit, Pumping Cost, and Pump Shut-Down Costs. If no values for Pumping Cost or Pump Shut-Down Costs are submitted, the CAISO will generate these Bid components based on values in the Master File. Scheduling Coordinators may only submit Supply Bids for Aggregated Participating Loads by using a Generating Unit or Physical Scheduling Plant Resource ID for the Demand reduction capacity represented by the Aggregated Participating Load as set forth in a Business Practice Manual. The CAISO will use Generation Distribution Factors provided by the Scheduling Coordinator for the Aggregated Participating Load.

30.5.2.4 Supply Bids for System Resources

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for System Resources shall also contain: the relevant Ramp Rate; Start-Up Costs; and Minimum Load Costs. Resource-Specific System Resources are subject to the Proxy Cost methodology or the Registered Cost methodology for Start-Up Costs and Minimum Load Costs as provided in Section 30.4, and Transaction ID as created by the CAISO. Other System Resources are not eligible to recover Start-Up Costs and Minimum Load Costs. Resource-Specific System Resources are eligible to participate in the Day-Ahead Market on an equivalent basis as Generating Units and are not obligated to participate in RUC or the RTM if the resource did not receive a Day-Ahead Schedule unless the resource is a Resource Adequacy Resource. If the Resource-Specific System Resource is a Resource Adequacy Resource, the Scheduling Coordinator for the resource is obligated to make it available to the CAISO Market as prescribed by Section 40.6. Dynamic Resource-Specific System Resources are also eligible to participate in the RTM on an equivalent basis as Generating Units. The quantity (in MWh) of Energy categorized as Interruptible Imports (non-firm imports) can only be submitted through Self-Schedules in the Day-Ahead Market and cannot be incrementally increased in the RTM. Bids submitted to the Day-Ahead Market for ELS Resources will be applicable for two days after they have been submitted and cannot be changed the day after they have been submitted.

30.5.2.4.1 Intertie Block Bids

Intertie Block Bids must contain the same energy Bid price for all hours of the period for which the Intertie Block Bid is submitted. Intertie Block Bids may only be submitted in the DAM.

30.5.2.5 Supply Bids for Metered Subsystems

Consistent with the bidding rules specified in this Section 30.5, Scheduling Coordinators that represent MSS Operators may submit Bids for Energy and Ancillary Services, including Self-Schedules and Submissions to Self-Provide an Ancillary Service, to the DAM. All Bids to supply Energy by MSS Operators must identify each Generating Unit on an individual unit basis. The CAISO will not accept aggregated Generation Bids without complying with the requirements of Section 4.9.12 of the CAISO Tariff. All Scheduling Coordinators that represent MSS Operators must submit Demand Bids at the relevant MSS LAP. Scheduling Coordinators that represent MSS Operators must comply with Section 4.9 of the CAISO Tariff. Scheduling Coordinators that represent MSS Operators that have opted out of RUC participation pursuant to Section 31.5 must Self-Schedule one hundred percent (100%) of the Demand Forecast for the MSS. For an MSS that elects Load following, the MSS Operator shall also self-schedule or bid Supply to match the Demand Forecast. All Bids for MSSs must be identify each Generating Unit on an individual unit basis or a System Unit. For an MSS that elects Load following consistent with Section 4.9.13.2, the Scheduling Coordinator for the MSS Operator must include the following additional information with its Bids: the Generating Unit(s) that are Load following; the range of the Generating Unit(s) being reserved for Load following; whether the quantity of Load following capacity is either up or down; and, if there are multiple Generating Units in the MSS, the priority list or distribution factors among the Generating Units. The CAISO will not dispatch the resource within the range declared as Load following capacity, leaving that capacity entirely available for the MSS to dispatch. The CAISO uses this information in the IFM runs and the RUC to simulate MSS Load following. The Scheduling Coordinator for the MSS Operator may change these characteristics through the Bid submission process in the RTM. If the Load following resource is also an RMR Unit, the MSS Operator must not specify the Maximum Net Dependable Capacity specified in the RMR Contract as Load following up or down capacity to allow the CAISO to access such capacity for RMR Dispatch.

30.5.2.6 Supply Bids for Distributed Energy Resource Aggregations

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for Distributed Energy Resource Aggregations will contain the following components as applicable: Generation Distribution Factors, Ramp Rate, Minimum and Maximum Operating Limits; Energy Limit, and Contingency Flag. If

the Scheduling Coordinator does not submit the Generation Distribution Factors for the Bid, the CAISO will use default Generation Distribution Factors registered in Master File.

30.5.2.7 Ancillary Service Bids

There are four distinct Ancillary Services: Regulation Up, Regulation Down, Spinning Reserve and Non-Spinning Reserve. A resource shall be eligible to provide Ancillary Service if it has complied with the CAISO's certification and testing requirements as contained in Appendix K and the CAISO's Operating Procedures. Scheduling Coordinators may use Dynamic System Resources to Self-Provide Ancillary Services as specified in Section 8. All System Resources, including Dynamic System Resources and Non-Dynamic System Resources, will be charged the Shadow Price as prescribed in Section 11.10, for any awarded Ancillary Services. A Scheduling Coordinator may submit Ancillary Services Bids for Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve for the same capacity by providing a separate price in \$/MW per hour as desired for each Ancillary Service. The Bid for each Ancillary Services is a single Bid segment. Only resources certified by the CAISO as capable of providing Ancillary Services are eligible to provide Ancillary Services and submit Ancillary Services Bids. In addition to the common elements listed in Section 30.5.2.1, all Ancillary Services Bid components of a Supply Bid must contain the following: (1) the type of Ancillary Service for which a Bid is being submitted; (2) Ramp Rate (Operating Reserve Ramp Rate and Regulation Ramp Rate, if applicable); and (3) Distribution Curve for Physical Scheduling Plant or System Unit. A Scheduling Coordinator may only submit an Ancillary Services Bid or Submission to Self-Provide an Ancillary Service for Multi-Stage Generating Resources for the Ancillary Service for which the specific MSG Configurations are certified. For any such certified MSG Configurations the Scheduling Coordinator may submit only one Operating Reserve Ramp Rate and Regulation Ramp Rate. An Ancillary Services Bid submitted to the Day-Ahead Market when submitted to the Day-Ahead Market may be, but is not required to be, accompanied by an Energy Bid that covers the capacity offered for the Ancillary Service. Submissions to Self-Provide an Ancillary Services submitted to the Day-Ahead Market when submitted to the Day-Ahead Market may be, but are not required to be, accompanied by an Energy Bid that covers the capacity to be self-provided. If a Scheduling Coordinator's Submission to Self-Provide an Ancillary Service is qualified as specified in Section 8.6, the Scheduling Coordinator must submit an Energy Bid that covers the self-provided capacity

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prior to the close of the Real-Time Market for the day immediately following the Day-Ahead Market in which the Ancillary Service Bid was submitted. Except as provided below, the Self-Schedule for Energy need not include a Self-Schedule for Energy from the resource that will be self-providing the Ancillary Service. If a Scheduling Coordinator is self-providing an Ancillary Service from a Fast Start Unit, no Self-Schedule for Energy for that resource is required. If a Scheduling Coordinator proposes to self-provide Spinning Reserve, the Scheduling Coordinator is obligated to submit a Self-Schedule for Energy for that particular resource, unless as discussed above the particular resource is a Fast Start Unit. When submitting Ancillary Service Bids in the Real-Time Market, Scheduling Coordinators for resources that either have been awarded or self-provide Spinning Reserve or Non-Spinning Reserve capacity in the Day-Ahead Market must submit an Energy Bid for at least the awarded or self-provided Spinning Reserve or Non-Spinning Reserve capacity, otherwise the CAISO will apply the Bid validation rules described in Section 30.7.6.1.

As provided in Section 30.5.2.6.4, a Submission to Self-Provide an Ancillary Service shall contain all of the requirements of a Bid for Ancillary Services with the exception of Ancillary Service Bid price information. In addition, Scheduling Coordinators must comply with the Ancillary Services requirements of Section 8. Scheduling Coordinators submitting Self-Schedule Hourly Blocks for Ancillary Services Bids for the Real-Time Market must also submit an Energy Bid for the associated Ancillary Services Bid under the same Resource ID, otherwise the bid validation rules in Section 30.7.6.1 will apply to cover any portion of the Ancillary Services Bid not accompanied by an Energy Bid. As described in Section 34.2.3, if the resource submits a Self-Scheduled Hourly Block, the CAISO will only use the Ancillary Services Bid in the RTM optimization and will not use the associated Energy Bid for the same Resource ID to schedule Energy from the Non-Dynamic System Resource in the RTM. Scheduling Coordinators must also comply with the bidding rules associated with the must offer requirements for Ancillary Services specified in Section 40.6.

30.5.2.7.1 Regulation Up or Regulation Down Bid Information

In the case of Regulation Up or Regulation Down, the Ancillary Services Bid or submission to self-provide must also contain: (a) the upward and downward range of generating capacity over which the resource is willing to provide Regulation in ten (10) minutes; (b) the Bid price of the capacity reservation, stated

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separately for Regulation Up and Regulation Down (\$/MW); and (c) the Bid price (\$) of the Mileage stated separately for Regulation Up and Regulation Down. For submissions to self-provide Regulation Up or Regulation Down, the price for the capacity reservation shall be \$0/MWh and the price for Mileage shall be \$0. In the case of Regulation Up or Regulation Down from Dynamic System Resources, the Ancillary Services Bid must also contain the Contract Reference Number, if applicable. Scheduling Coordinators may include inter-temporal opportunity costs in their Regulation capacity bids, but these inter-temporal opportunity costs must be verifiable. Ancillary Services Bids submitted to the Day-Ahead or Real-Time Market for Regulation need not be accompanied by an Energy Supply Bid that covers the Ancillary Services capacity being offered. A Regulation Down Bid will be erased unless there is an Energy Supply Bid or Energy Self-Schedule at a level that would permit the resource to provide Regulation Down to its lower Regulation Limit. A submission to self-provide Regulation Down will be erased unless there is an Energy Self-Schedule at a level that would permit the resource to provide Regulation Down to its lower Regulation Limit. A Regulation Up Bid will be erased unless there is an Energy Supply Bid or Energy Self-Schedule at a level that would permit the resource to provide Regulation Up within its Regulation Limit. A submission to self-provide Regulation Up will be erased unless there is an Energy Self-Schedule at a level that would permit the resource to provide Regulation Up within its Regulation Limit.

30.5.2.7.2 Spinning Reserve Capacity Bid Information

In the case of Spinning Reserve capacity, the Ancillary Services Bid must also contain: (a) MW of additional capability synchronized to the system, immediately responsive to system frequency, and available within ten (10) minutes; (b) Bid price of capacity reservation, and (c) an indication whether the capacity reserved would be available to supply imbalance energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency (Contingency Flag). In the case of Spinning Reserve capacity from System Resources, the Ancillary Services Bid must also contain: (a) Schedule ID (NERC ID number); and (b) a Contract Reference Number, if applicable. Ancillary Services Bids and Submissions to Self-Provide an Ancillary Services submitted to the Real-Time Market for Spinning Reserves must also submit an Energy Bid that covers the Ancillary Services capacity being offered into the Real-Time Market.

30.5.2.7.3 Non-Spinning Reserve Capacity

In the case of Non-Spinning Reserve, the Ancillary Service Bid must also contain: (a) the MW capability available within ten (10) minutes; (b) the Bid price of the capacity reservation; (c) time of synchronization following notification (minutes); and (d) an indication whether the capacity reserved would be available to supply imbalance energy only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency (Contingency Flag). In the case of Non-Spinning Reserve Capacity from System Resources, the Ancillary Services Bid must also contain: (a) Schedule ID (NERC ID number); and (b) a Contract Reference Number, if applicable. In the case of Non-Spinning Reserve Capacity from Participating Load within the CAISO Balancing Authority Area, the Ancillary Service Bid must also contain: (a) a Load identification name and Location Code; (b) Demand reduction available within ten (10) minutes; (c) time to interruption following notification (minutes); and (d) maximum allowable curtailment duration (hour). In the case of Aggregated Participating Load, and Proxy Demand Resources, Scheduling Coordinators must submit Bids using a Generating Unit, Physical Scheduling Plant Resource ID, or Resource ID for the Proxy Demand Resource for the Demand reduction capacity of the Aggregated Participating Load through a Bid to provide Non-Spinning Reserve or a Submission to Self-Provide an Ancillary Service for Non-Spinning Reserve. Ancillary Services Bids and Submissions to Self-Provide an Ancillary Services submitted to the Real-Time Market for Non-Spinning Reserves must also submit an Energy Bid that covers the Ancillary Services capacity being offered into the Real-Time Market.

30.5.2.7.4 Additional Rules for Self-Provided Ancillary Services

Scheduling Coordinators electing to self-provide Ancillary Services shall supply the information referred to in this Section 30.5 in relation to each Ancillary Service to be self-provided, excluding the capacity price information, but including the name of the trading Scheduling Coordinator in the case of Inter-Scheduling Coordinator Ancillary Service Trades. The portion of the Energy Bid that corresponds to the high end of the resource's operating range, shall be allocated to any awarded or Self-Provided Ancillary Services in the following order from higher to lower capacity: (a) Regulation Up; (b) Spinning Reserve; and (c) Non-Spinning Reserve. For resources providing Regulation Up, the upper regulating limit shall be used if it is lower than the highest operating limit. The remaining portion of the Energy Bid (i.e. that portion not associated with capacity committed to provide Ancillary Services) shall constitute a Bid to provide Energy.

30.5.2.8 RUC Availability Bids

Scheduling Coordinators may submit RUC Availability Bids for specific Generating Units capacity that is not Resource Adequacy Capacity or CPM Capacity in the DAM. Scheduling Coordinators for Resource Adequacy Capacity or CPM Capacity must participate in RUC to the extent that such capacity is not reflected in an IFM Schedule but need not submit RUC Availability Bids. Resource Adequacy Capacity participating in RUC will be optimized using a zero dollar (\$0/MW-hour) RUC Availability Bid. For Multi-Stage Generating Resources, the RUC Availability Bids shall be submitted at the MSG Configuration. Capacity that does not have Bids for Supply of Energy in the IFM will not be eligible to participate in the RUC process. The RUC Availability Bid component is MW-quantity of non-Resource Adequacy Capacity in \$/MW per hour.

30.5.3 Demand Bids

Each Scheduling Coordinator representing Demand, including Non-Participating Load and Aggregated Participating Load, shall submit Bids indicating the hourly quantity of Energy in MWh that it intends to purchase in the IFM for each Trading Hour of the Trading Day. Scheduling Coordinators must submit Demand Bids, including Self Schedules, for CAISO Demand at Load Aggregation Points except as provided in Section 30.5.3.2.

30.5.3.1 Demand Bids Components

Demand Bids must have the following components: Scheduling Coordinator ID Code; a Demand Bid curve that is a monotonically decreasing staircase function of no more than ten (10) segments defined by eleven (11) ordered pairs of MW and \$/MWh; Location Code for the LAP, Custom LAP or PNode, as applicable; and hourly scheduled MWh within the range of the Bid curve, including any zero values, for each Settlement Period of the Trading Day.

30.5.3.2 Exceptions to Requirement for Submission of Demand Bids and Settlement at the LAP

The following are exceptions to the requirement that Demand Bids be submitted and settled at the LAP:

- (a) ETC or TOR Self-Schedules submitted consistent with the submitted TRTC Instructions;
- (b) Participating Load and Aggregated Participating Load Bids for Supply and Demand may

be submitted and settled at a PNode or Custom LAP, as appropriate; and

- (c) Export Bids are submitted and settled at Scheduling Points, which do not constitute a LAP.

30.5.4 Wheeling Through Transactions

A Wheeling Through transaction consists of an Export Bid and an Import Bid with the same Wheeling reference (a unique identifier for each Wheeling Through transaction). If the Wheeling reference does not match at the time the relevant market closes, the Wheeling Through transaction will be erased; this includes any Economic Bid or Self-Schedule for the resource for that Trading Hour. Wheeling Through transactions with matching Wheeling references will be kept balanced in the IFM and RTM; that is, to the extent an Export Bid or Import Economic Bid or Self-Schedule specify different quantities, only that matching quantity will clear the CAISO Markets.

30.5.5 Scheduling Sourcing/Sinking in Same Balancing Authority Area

30.5.5.1 Prohibition

A Scheduling Coordinator is prohibited from submitting Bids that result in a Schedule(s) being awarded to that single Scheduling Coordinator that has an associated E-Tag reflecting a source and sink in the same Balancing Authority Area. A Schedule or Schedules resulting from Bids submitted in violation of this Section 30.5.5.1 will be settled according to Section 11.2.4.7 and Section 11.33.

30.5.5.2 Exceptions to Prohibition

Bids that otherwise would be prohibited under Section 30.5.5.1 are permitted, and the resulting Schedule(s) will not be settled according to Section 11.2.4.7 and Section 11.33, if any of the following four conditions cause the associated E-Tag to have a source and sink in the same Balancing Authority Area.

- (a) The Schedule(s) includes a transmission segment on a DC Intertie.
- (b) The Schedule(s) involves a Pseudo-Tie generating unit delivering energy from its Native Balancing Authority Area to an Attaining Balancing Authority Area.
- (c) The Schedule(s) are used either to: (i) serve Load that temporarily has become isolated from the CAISO Balancing Authority Area because of an Outage; or (ii) deliver Power from a Generating Unit that temporarily has become isolated from the CAISO Balancing Authority Area because of an Outage.

- (d) The Schedule(s) involve a Wheeling Through transaction that the Scheduling Coordinator can demonstrate was used to serve load located outside the transmission and Distribution System of a Participating TO.

Provided, however, that if the circumstances leading to one of the above four conditions being met were excluded from consideration and the resulting hypothetical Schedule(s) could have an associated E-Tag reflecting a source and sink in the same Balancing Authority Area, then the Schedule(s) will be settled according to Section 11.2.4.7 and Section 11.33.

30.5.6 Non-Generator Resource Bids

Scheduling Coordinators must ensure that Non-Generator Resource Bids or Bids from resources using Non-Generator Resource Generic Modeling functionality contain the Bid components specified in this Section 30.5 based on how the resource is then participating in the CAISO Markets, namely, whether it is providing Supply, Demand, and/or Ancillary Services Bids. In addition to the Bid components listed in this Section 30.5, Scheduling Coordinators representing Non-Generator Resources may submit Bids including the State of Charge for the Day-Ahead Market to indicate the forecasted starting physical position of the Non-Generator Resource. Scheduling Coordinators representing Non-Generator Resources using Regulation Energy Management must submit Bids compliant with the requirements of Section 8.4.1.2.

30.5.7 E-Tag Rules and Treatment of Intertie Schedules

In addition to complying with all generally applicable E-Tagging requirements, Scheduling Coordinators must submit their E-tags consistent with the requirements specified in this Section 30.5.7. If a Scheduling Coordinator receives an intra-hour Schedule change, then the Scheduling Coordinator must, by twenty minutes before the start of the FMM interval to which the Schedule change applies, ensure that an updated energy profile reflects the change. Absent extenuating circumstances, the CAISO automatically updates Energy profiles on E-tags for Energy Schedules that change from HASP to the FMM within a Trading Hour. In performing this service for a Scheduling Coordinator, the CAISO does not assume any responsibility for compliance with any E-tag requirements or obligations to which the Scheduling Coordinator is subject. The changed energy profile will apply for the balance of the operating hour unless it is subsequently changed by a further updated energy profile.

30.5.7.1 Self-Schedule Hourly Blocks

By twenty minutes prior to the applicable Trading Hour, the Scheduling Coordinator must submit an E-Tag in support of Self-Scheduled Hourly Blocks. The transmission profile must be greater than or equal to the Energy profile, and the Energy profile must equal the Self-Scheduled Hourly Block. The CAISO may modify the Energy profile due to Reliability related curtailments.

30.5.7.2 Variable Energy Resource Self-Schedule

By twenty minutes prior to the applicable Trading Hour, the Scheduling Coordinator must submit an E-Tag in support of a Variable Energy Resource Self-Schedule. The transmission profile must be greater than or equal to the Energy profile, and the Energy profile must equal the Variable Energy Resource Self-Schedule. The CAISO may modify the Energy profile due to Reliability related curtailments.

30.5.7.3 Economic Hourly Bid

By twenty minutes prior to the applicable Trading Hour, the Scheduling Coordinator must submit an E-Tag in support of an Economic Hourly Block Bid. The transmission profile must be greater than or equal to the Energy profile, and the Energy profile must equal the Economic Hourly Block Bid as awarded through HASP. The CAISO may modify the Energy profile due to Reliability related curtailments.

30.5.7.4 Economic Hourly Block Bid with Intra-Hour Option

By twenty minutes prior to the applicable Trading Hour, the Scheduling Coordinator must submit an E-Tag in support of an Economic Hourly Block Bid. The transmission profile must be greater than or equal to the Energy profile, and the Energy profile must equal the Economic Hourly Block Bid as awarded through HASP. The CAISO may modify the Energy profile due to Reliability related curtailments. In the case of an intra-hour redispatch from the FMM, the CAISO may increment or decrement the Energy profile to correspond to the intra-hour redispatch.

30.5.7.5 FMM Economic Bid

By twenty minutes prior to the applicable Trading Hour, the Scheduling Coordinator must submit an E-Tag in support of a FMM Economic Bid. The transmission profile must be greater than or equal to the maximum bid-in capacity for the Trading Hour, and the Energy profile must equal the MWs awarded for the first FMM interval of the Operating Hour. If the Scheduling Coordinator intends to limit its participation in the FMM to the quantity in the HASP advisory energy schedule (including zero), the Scheduling

Coordinator may update its transmission profile to the maximum amount it wants to make available to the FMM prior to the start of the binding FMM optimization, which is no earlier than thirty-seven and a half minutes before the applicable Trading Hour. If the Scheduling Coordinator does not have a transmission profile greater than or equal to its advisory Energy schedule, then the CAISO will limit the schedule for Energy in the FMM so that it does not exceed amounts greater than what is listed in the transmission profile. Cleared FMM Economic Bids are eligible for Bid Cost Recovery as specified in Section 11.8.

30.6 Bidding and Scheduling of PDRs and RDRRs

30.6.1 Bidding and Scheduling of PDRs

Unless otherwise specified in the CAISO Tariff and applicable Business Practice Manuals, and subject to Section 30.6.3, the CAISO will treat Bids for Energy and Ancillary Services on behalf of Proxy Demand Resources like Bids for Energy and Ancillary Services on behalf of other types of supply resources. A Scheduling Coordinator for a Demand Response Provider representing a Proxy Demand Resource may submit (1) Energy Bids only in the Day-Ahead Market and in the Real-Time Market; (2) RUC Availability Bids; and (3) Ancillary Service Bids in the Day-Ahead Market and Real-Time Market for those Ancillary Services for which the Proxy Demand Resource is certified. A Scheduling Coordinator for a Demand Response Provider representing a Proxy Demand Resource may Self-Provide Ancillary Services for which it is certified. The Demand Response Provider's Demand Response Services for Proxy Demand Resources will be bid separately and independently from the LSE's underlying Demand Bid.

30.6.2 Bidding and Scheduling of RDRRs

Unless otherwise specified in the CAISO Tariff and applicable Business Practice Manuals, and subject to Section 30.6.3, the CAISO will treat Bids for Energy on behalf of Reliability Demand Response Resources like Bids for Energy on behalf of other types of supply resources. A Scheduling Coordinator for a Demand Response Provider representing a Reliability Demand Response Resource may submit Energy Bids for the Reliability Demand Response Resource only in the Day-Ahead Market and in the Real-Time Market, but may not submit Energy Self-Schedules for the Reliability Demand Response Resource, may not Self-Provide Ancillary Services from the Reliability Demand Response Resource, and may not submit RUC Availability Bids or Ancillary Service Bids for the Reliability Demand Response Resource. The Demand Response Provider's Demand Response Services for Reliability Demand Response Resources

will be bid separately and independently from the LSE's underlying Demand Bid.

30.6.2.1 Bidding and Scheduling of RDRRs in the Real-Time Market

30.6.2.1.1 Limitations on Obligation to Bid in the Real-Time Market

Within each Reliability Demand Response Services Term, any capacity of a Reliability Demand Response Resource that remains uncommitted after the Day-Ahead Market shall be bid in the Real-Time Market in order to be available to provide Demand Response Services in Real-Time until such time as the Reliability Demand Response Resource has reached the RDRR Availability Limit for the Reliability Demand Response Services Term. Within each Reliability Demand Response Services Term, any capacity of a Reliability Demand Response Resource that remains uncommitted after the Day-Ahead Market may be (but is not required to be) bid in the Real-Time Market in order to be available to provide Demand Response Services in Real-Time after the Reliability Demand Response Resource has reached the RDRR Availability Limit during the Reliability Demand Response Services Term.

30.6.2.1.2 Real-Time Dispatch Options

For purposes of bidding and scheduling in the Real-Time Market, each Scheduling Coordinator for a Demand Response Provider representing a Reliability Demand Response Resource shall select either the Marginal Real-Time Dispatch Option or the Discrete Real-Time Dispatch Option prior to the start of the initial Reliability Demand Response Services Term applicable to the Reliability Demand Response Resource. The selection for each Reliability Demand Response Resource shall remain in effect until such time as the Scheduling Coordinator for the Reliability Demand Response Resource chooses to change its selection from the Marginal Real-Time Dispatch Option to the Discrete Real-Time Dispatch Option or vice versa, in which case the change in selection shall go into effect at the start of the next Reliability Demand Response Services Term applicable to the Reliability Demand Response Resource. A Reliability Demand Response Resource that is subject to either the Marginal Real-Time Dispatch Option or the Discrete Real-Time Dispatch Option shall have Minimum Load Costs of zero (0) dollars registered in the Master File.

30.6.2.1.2.1 Marginal Real-Time Dispatch Option

A Reliability Demand Response Resource that is subject to the Marginal Real-Time Dispatch Option:

- (a) May submit either a single-segment Bid or a multi-segment Bid in the Real-Time Market

that must be at least ninety-five (95) percent of the applicable maximum Bid price and can be no greater than one hundred (100) percent of the applicable maximum Bid price set forth in Section 39.6.1.1.

- (b) Shall be dispatched as a marginal resource if it is dispatched by the CAISO.

30.6.2.1.2.2 Discrete Real-Time Dispatch Option

A Reliability Demand Response Resource that is subject to the Discrete Real-Time Dispatch Option:

- (a) May submit only a single-segment Bid in the Real-Time Market that must be at least ninety-five (95) percent of the applicable maximum Bid price and can be no greater than one hundred (100) percent of the applicable maximum Bid price set forth in Section 39.6.1.1.
- (b) Shall be dispatched as a discrete (non-marginal) resource if it is dispatched by the CAISO.

30.6.3 Net Benefits Test for PDRs or PDRRs

In accordance with Section 11.5.2.4, the CAISO will apply a net benefits test to determine a threshold Market Clearing Price for Proxy Demand Resources settlement adjustments.

30.6.3.1 Supply Curve Used in Applying the Net Benefits Test

The CAISO will generate one (1) on-peak supply curve and one (1) off-peak supply curve for each month that depicts the system-wide aggregated power supplies at different offer prices in the CAISO Markets within that month. The CAISO will generate these two supply curves for each month, using the following sequential methodology:

- (i) The CAISO will collect supply curve data for the month that is twelve (12) months prior to the month for which the CAISO is generating the supply curves (the reference month), using all mitigated Bids in the Real-Time Market from any Generating Unit that is either committed or uncommitted and excluding Import Bids and Export Bids.
- (ii) The CAISO will adjust the supply curve data to reflect differences in resource availability and fuel prices between the target month and the reference month. Significant changes in resource availability will be determined using the averages of the hourly supply curves over the entire reference month, with the supply quantities being averaged for every price

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level. Significant changes in fuel prices will be determined using the simple average of the relevant fuel indices as specified in the Business Practice Manual. For every supply quantity, the corresponding price will be scaled using a scaling factor defined as the forward gas price for the Trading Month divided by the historical average gas price for the reference month. These adjustments will result in two representative supply curves for the target month, one (1) on-peak and one (1) off-peak.

- (iii) The CAISO will smooth the representative supply curves to twice differentiable using an exponential form function and applying a price window that is likely to contain the threshold Market Clearing Price. The price window may need to be adjusted in the process until the smoothed supply curves fit the representative supply curves closely.

Using the smoothed supply curves, the CAISO will determine a candidate threshold Market Clearing Price for the on-peak and a threshold Market Clearing Price for the off-peak corresponding to the point on each supply curve beyond which (i) the product of the amount of supplied Power (prior to the dispatch of Proxy Demand Resources) and the reduction in Market Clearing Price that results from the dispatch of Proxy Demand Resources exceeds (ii) the product of the Market Clearing Price (prior to the dispatch of Proxy Demand Resources) and the reduction in the amount of supplied Power that results from the dispatch of Proxy Demand Resources. If the candidate threshold Market Clearing Price is outside the corresponding price window being used, the price window needs to be adjusted and this process will be repeated until the price window contains the candidate threshold Market Clearing Price and thus makes it the final threshold Market Clearing Price. If multiple candidate threshold Market Clearing Prices exist, the candidate threshold Market Clearing Price that is concave on the supply curve (a supply function of price) will be the final threshold Market Clearing Price.

30.6.3.2 Information Posted on CAISO Website

The net benefits test will be posted on the CAISO website, along with supporting documentation and the threshold Market Clearing Prices that were in effect in the previous twelve (12) months, and any updated supply curve analysis. The CAISO will post the threshold Market Clearing Prices determined for each month on the CAISO Website by the fifteenth (15th) day of the immediately preceding month.

30.7 Bid Validation

The CAISO shall validate submitted Bids pursuant to the procedures set forth in this Section 30.7 and the rules set forth in the Business Practice Manuals.

30.7.1 Scheduling Coordinator Access

Each Scheduling Coordinator will be provided access to the CAISO's secure communication system to submit, modify and cancel Bids prior to the close of both the DAM and RTM, as specified in Section 30.5.1. The CAISO shall provide information regarding submitted Bids including, but not be limited to, the following: (i) notification of acceptance; (ii) notification of validation; (iii) notification of rejection; (iv) notification of status; (v) notification of submission error(s); and (vi) default modification or generation of Bids as further provided below, if any, on behalf of Scheduling Coordinators.

30.7.2 Timing of CAISO Validation

Once a Bid is submitted to the CAISO Markets, the Bid is available for validation, which is conducted in multiple steps. Clean Bids will be generated after Market Close.

30.7.3 DAM Validation

30.7.3.1 Validation Prior to Market Close and Master File Update

The CAISO conducts Bid validation in three steps:

Step 1: The CAISO will validate all Bids after submission of the Bid for content validation which determines that the Bid adheres to the structural rules required of all Bids as further described in the Business Practices Manuals. If the Bid fails any of the content level rules the CAISO shall assign it a rejected status and the Scheduling Coordinator must correct and resubmit the Bid.

Step 2: After the Bids are successfully validated for content, but prior to the Market Close of the DAM, the Bids will continue through the second level of validation rules to verify that the Bid adheres to the applicable CAISO Market rules and if applicable, limits based on Master File data. If the Bid fails any level two validation rules, the CAISO shall assign the Bid as invalid and the Scheduling Coordinator must either correct or resubmit the Bid.

Step 3: If the Bid successfully passes validation in Step 2, it will continue through the third level of validation where the Bid will be analyzed based on its contents to identify any missing Bid components that must be present for the Bid to be valid consistent with the market rules

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contained in Article III of this CAISO Tariff and as reflected in the Business Practice Manuals. At this stage the Bid will either be automatically modified for correctness and assigned a status of conditionally modified or modified, or if it can be accepted as is, the Bid will be assigned a status of conditionally valid, or valid. A Bid will be automatically modified and assigned a status of modified or conditionally modified Bid, whenever the CAISO inserts or modifies a Bid component. The CAISO will insert or modify a Bid component whenever (1) a Self-Schedule quantity is less than the lowest quantity specified as an Economic Bid for either an Energy Bid or Demand Bid, in which case the CAISO extends the Self-Schedule to cover the gap; (2) for non-Resource Adequacy Resources, the CAISO will extend the Energy Bid Curve using Proxy Costs to cover any capacity in a RUC Bid component, if necessary; and (3) for a Resource Adequacy Resource that is not a Use-Limited Resource, the CAISO will extend the Energy Bid Curve using Proxy Costs to cover any capacity in a RUC Bid component and, if necessary, up to the full registered Resource Adequacy Capacity. The CAISO will generate a Proxy Bid or extend an Energy Bid or Self-Schedule to cover any RUC Award or Day-Ahead Schedule in the absence of any Self-Schedule or Economic Bid components, or to fill in any gaps between any Self-Schedule Bid and any Economic Bid components to cover a RUC Award or Day-Ahead Schedule. To the extent that an Energy Bid to the HASP/RTM is not accompanied by an Ancillary Services Bid, the CAISO will insert a Spinning Reserve and Non-Spinning Reserve Ancillary Services Bid at \$ 0/MW for any certified Operating Reserve capacity. The CAISO will also generate a Self-Schedule Bid for any Generating Unit that has a Day-Ahead Schedule but has not submitted Bids in HASP/RTM, up to the quantity in the Day-Ahead Schedule. Throughout the Bid evaluation process, the Scheduling Coordinator shall have the ability to view the Bid and may choose to cancel the Bid, modify and re-submit the Bid, or leave the modified, conditionally modified or valid, conditionally valid Bid as is to be processed in the designated CAISO Market. The CAISO will not insert or extend any Bid for a Resource Adequacy Resource that is a Use-Limited Resource.

30.7.3.2 Master File Data Update

Except as otherwise prescribed in this tariff, once a day the Master File data is updated with changes to the Master File that were submitted between at least five (5) and up to eleven (11) Business Days in advance, after which all conditional Bids must be re-validated prior to the trading period when the Bid will take effect. After this re-validation takes place, the status of all conditionally modified and conditionally valid Bids may be changed to modified or valid, if the Bid period is for the next relevant DAM.

30.7.3.3 Validation Prior to Market Close and After Master File Update

Prior to the Market Close of the DAM, after the Master File data has been updated, all Bids must be re-validated using the same process as described in Section 30.7.3.1 to produce either valid Bids or modified Bids. Throughout this process the Scheduling Coordinator shall have the ability to view the Bid and may choose to re-submit (at which point the Bid would undergo the Bid validation process described in this Section 30.7 again), cancel, or modify the Bid. Valid or modified Bids that are not re-submitted or cancelled become Clean Bids after the Market Close of the DAM. Modified Bids for Resource Adequacy Resources will reflect the full capability of the resource as defined in the Master File.

30.7.3.4 Validation After Market Close

To the extent that a Scheduling Coordinator fails to enter a Bid for a resource that is required to submit a Bid in the full range of available capacity consistent with the bidding provisions of Section 30 or the Resource Adequacy provisions of Section 40, the CAISO will create a Bid for the Scheduling Coordinator, which is referred to as the Generated Bid. This does not apply to Load-following MSSs. The Generated Bid will be created only after the Market Close for the DAM and will be based on data registered in the Master File, and, if applicable, published natural gas pricing data and published pricing data for greenhouse gas allowances. The Generated Bid components will be calculated as set forth in Sections 30 and 40.6.8. The Scheduling Coordinator may view Generated Bids, but may not modify such Bids. The CAISO will provide notice to the Scheduling Coordinator of the use of a Generated Bid prior to Market Clearing of the IFM. In addition, validation of export priority pursuant to Sections 31.4 and 34.12.1 and Wheeling Through transactions pursuant to Section 30.5.4 occur after the Market Close for the DAM.

30.7.3.5 Bid Validation Rules for Multi-Stage Generating Resources

If a Scheduling Coordinator does not submit a Bid in the Day-Ahead Market or Real-Time Market for a Multi-Stage Generating Resource with a Resource Adequacy must-offer obligation at a MSG Configuration that can meet the applicable Resource Adequacy must-offer obligation, the CAISO will create a Generated Bid for the default Resource Adequacy MSG Configuration. If the Multi-Stage Generating Resource is not capable of Start-Up in the default Resource Adequacy MSG Configuration, then the ISO will, based on feasibility of transitions, create a Generated Bid for every MSG Configuration that has a minimum output below the MW level of the Resource Adequacy must-offer obligation, which will cover the operating range from its minimum output to the minimum of its maximum output and the MW level of the Resource Adequacy must-offer obligation. In the event that the Scheduling Coordinator does not submit a Bid in compliance with section 30.5.1(p), the CAISO will create a Generated Bid for all of the capacity not bid into the CAISO Market between the maximum bid-in Energy MW and the higher of Self-Scheduled Energy MW and the Multi-Stage Generating Resource plant-level PMin. If the Scheduling Coordinator submits a Bid for the Multi-Stage Generating Resource, the CAISO will create this Generated Bid for the registered MSG Configurations before the Market Close, and if it does not submit such a Bid the CAISO will create this Generated Bid after the Market Close. Any Generated Bid created by the CAISO for the default Resource Adequacy MSG Configuration will be in addition to the MSG Configurations bid into the Real-Time Market by the responsible Scheduling Coordinator. If the Scheduling Coordinator submits a Bid in the Day-Ahead Market or Real-Time Market for a MSG Configuration that is not the default Resource Adequacy MSG Configuration and that does not cover the full amount of the resource's Resource Adequacy requirements, the CAISO will create a Generated Bid for the full Resource Adequacy Capacity. Before the market closes, if a Scheduling Coordinator submits a Bid in the Day-Ahead Market or Real-Time Market for the default Resource Adequacy MSG Configuration of a Multi-Stage Generating Resource that only meets part of the resource's Resource Adequacy must-offer obligation, the CAISO will extend the last segment of the Energy Bid curve in the submitted Bid for the Multi-Stage Generating Resource up to the Multi-Stage Generating Resource's Resource Adequacy must-offer obligation. After the market closes, to the extent that no Bid is submitted into the Real-Time Market for a Multi-Stage Generating Resource scheduled in the Integrated Forward

Market as required in Section 30.5 the CAISO will create a Self-Schedule for MSG Configuration equal to the Day-Ahead Schedule for that resource for the MSG Configuration scheduled in the IFM. To the extent a Multi-Stage Generating Resource is awarded Operating Reserves in the Day-Ahead Market and no Economic Energy Bids is submitted for that resource in the Real-Time Market, the CAISO will insert Proxy Energy Bid in the MSG Configuration that was awarded in the Day-Ahead Market to cover the awarded Operating Reserves. To the extent that a Multi-Stage Generating Resources RUC Schedule is greater than its Day-Ahead Schedule, if the Scheduling Coordinator does not submit an Energy Bid in the RTM to cover the difference, then the CAISO will either create a Bid in the MSG Configuration awarded in RUC, or extend the Bid submitted by the Scheduling Coordinator before the Market Close. After the Market Close, the CAISO will create a Generated Bid if there is no Bid submitted for the resource for this difference. The CAISO will validate that the combination of the Day-Ahead Ancillary Services Awards and Submissions to Self-Provide Ancillary Services are feasible with respect to the physical operating characteristics of the applicable MSG Configuration. The CAISO will reject Ancillary Services Bids or Submissions to Self-Provide Ancillary Services for MSG Configurations that are not certified Ancillary Services. For any given Multi-Stage Generating Resource, for any given CAISO Market and Trading Hour if one MSG Configuration's Bid fails the bid validation process, all other Bids for all other MSG Configurations are also invalidated.

30.7.3.6 Additional Bid Validation Rules for Virtual Bids

In addition to the validation rules described in Section 30.7.3.1, Virtual Bids will be subject to the following additional validation rules.

30.7.3.6.1 Scheduling Coordinator Validation

The CAISO will validate that the SCID associated with a Virtual Bid is submitted from a Scheduling Coordinator authorized to submit Virtual Bids and that the Virtual Bid is submitted at an Eligible PNode or Eligible Aggregated PNode. The CAISO will reject Virtual Bids that do not satisfy these requirements.

30.7.3.6.2 Credit Requirement

Virtual Bids must satisfy the credit requirements of Section 12.8. The Scheduling Coordinator will be notified if Virtual Bids fail to satisfy the credit requirements. If the Scheduling Coordinator fails to resubmit Virtual Bids that satisfy the credit requirements or to provide adequate additional Financial Security, the

CAISO will reject the Scheduling Coordinator's Virtual Bids on a last-in, first-out basis.

30.7.3.6.3 Position Limits

For each Convergence Bidding Entity, the CAISO will reject all Virtual Bids submitted by its Scheduling Coordinator at any Eligible PNode or Eligible Aggregated PNode (other than a Default LAP or Trading Hub) that exceed the position limits specified in this Section 30.7.3.6.3. If the Scheduling Coordinator uses multiple SCIDs on behalf of a Convergence Bidding Entity, the position limits will apply to the sum of those Virtual Bids submitted at the Eligible PNode or Eligible Aggregated PNode (other than a Default LAP or Trading Hub). The CAISO will perform all position limit calculations based on the highest Virtual Bid segment MW point submitted in the Virtual Bid Curve. The CAISO will not net Virtual Supply Bids and Virtual Demand Bids in performing the position limit calculations. The affected Scheduling Coordinator will be provided notice that position limits have been violated. If the Scheduling Coordinator does not resubmit Virtual Bids within the position limits, the CAISO will reject Virtual Bids for all hours at each Eligible PNode and Eligible Aggregated PNode (other than a Default LAP or Trading Hub) where the position limits are violated. Position limits only apply to Eligible PNodes or Eligible Aggregated PNodes (other than Default LAPs or Trading Hubs).

30.7.3.6.3.1 Position Limits at Eligible PNodes and Eligible Aggregated PNodes

For an Eligible PNode associated with a single physical supply resource, the CAISO will publish a locational limit that will be equal to the PMax of the physical supply resource. For an Eligible PNode or Eligible Aggregated PNode (other than a Default LAP or Trading Hub) associated with more than one physical supply resource, the CAISO will publish a locational limit that will be equal to the sum of the PMaxes of the physical supply resources. For an Eligible PNode associated with a single physical demand resource, the CAISO will publish a locational limit that will be equal to the forecast of the maximum MW consumption of the physical demand resource. For an Eligible PNode or Eligible Aggregated PNode (other than a Default LAP or Trading Hub) associated with more than one physical demand resource, the CAISO will publish a locational limit that will be equal to the forecast of the maximum MW consumption of the physical demand resources. The percentages used to calculate the position limits for each Convergence Bidding Entity at Eligible PNodes and Eligible Aggregated PNodes (other than Default LAPs or Trading Hubs) will be the following percentages of the published locational

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limits:

- (a) Position limits of ten (10) percent will apply during the time period beginning as of the effective date of this tariff provision through the last day of the eighth month following the effective date of this tariff provision.
- (b) Position limits of fifty (50) percent will apply during the time period beginning as of the first day of the ninth month following the effective date of this tariff provision through the last day of the twelfth month following the effective date of this tariff provision.
- (c) Position limits will cease to apply beginning on the first day of the month as of the first anniversary of the effective date of this tariff provision.

The CAISO will enforce the position limits for Eligible PNodes and Eligible Aggregated PNodes (other than Default LAPs or Trading Hubs) at the time of Virtual Bid submission. It is possible for the enforcement of position limits on a later-submitted Virtual Bid to cause a previously approved Virtual Bid to be rejected, if both of those Virtual Bids are submitted by a Scheduling Coordinator on behalf of the same Convergence Bidding Entity at the same Eligible PNode or Eligible Aggregated PNode (other than a Default LAP or Trading Hub). The CAISO will timely publish the locational limits for Eligible PNodes and Eligible Aggregated PNodes (other than Default LAPs or Trading Hubs).

30.7.3.6.3.2 [Not Used]

30.7.4 RTM Validation

RTM Bids will include the same validation process implemented in the DAM except that the CAISO will not validate the Bid before and again after the Master File Data update. RTM Bids are only validated based on the current Master File Data on the relevant Trading Day.

30.7.5 Validation of ETC Self-Schedules

ETC Self-Schedules shall be validated pursuant to the procedures set forth in Section 16.6.

30.7.6 Validation and Treatment of Ancillary Services Bids

30.7.6.1 Validation of Ancillary Services Bids

Throughout the validation process described in Section 30.7, the CAISO will verify that each Ancillary Services Bid conforms to the content, format and syntax specified for the relevant Ancillary Service. If the Ancillary Services Bid does not so conform, the CAISO will send a notification to the Scheduling

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Coordinator notifying the Scheduling Coordinator of the errors in the Bids as described in Section 30.7.

When the Bids are submitted, a technical validation will be performed to verify that the bid quantity of Regulation, Spinning Reserve, or Non-Spinning Reserve does not exceed the certified Ancillary Services capacity for Regulation, or Operating Reserves on the Generating Units, System Units, Participating Loads, Proxy Demand Resources, and external imports/exports bid. The Scheduling Coordinator will be notified within a reasonable time of any validation errors. For each error detected, an error message will be generated by the CAISO in the Scheduling Coordinator's notification screen, which will specify the nature of the error. The Scheduling Coordinator can then look at the notification messages to review the detailed list of errors, make changes, and resubmit if it is still within the CAISO's timing requirements. The Scheduling Coordinator is also notified of successful validation. If a resource is awarded or has qualified Self-Provided Ancillary Services in the Day-Ahead Market, the following rules will apply: (1): if no Energy Self-Schedule is submitted to support a Submission to Self-Provide an Ancillary Service for Regulation, the Submission to Self-Provide an Ancillary Service will be invalidated: (2) if no Energy Supply Bid is submitted to cover the awarded or Self- Provided Ancillary Services for Spinning Reserve or Non-Spinning Reserve by the Market Close of the RTM, the CAISO will generate or extend an Energy Supply Bid as necessary to cover the awarded or Self-Provided Ancillary Services capacity using the registered values in the Master File and relevant fuel prices as described in the Business Practice Manuals for use in the RTM and IFM. If an AS Bid or Submission to Self-Provide an AS is submitted in the Real-Time Market for Spinning Reserve or Non-Spinning Reserve without an accompanying Energy Supply Bid at all, the AS Bid or Submission to Self-Provide an Ancillary Service will be erased. If an AS Bid is submitted in the Real-Time Market for Spinning Reserve and Non-Spinning Reserve with only a partial Energy Supply Bid for the AS capacity, the CAISO will generate an Energy Supply Bid for the uncovered portions. If a Submission to Self-Provide an Ancillary Service is submitted in the Real-Time Market for Spinning Reserve and Non-Spinning Reserve with only a partial Energy Supply Bid for the AS capacity bid in, the CAISO will not generate or extend an Energy Supply Bid for the uncovered portions. For Generating Units with certified Regulation capacity, if there no Bid for Regulation in the Real-Time Market, but there is a Day-Ahead award for Regulation Up or Regulation Down or a submission to self-provide Regulation Up or Regulation Down, respectively, the CAISO will generate a Regulation Up or Regulation Down Bid at the

default Ancillary Service Bid price of \$0 up to the certified Regulation capacity for the Generating Unit minus any Regulation awarded or self-provided in the Day-Ahead. If there is a Bid for Regulation Up or Regulation Down in the Real-Time Market, the CAISO will increase the respective Bid up to the certified Regulation capacity for the Generating Unit minus any Regulation awarded or self-provided in the Day-Ahead. If a Self-Schedule amount is greater than the Regulation Limit for Regulation Up, the Regulation Up Bid will be erased.

Notwithstanding any of the provisions of Section 30.7.6.1 set forth above, the CAISO will not insert or extend any Bid for Regulation Up or Regulation Down for a Use-Limited Resource of a Load Following MSS Operator. The CAISO will not insert a Spinning Reserve and Non-Spinning Reserve Ancillary Service Bid at \$0 in the Real-Time Market for any certified Operating Reserve capacity of a resource unless that resource submits an Energy Supply Bid but fails to submit an Ancillary Service Bid in the Real-Time Market.

30.7.6.2 Treatment of Ancillary Services Bids

When Scheduling Coordinators bid into the Regulation Up, Regulation Down, Spinning Reserve, and Non-Spinning Reserve markets, they may submit Bids for the same capacity into as many of these markets as desired at the same time by providing the appropriate Bid information to the CAISO. The CAISO optimization will evaluate AS Bids simultaneously with Energy Bids. A Scheduling Coordinator may specify that its Bid applies only in the markets it desires. A Scheduling Coordinator shall also have the ability to specify different capacity prices for the Spinning Reserve, Non-Spinning Reserve, and Regulation markets. A Scheduling Coordinator providing one or more Regulation Up, Regulation Down, Spinning Reserve or Non-Spinning Reserve services may not change the identification of the Generating Units or Proxy Demand Resources offered in the Day-Ahead Market or in the Real-Time Market for such services unless specifically approved by the CAISO (except with respect to System Units, if any, in which case Scheduling Coordinators are required to identify and disclose the resource specific information for all Generating Units, Participating Loads, and Proxy Demand Resources constituting the System Unit for which Bids and Submissions to Self-Provide Ancillary Services are submitted into the CAISO's Day-Ahead Market and Real-Time Market).

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The following principles will apply in the treatment of Ancillary Services Bids in the CAISO Markets:

- (a) not differentiate between bidders for Ancillary Services and Energy other than through cost, price, effectiveness, and capability to provide the Ancillary Service or Energy, and the required locational mix of Ancillary Services;
- (b) select the bidders with most cost effective Bids for Ancillary Service capacity which meet its technical requirements, including location and operating capability to minimize the costs to users of the CAISO Controlled Grid;
- (c) evaluate the Day-Ahead Bids over the twenty-four (24) Settlement Periods of the following Trading Day along with Energy, taking into account Transmission Constraints and AS Regional Limits;
- (d) evaluate Import Bids along with Bids from internal resources (which includes Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area);
- (e) establish Real-Time Ancillary Service Awards through the FMM from imports and resources internal to the CAISO Balancing Authority Area (which includes Pseudo-Ties of Generating Units to the CAISO Balancing Authority Area) at fifteen (15) minutes intervals to the hour of operation; and
- (f) procure sufficient Ancillary Services in the Day-Ahead and Real-Time Markets to meet its forecasted requirements.

30.7.7 Format and Validation of Operational Ramp Rates

The submitted Operational Ramp Rate expressed in megawatts per minute (MW/min) as a function of the operating level, expressed in megawatts (MW), must be a staircase function with up to four segments.

There is no monotonicity requirement for the Operational Ramp Rate. The submitted Operational Ramp Rate shall be validated as follows:

- (a) The range of the submitted Operational Ramp Rate must cover the entire capacity of the resource, from the minimum to the maximum operating capacity, as registered in the Master File for the relevant resource.

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- (b) The operating level entries must match exactly (in number, sequence, and value) the corresponding minimum and maximum Operational Ramp Rate breakpoints, as registered in the Master File for the relevant resource.
- (c) If a Scheduling Coordinator does not submit an Operational Ramp Rate for a generating unit for a day, the CAISO shall use the maximum Ramp Rate for each operating range set forth in the Master File as the Ramp Rate for that unit for that same operating range for the Trading Day.
- (d) The last Ramp Rate entry shall be equal to the previous Ramp Rate entry and represent the maximum operating capacity of the resource as registered in the Master File. The resulting Operational Ramp Rate segments must lie between the minimum and maximum Operational Ramp Rates, as registered in the Master File.
- (e) The submitted Operational Ramp Rate must be the same for each hour of the Trading Day, i.e., the Operational Ramp Rate submitted for a given Trading Hour must be the same with the one(s) submitted earlier for previous Trading Hours in the same Trading Day.
- (f) Outages that affect the submitted Operational Ramp Rate must be due to physical constraints, reported in the CAISO's outage management system pursuant to Section 9 and are subject to CAISO approval. All approved changes to the submitted Operational Ramp Rate will be used in determination of Dispatch Instructions for the shorter period of the balance of the Trading Day or duration of reported Outage.
- (g) Operational Ramp Rate derates in the CAISO's outage management system pursuant to Section 9 may be declared for any operational segment established in the Master File. Ramping capability through Forbidden Operating Regions are not affected by derates entered in the CAISO's outage management system pursuant to Section 9.
- (h) The amount of change in Ramp Rates from one operating range to a subsequent operating range must not exceed a 10 to 1 ratio, and any Ramp Rate change in excess will be adjusted to achieve the 10 to 1 ratio. This adjustment will also include the implicit ramp rate in the Forbidden Operating Region.

- (i) For all CAISO Dispatch Instructions of Reliability Must-Run Units the Operational Ramp Rate will be the Ramp Rate declared in the Reliability Must Run Contract Schedule A.

30.7.8 Format and Validation of Start-Up and Shut-Down Times

For a Generating Unit or a Resource-Specific System Resource, the submitted Start-Up Time expressed in minutes (min) as a function of down time expressed in minutes (min) must be a staircase function with up to three (3) segments defined by a set of 1 to 4 down time and Start-Up Time pairs. The Start-Up Time is the time required to start the resource if it is offline longer than the corresponding down time. The CAISO shall model Start-Up Times for Multi-Stage Generating Resource at the MSG Configuration level and Transition Times are validated based on the Transition Matrix submitted as provided in Section 27.8. The last segment will represent the time to start the unit from a cold start and will extend to infinity. The submitted Start-Up Time function shall be validated as follows:

- (a) The first down time must be zero (0) min.
- (b) The down time entries must match exactly (in number, sequence, and value) the corresponding down time breakpoints of the maximum Start-Up Time function, as registered in the Master File for the relevant resource.
- (c) The Start-Up Time for each segment must not exceed the Start-Up Time of the corresponding segment of the maximum Start-Up Time function, as registered in the Master File for the relevant resource.
- (d) The Start-Up Time function must be strictly monotonically increasing, i.e., the Start-Up Time must increase as down time increases.

For Participating Load and for a Proxy Demand Resource or Reliability Demand Response Resource, a single Shut-Down time in minutes is the time required for the resource to Shut-Down after receiving a Dispatch Instruction. For Multi-Stage Generating Resources, the Scheduling Coordinator must provide Start-Up Costs for each MSG Configuration into which the resource can be started.

30.7.9 Format and Validation of Start-Up Costs and Shut-Down Costs

For a Generating Unit or a Resource-Specific System Resource, the submitted Start-Up Cost expressed in dollars (\$) as a function of down time expressed in minutes must be a staircase function with up to three (3) segments defined by a set of 1 to 4 down time and Start-Up Cost pairs. The Start-Up Cost is the

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cost incurred to start the resource if it is offline longer than the corresponding down time. The last segment will represent the cost to start the resource from cold Start-Up and will extend to infinity. The submitted Start-Up Cost function shall be validated as follows:

- (a) The first down time must be zero (0) min.
- (b) The down time entries must match exactly (in number, sequence, and value) the corresponding down time breakpoints of the Start-Up Cost function, as registered in the Master File for the relevant resource as either the Proxy Cost or Registered Cost.
- (c) The Start-Up Cost for each segment must not be negative and must be equal to the Start-Up Cost of the corresponding segment of the Start-Up Cost function, as registered in the Master File for the relevant resource. In addition, if the Proxy Cost methodology pursuant to Section 30.4 applies to the resource, the Scheduling Coordinator for that resource may submit a daily Bid for the Start-Up Cost that must not be negative but may be less than or equal to the sum of (i) one hundred twenty-five (125) percent of the Proxy Cost other than the portion of the Proxy Cost that consists of Start-Up Opportunity Costs, if any; and (ii) one hundred (100) percent of the portion of the Proxy Cost that consists of Start-Up Opportunity Costs; and if the resource is a Multi-Stage Generating Resource, the Scheduling Coordinator may submit a daily Bid for each MSG Configuration of the resource that must not be negative but may be less than or equal to the sum of (i) one hundred twenty-five (125) percent of the Start-Up Cost for the MSG Configuration other than the portion of the Start-Up Cost for the MSG Configuration that consists of Start-Up Opportunity Costs, if any; and (ii) one hundred (100) percent of the portion of the Start-Up Cost for the MSG Configuration that consists of Start-Up Opportunity Costs. For a resource that is eligible and has elected to use the Registered Cost methodology pursuant to Section 30.4, if a value is submitted in a Bid for the Start-Up Cost, it will be overwritten by the Registered Cost reflected in the Master File. If no value for Start-Up Cost is submitted in a Bid, the CAISO will insert the Master File value, as either the Proxy Cost or Registered Cost based on the methodology elected pursuant to Section 30.4.

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- (d) The Start-Up Cost function must be strictly monotonically increasing, i.e., the Start-Up Cost must increase as down time increases.

The Start-Up Cost for a Reliability Demand Response Resource shall be zero (0). For Participating Loads and Proxy Demand Resources, a single Shut-Down Cost in dollars (\$) is the cost incurred to Shut-Down the resource after receiving a Dispatch Instruction. The submitted Shut-Down Cost must not be negative. For Multi-Stage Generating Resources, the Scheduling Coordinator must provide Start-Up Costs for each MSG Configuration into which the resource can be started.

30.7.10 Format and Validation of Minimum Load Costs

30.7.10.1 In General

For a Generating Unit or a Resource-Specific System Resource, the submitted Minimum Load Cost expressed in dollars per hour (\$/hr) is the cost incurred for operating the unit at Minimum Load as registered in the Master File. The submitted Minimum Load Cost must not be negative. In addition, if the Proxy Cost methodology pursuant to Section 30.4 applies to the resource, the Scheduling Coordinator for that resource may submit a daily Bid for the Minimum Load Cost that must not be negative but may be less than or equal to the sum of (i) one hundred twenty-five (125) percent of the Proxy Cost value other than the portion of the Proxy Cost value that consists of Minimum Load Opportunity Costs, if any; and (ii) one hundred (100) percent of the portion of the Proxy Cost value that consists of Minimum Load Opportunity Costs. For a resource that is eligible and has elected to use the Registered Cost methodology pursuant to Section 30.4, any submitted Minimum Load Cost must be equal to the Minimum Load Cost as registered in the Master File.

30.7.10.2 Adjustments to Minimum Load Costs Due to Increases in Minimum Load

For Generating Units or Resource-Specific System Resources for which the responsible Scheduling Coordinator has temporarily increased their Minimum Load through the CAISO's outage management system as specified in Section 9.3.3, regardless of the election made pursuant to Section 30.4, the CAISO will add to the Minimum Load Costs submitted by the Scheduling Coordinator the cost of the incremental Minimum Load determined as the product of the resource's applicable Default Energy Bid and the corresponding MWs between the resource's original Minimum Load as registered in the Master File and the Minimum Load increased pursuant to Section 9.3.3. The CAISO will use the adjusted

Minimum Load Cost in the clearing of the applicable CAISO Markets as well as for Settlement purposes as described in Section 11. For Multi-Stage Generating Resources, the adjustments to Minimum Load Cost will be made at the MSG Configuration level.

30.7.10.3 Participating Loads

For Participating Loads, the submitted Minimum Load Cost (\$/hr) is the cost incurred while operating the resource at reduced consumption after receiving a Dispatch Instruction. The submitted Minimum Load Cost must not be negative.

30.8 Bids on Out-of-Service Paths at Scheduling Points Prohibited

Scheduling Coordinators shall not submit any Bids or ETC Self-Schedules at Scheduling Points using a transmission path for any Settlement Period for which the Total Transfer Capability for that path is zero (0) MW. The CAISO shall reject Bids or ETC Self-Schedules submitted at Scheduling Points where the Total Transfer Capability on the transmission path is zero (0) MW. If the Total Transfer Capability of a transmission path at the relevant Scheduling Point is reduced to zero (0) after Day-Ahead Schedules have been issued, then, if time permits, the CAISO shall direct the responsible Scheduling Coordinators to reduce all MWh associated with the Bids on such zero-rated transmission paths to zero (0) in the RTM. As necessary to comply with Applicable Reliability Criteria, the CAISO shall reduce any non-zero (0) RTM Bids across zero-rated transmission paths to zero after the Market Close for the RTM.

30.9 Virtual Bids

Virtual Bids are Energy Bids that may be submitted only in the Day-Ahead Market, at Eligible PNodes or Eligible Aggregated PNodes where virtual bidding is permitted, by Scheduling Coordinators representing Convergence Bidding Entities. Virtual Bids are either Virtual Supply Bids or Virtual Demand Bids. A Virtual Bid submitted in the Day-Ahead Market and cleared in the IFM represents a commitment to liquidate a Day-Ahead award in the Real-Time Market at the price determined for the applicable Eligible PNode or Eligible Aggregated PNode as set forth in Section 11.3. For each SCID associated with a Convergence Bidding Entity, there may be only one Virtual Supply Bid and one Virtual Demand Bid per each Eligible PNode or Eligible Aggregated PNode in the Day-Ahead Market. The minimum size of a segment of a Virtual Bid is one (1) MW.

30.9.1 Virtual Bid Components

Each Virtual Bid must have the following components: an indicator that identifies the Virtual Bid as a Virtual Supply Bid or a Virtual Demand Bid; Scheduling Coordinator ID Code; Eligible PNode or Eligible Aggregated PNode as applicable; Virtual Bid Curve; and the Trading Hour or Trading Day to which the Virtual Bid applies. Virtual Bids do not include Start-Up Costs or Minimum Load Costs.

30.10 Use of AC Solution and Nodal MW Constraints

The CAISO will achieve an alternating current (AC) solution in the Day-Ahead Market to the extent practicable. If and when it is impracticable to achieve an AC power flow solution without the initial enforcement of nodal MW limit constraints, the CAISO will apply nodal MW constraints to Eligible PNodes (except for Eligible PNodes established for Interties, which are addressed through the process described in Section 31.8). The CAISO will determine whether to apply such nodal MW constraints as follows:

- (i) The CAISO will calculate a MW limit for each Eligible PNode other than an Eligible PNode established for an Intertie. For an Eligible PNode associated with physical supply resource, the MW limit will be equal to a factor multiplied by the PMax of the physical supply resource. For an Eligible PNode associated with a physical demand resource, the MW limit will be equal to a factor multiplied by the nodal load forecast of the Eligible PNode calculated as the MW portion of the System Demand Forecast that is distributed to the Eligible PNode according to the corresponding system Load Distribution Factor associated with the Eligible PNode. The factors used in these calculations will be determined in accordance with a process set forth in the Business Practice Manuals.
- (ii) For each of the Eligible PNodes or group of Eligible PNodes, the CAISO will calculate the percentage by which the sum of the MW amounts of all Energy Supply Bids, Demand Bids, and Virtual Bids exceeds the MW limit calculated pursuant to Section 30.10(i).
- (iii) Starting with the Eligible PNodes or group of Eligible PNodes at which the MW limits would be exceeded by the largest percentages, and working in descending order of the Eligible PNodes or group of Eligible PNodes that would exceed their MW limits ranked by the extent to which the corresponding MW limits would be exceeded, the CAISO will apply the MW limits to all Energy Supply Bids, Demand Bids, and Virtual Bids at the

applicable Eligible PNodes or group of Eligible PNodes and run iterations of the IFM until the CAISO Markets can achieve an AC solution. The application of the MW limit will be enforced by means of a MW limit constraint on the sum of the nodal Energy Supply Bids, Demand Bids, and Virtual Bids as well as the portions of the aggregate Energy Supply Bids, Demand Bids, and Virtual Bids that are applicable to the Eligible PNodes or group of Eligible PNodes. The MW limit constraints will be enforced in the IFM optimization engine to curtail the Bids at the Eligible PNodes or group of Eligible PNodes that have been identified as candidates for causing AC convergence issues. The IFM optimization engine will use the economic criteria based on Bid prices and effectiveness of Bids to mitigate the violation of the MW limit at the Eligible PNode or group of Eligible PNodes.

30.11 Filings to Recover Commitment-Related Fuel Costs

If a Scheduling Coordinator incurs but cannot recover through the Bid Cost Recovery process any actual marginal fuel procurement costs that exceed (i) the limit on Bids for Start-Up Costs set forth in Section 30.7.9, (ii) the limit on Bids for Minimum Load Costs set forth in Section 30.7.10, or (iii) the limit on Bids for Transition Costs set forth in Section 30.4.1.1.5, the Scheduling Coordinator for the resource may seek to recover those costs through a FERC filing made pursuant to Section 205 of the Federal Power Act. The Scheduling Coordinator must notify the CAISO within thirty (30) Business Days after the Operating Day on which the resource incurred the unrecovered costs, and must submit the filing to FERC within ninety (90) Business Days after that Trading Day. Within sixty (60) Business Days after the Trading Day for which the Scheduling Coordinator provides notice to the CAISO per this Section, the CAISO will provide the Scheduling Coordinator with a written explanation of any effect that events or circumstances in the CAISO Markets and fuel market conditions may have had on the resource's inability to recover the costs on the Trading Day.

Each filing the Scheduling Coordinator submits to FERC must include:

- (1) Data supporting the Scheduling Coordinator's claim to the unrecovered costs it seeks, including Invoices for the unrecovered costs;
- (2) A description of the resource's participation in any gas pooling arrangements;
- (3) An explanation of why recovery of the costs is justified; and

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- (4) A copy of the written explanation from the CAISO to the Scheduling Coordinator described above in this Section.

To the extent that FERC authorizes the Scheduling Coordinator to recover any costs pursuant to the Scheduling Coordinator's filing, the CAISO will pay the Scheduling Coordinator any amounts the Commission deems recoverable and will allocate such amounts pursuant to Section 11.14.

30.12 Eligibility to Submit Filings to Recover Marginal Fuel-Related Costs

30.12.1 Applicability

A Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator may seek to recover through a FERC filing pursuant to Section 205 of the Federal Power Act any actual margin fuel procurement costs that cannot be recovered through CAISO market revenues under the following conditions:

- (i) A Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator is mitigated to its Default Energy Bid that is calculated pursuant to any of the options set forth in Section 39.7.1, or the competitive LMP through the Local Market Power Mitigation as specified in Sections 31.2 and 34.1.5;
- (ii) A Scheduling Coordinator whose Exceptional Dispatch is mitigated pursuant to Section 39.10 for any of the options set forth in Section 39.7.1, or submits no Bid, and the Exceptional Dispatch is settled at the greater of the applicable Default Energy Bid or resource-specific LMP;
- (iii) A Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator that is required by FERC order to submit Bids no greater than its Default Energy Bid calculated pursuant to any of the options set forth in Section 39.7.1, and submit Bids at the Default Energy Bid; or
- (iv) A Scheduling Coordinator that is subject to a Generated Bid as set forth in Sections 30.7.3.4, 39.7.1.1.1, and 40.6.8.

30.12.2 Notice and Process

The Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator must notify the CAISO within thirty (30) Business Days after the Operating Day on which the resource incurred the

unrecovered costs, and must submit the filing to FERC within ninety (90) Business Days after that Operating Day. Within sixty (60) Business Days after the Operating Day for which the Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator provides notice to the CAISO per this Section, the CAISO will provide the Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator with a written explanation of any effect that events or circumstances in the CAISO Markets and fuel market conditions may have had on the resource's inability to recover the costs on the Trading Day.

30.12.3 Documentation Required for FERC Filing

Each filing the Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator submits to FERC must include:

- (1) Data supporting the Scheduling Coordinator's or EIM Participating Resource Scheduling Coordinator claim to the unrecovered costs it seeks, including invoices related to the unrecovered costs;
- (2) A description of the resource's participation in any gas pooling arrangements;
- (3) An explanation of why recovery of the costs is justified; and
- (4) A copy of the written explanation from the CAISO to the Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator described above in this Section.

30.12.4 Payment and Allocation Costs Recovered Per FERC Order

To the extent that FERC authorizes the Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator to recover any costs pursuant to the Scheduling Coordinator's or EIM Participating Resource Scheduling Coordinator's filing, the CAISO will pay the Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator any amounts the Commission deems recoverable and will allocate such amounts pursuant to Section 11.14.