

**31 Day-Ahead Market.**

The DAM consists of the following functions performed in sequence: the MPM-RRD, IFM, and RUC. Scheduling Coordinators may submit Bids for Energy, Ancillary Services and RUC Capacity for an applicable Trading Day. The CAISO shall issue Schedules for all Supply and Demand, including Participating Load, pursuant to their Bids as provided in this Section 31.

**31.1 Bid Submission and Validation in the Day-Ahead Market.**

Bids, including Self-Schedules and Ancillary Services Bids, and Submissions to Self-Provide an Ancillary Service shall be submitted pursuant to the submission rules specified in Section 30. Scheduling Coordinators submit a single Bid to be used in the DAM, which includes the MPM-RRD, the IFM and RUC. Scheduling Coordinators may submit Bids for the DAM as early as seven (7) days ahead of the targeted DAM and up to Market Close of the DAM for a targeted Trading Day. The CAISO will validate all Bids submitted to the DAM pursuant to the procedures set forth in Section 30.7. Scheduling Coordinators must submit Bids for participation in the IFM for Resource Adequacy Capacity as required in Section 40.

**31.2 Market Power Mitigation and Reliability Requirement Determination (MPM-RRD).**

After the Market Close of the DAM, and after the CAISO has validated the Bids pursuant to Section 30.7, the CAISO will perform the MPM-RRD procedures in a series of processing runs that occur prior to the IFM Market Clearing run. The MPM process determines which Bids need to be mitigated in the IFM. The RRD process is the automated process for determining RMR Generation requirements for RMR Units. The MPM-RRD process optimizes resources using the same optimization used in the IFM, but instead of

using Demand Bids as in the IFM the MPM-RRD process optimizes resources to meet one hundred percent of the CAISO Demand Forecast and Export Bids to the extent the Export Bids are selected in the MPM-RRD process, and meet one hundred percent of Ancillary Services requirements based on Supply Bids submitted to the DAM. The pool of resources identified in the MPM-RRD process is then passed to the IFM to constitute the pool of resources available for commitment in the IFM. The CAISO performs the MPM-RRD for the DAM for the twenty-four (24) hours of the targeted Trading Day.

### **31.2.1 The Reliability and Market Power Mitigation Runs.**

The first run of the MPM-RRD procedures is the Competitive Constraints Run (CCR), in which only limits on transmission lines pre-designated as competitive are enforced. The only RMR Units considered in the CCR are Condition 1 RMR Units that have provided market Bids for the DAM. The second run is the All Constraints Run (ACR), during which all transmission Constraints are enforced. All RMR Units, Condition 1 and Condition 2, are considered in the ACR. The resources committed in the ACR form the pool of resources that is available for commitment in the IFM.

### **31.2.2 Bid Mitigation.**

The CAISO shall compare the resource dispatch levels derived from CCR and ACR and will mitigate Bids as follows.

**31.2.2.1 RMR Units.**

For a Condition 1 RMR Unit that is dispatched in the CCR, the Bid used in the ACR for the entire portion of the unit's Energy Bid Curve above the CCR dispatch level and below the Maximum Net Dependable Capacity specified in the RMR Contract will be set to the lower of the RMR Proxy Bid, or the DAM Bid, but not lower than the unit's highest Bid price that cleared the CCR. If a Condition 1 RMR Unit is dispatched in the CCR and receives a greater dispatch in the ACR, the entire portion of the unit's Energy Bid Curve above the CCR dispatch level and below the Maximum Net Dependable Capacity specified in the RMR Contract, will be set to the lower of the RMR Proxy Bid or the DAM Bid, but not lower than the unit's highest Bid price that cleared the CCR for purposes of being considered in the IFM. For purposes of the MPM-RRD, Condition 1 RMR Units will be treated like non-RMR Units with respect to any capacity in excess of the Maximum Net Dependable Capacity specified in the RMR Contract. For Condition 1 RMR Units, the market Bid at and below the CCR dispatch level will be retained in the IFM. For Condition 2 RMR Units and for Condition 1 RMR Units that either did not submit DAM Bids or submitted DAM Bids but were not dispatched in the CCR, the CAISO will use the RMR Proxy Bid in the ACR to determine the Energy required from RMR Units for each Trading Hour. If the dispatch level produced through the ACR for a Condition 1 RMR Unit is not greater than the dispatch level produced through CCR, the unit's original, unmitigated DAM Bid will be retained in its entirety. For a Condition 1 RMR Unit, if the dispatch level produced through the ACR is greater than the dispatch level produced through the CCR, and for a Condition 2 RMR Unit that is dispatched through the ACR, the resource will be flagged as an RMR Dispatch in the Day-Ahead Schedule and shall constitute a Dispatch Notice pursuant to the RMR Contract.

**31.2.2.2 Non-RMR Units.**

If the dispatch level produced through the ACR is greater than the dispatch level produced through CCR, then the resource is subject to Local Market Power Mitigation, in which case the entire portion of the unit's Energy Bid Curve that is above the CCR dispatch level will be mitigated to the lower of the Default Energy Bid as specified in Section 39, or the DAM Bid, but no lower than the unit's highest Bid price that cleared the CCR.

**31.3 Integrated Forward Market.**

After the MPM-RRD and prior to RUC, the CAISO shall perform the IFM. The IFM performs Unit Commitment and Congestion Management, clears the Energy Bids as modified and in the MPM-RRD, taking into account transmission limits and honoring technical and inter-temporal operating Constraints, such as Minimum Run Times, and procures Ancillary Services to meet one hundred percent (100%) of the CAISO Forecast of CAISO Demand requirements. The IFM utilizes a set of integrated programs that: (1) determine Day-Ahead Schedules and AS Awards, and related LMPs and ASMPs; and (2) optimally commits resources that are bid in to the DAM. The IFM utilizes a SCUC algorithm that optimizes Start-Up Costs, Minimum Load Costs, and Energy Bids along with any Bids for Ancillary Services as well as Self-Schedules submitted by Scheduling Coordinators. The IFM also provides for the optimal management of Use-Limited Resources. The ELS Resources committed through the ELC Process conducted two days before the day the IFM process is conducted for the next Trading Day as described in Section 31.7 are binding and the IFM process will model such capacity as capacity that is under a contractual obligation to provide.

**31.3.1 Market Clearing and Price Determination.**

**31.3.1.1 Integrated Forward Market Output.**

The IFM produces: (1) a set of hourly Day-Ahead Schedules, AS Awards, and AS Schedules for all participating Scheduling Coordinators that cover each Trading Hour of the next Trading Day; and (2) the hourly LMPs for Energy and the ASMPs for Ancillary Services to be used for settlement of the IFM. The CAISO will publish the LMPs at each PNode as calculated in the IFM. In determining Day-Ahead Schedules, AS Awards, and AS Schedules the IFM optimization will minimize total Bid Costs based on submitted and mitigated Bids while respecting the operating characteristics of resources, the operating limits of transmission facilities, and a set of scheduling priorities that are described in Section 31.4. In performing its optimization, the IFM first tries to complete its required functions utilizing Economic Bids without adjusting Self-Schedules, and adjusts Self-Schedules only if it is not possible to balance Supply and Demand and manage Congestion with available Economic Bids. The Day-Ahead Schedules are binding commitments, including the commitment to Start-Up, if necessary, to comply with the Day-Ahead Schedules. The CAISO will not issue separate Start-Up Instructions for Day-Ahead commitments. A resource's status, however, can be modified as a result of additional market processes occurring in HASP, STUC and RTUC. In addition, in Real-Time, resources are required to follow Real-Time Dispatch Instructions.

**31.3.1.2 Treatment of Ancillary Services Bids in IFM.**

As provided in Section 30.7.6.2 the CAISO shall co-optimize the Energy and Ancillary Services Bids in clearing the IFM. To the extent that capacity subject to an Ancillary Services Bid submitted in the Day-Ahead Market is not associated with an Energy Bid, there is no co-optimization, and therefore, no opportunity cost associated with that resource for that Bid for the purposes of calculating the Ancillary Services Marginal Price as specified in Section 11.10.11. When the capacity associated with the Energy Bid overlaps with the quantity submitted in the Ancillary Services Bid, then the Energy Bid will be used to determine the opportunity cost, if any, in the co-optimization to the extent of the overlap. Therefore, the capacity that will be considered when co-optimizing the procurement of Energy and Ancillary Services from Bids in the IFM will consider capacity up to the total capacity of the resource as reflected in the Ancillary Services Bid as derated through SLIC, if at all. In the case of Regulation, the capacity that will be considered is the lower of the capacity of the resource offered in the Ancillary Services Bid or the upper Regulation limit of the highest Regulating Range as contained in the Master File.

**31.3.1.3 Reduction of LAP Demand.**

To the extent the CAISO cannot resolve a non-competitive transmission Constraint utilizing effective Economic Bids such that Load at the LAP level in the pre-IFM pass 2 (ACR) would otherwise be adjusted to relieve the Constraint, the CAISO will take the following actions in sequence:

Step 1: Schedule the Energy from Self-Provided Ancillary Service Bids from capacity that is obligated to offer an Energy Bid under a must-offer obligation such as from an RMR Unit or a Resource Adequacy Resource. Since the otherwise Self-Provided Ancillary Services capacity in question is under a must-offer obligation, the associated Energy Bid prices will be either: (a) submitted Energy Bids; or (b) Default Energy Bids to the extent an Energy Bid was not submitted for the Self-Provided Ancillary Services capacity, but not lower than any Energy Bids from the same resource that may have cleared pre-IFM pass 1 (ACR).

Step 2: In case the measure in Step 1 is insufficient to avoid adjustment of Load at the LAP level, the CAISO will evaluate the validity of the binding transmission Constraint and if it is determined that the Constraint can be relaxed based on the operating practices, will relax the Constraint consistent with operating practices. The CAISO will use the following rules in relaxing the transmission Constraints in this step 2:

- (a) No Constraints on WECC rated paths or Interties with adjacent Balancing Authority Areas would be relaxed.
- (b) Only the transmission Constraints that can be mitigated in the Real-Time Market or Real-Time operation are candidates for Constraint relaxation. The criteria used to assess whether or not the Constraint can be mitigated in Real-Time can include, but are not limited to, the following: (1) there is a Submission to Self-Provide an Ancillary Service for Operating Reserves from non-Resource Adequacy Resources or non-RMR Units within the transmission constrained Load pocket constrained by the transmission path in question; provided, however, such Submissions to Self-Provide an Ancillary Service cannot be used in Step 1, but are available in Real-Time; (2) Scheduling Coordinators have submitted Self-Schedules for Participating Load in the constrained Load pocket; or (3) there are non-Resource Adequacy Resources and non-RMR Units within the constrained Load pocket that did not participate in the Day-Ahead Market but can be called upon under their Participating Generator Agreement before the CAISO curtails firm Load.

- (c) Candidate Constraints will be relaxed by assigning a high penalty for Constraint violation (as opposed to enforcing them as hard Constraints) in this Step 2. Such penalty will be lower than the penalty for curtailing firm (Price Taker) Load.
- (d) The higher of the facility rating or the pre-IFM flows through the facility with relaxed Constraints in this Step 2 will be used as hard limits in IFM.
- (e) To avoid unwarranted price impact in IFM, a Constraint violation penalty equal to three times the prevailing Energy Bid cap as specified in Section 39.6 will be applied to the Constraints relaxed in Step 2 between their operating limit and the relaxed limit determined.
- (f) The information relating to the relaxed Constraints will be forwarded to the CAISO Operator together with the necessary mitigating measures.

Step 3: In case the measures in Step 1 and Step 2 are insufficient, the CAISO may "soften" the LDF Constraints on a Node or sub-LAP basis, i.e., adjust Load at individual Nodes or, in aggregate, a group of Nodes to relieve the Constraint in such a way that minimizes the quantity of load curtailed. The adjustment to Load at individual Nodes shall be facilitated by adjustment and renormalization of applicable LDFs.



**31.3.2 Congestion and Transmission Losses Cost Determination.**

Except for those transactions exempt from such charges as specified in Section 11.2.1.5, Scheduling Coordinators will be responsible for MCC and MCL as specified in Section 27.1. The CAISO will determine the Marginal Losses surplus it has collected and will allocate such revenues to Scheduling Coordinators as described in Section 11.2.1.6.

**31.3.3 Metered Subsystems.**

In clearing the IFM, the CAISO will not enforce Constraints within each MSS. The Full Network Model (FNM) includes a full model of MSS transmission networks used for power flow calculations and Constraint management in the IFM and RTM. Network Constraints (i.e. circuit ratings, thermal ratings, etc.) within the MSS, or at its boundaries, shall be monitored but not enforced in the CAISO's FNM. If overloads are observed in the forward markets that are internal to the MSS or at the MSS boundaries and are attributable to MSS operations, the CAISO shall communicate such events to the Scheduling Coordinator for the MSS and coordinate any manual Redispatch required in Real-Time. If, independent of the CAISO, the Scheduling Coordinator for the MSS is unable to resolve Congestion internal to the MSS or at the MSS boundaries in Real-Time, the CAISO will use Exceptional Dispatch Instructions on resources that have been bid into the HASP and RTM to resolve the Congestion. Such costs will be allocated pursuant to the provisions specified in Section 11.5.6.2.5.2. The CAISO and MSS Operator shall develop specific procedures for each MSS to determine how network Constraints will be handled. Costs associated with internal Congestion and Transmission Losses in the MSS will be the responsibility of the MSS Operator. The Scheduling Coordinator for the MSS shall be responsible for payment of Marginal Losses for transactions at any points of interconnection between the MSS and the CAISO Controlled Grid, and for the delivery of Energy to the MSS or from the MSS in accordance with the CAISO Tariff. For MSS Operators that elect Load following, the CAISO shall exclude the effect of Transmission Losses in the relevant MSS in the CAISO's calculation of loss sensitivity factors used to calculate LMPs.

**31.4 Uneconomic Adjustments in the IFM.**

All Self-Schedules are respected by SCUC to the maximum extent possible and are protected from curtailment in the Congestion Management process to the extent that there are Economic Bids that can relieve Congestion. If all Economic Bids in the IFM are exhausted, resource Self-Schedules between the resource's Minimum Load and the first Energy level of the first Energy Bid point will be subject to uneconomic adjustments based on the scheduling priorities listed below. Through this process, imports and exports may be reduced to zero, Demand Bids may be reduced to zero, Price Taker Demand (LAP load) may be reduced, and Generation may be reduced to a lower operating limit (or Regulation Limit) (or to a lower Regulation Limit plus any qualified Regulation Down award or Self-Provided Ancillary Services, if applicable). Any Self-Schedules below the Minimum Load level are treated as fixed Self-Schedules and are not subject to uneconomic adjustments for Congestion Management. The provisions of this section shall apply only to the extent they do not conflict with any MSS Agreement. The scheduling priorities for the IFM from highest priority (last to be adjusted) to lowest priority (first to be adjusted) are as follows:

- (a) Reliability Must Run (RMR) Generation pre-dispatch reduction;
- (b) Day-Ahead TOR Self-Schedules (balanced demand and supply reduction);
- (c) Day-Ahead ETC Self-Schedules (balanced demand and supply reduction);  
different ETC priority levels will be observed based upon global ETC priorities provided to the CAISO by the Responsible PTOs;

- (d) Other Self-Schedules of CAISO Demand reduction subject to Section 31.3.1.3, exports explicitly identified in a Resource Adequacy Plan to be served by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports, and Self-Schedules of exports at Scheduling Points explicitly sourced by non-Resource Adequacy Capacity;
- (e) Self-Schedules of exports at Scheduling Points not explicitly sourced by non-Resource Adequacy Capacity, except those exports explicitly identified in a Resource Adequacy Plan to be served by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports as set forth in Section 31.4(d);
- (f) Day-Ahead Regulatory Must-Run Generation and Regulatory Must-Take Generation reduction;
- (g) Other Self-Schedules of Supply reduction; and
- (h) Economic Bids of Demand and Supply.

**31.5 Residual Unit Commitment.**

The CAISO shall perform the RUC process after the IFM. In the event that the IFM did not commit sufficient resources to meet the CAISO Forecast of CAISO Demand and account for other factors such as Demand Forecast error, as described in the Business Practice Manuals, the RUC shall commit additional resources and identify additional RUC Capacity to ensure sufficient on-line resources to meet Demand for

each hour of the next Trading Day. RUC Capacity is selected by a SCUC optimization that uses the same FNM used in the IFM to help ensure the deliverability of Energy from the RUC Capacity.

### **31.5.1 RUC Participation.**

#### **31.5.1.1 Capacity Eligible for RUC Participation.**

RUC participation is voluntary for capacity that has not been designated as Resource Adequacy Capacity. Scheduling Coordinators may make such capacity available for participation in RUC by submitting a RUC Availability Bid, provided the Scheduling Coordinator has also submitted an Energy Bid for such capacity into the IFM. Capacity from Non-Dynamic System Resources that has not been designated Resource Adequacy Capacity is not eligible to participate in RUC. Capacity from resources including System Resources that has been designated as qualified Resource Adequacy Capacity must participate in RUC. RUC participation is required for Resource Adequacy Capacity to the extent that Resource Adequacy Capacity is not committed following the IFM. System Resources eligible to participate in RUC will be considered on an hourly basis; that is, RUC will not observe any multi-hour block constraints and the Energy Limits that may have been submitted in conjunction with Energy Bids to the IFM. RMR Unit capacity will be considered in RUC in accordance with Section 31.5.1.3. MSS resources may participate in RUC in accordance with Section 31.5.2.3. COG resources are accounted for in RUC, but may not submit or be paid RUC Availability Payments. The ELS Resources committed through the ELC Process conducted two days before the day the RUC process is conducted for the next Trading Day as described in Section 31.7 are binding and the RUC process will model such capacity as capacity that is under a contractual obligation to provide.

#### **31.5.1.2 RUC Availability Bids.**

Scheduling Coordinators may only submit RUC Availability Bids for capacity (above the Minimum Load) for which they are also submitting an Energy Bid to participate in the IFM. The RUC Availability Bid for the Resource Adequacy Capacity submitted by a Scheduling Coordinator must be \$0/MW per hour for the entire Resource Adequacy Capacity. If the Scheduling Coordinator fails to submit a \$0/MW per hour for

Resource Adequacy Capacity, the CAISO will insert the \$0/MW per hour for the full amount of Resource Adequacy Capacity for a given resource. Scheduling Coordinators may submit non-zero RUC Availability Bids for the portion of a resource's capacity that is not Resource Adequacy Capacity.

**31.5.1.3 RMR Generation Resources.**

If a resource is determined to have an RMR Generation requirement for any Trading Hour of the next day, either by the MPM-RRD process or by the CAISO through a manual RMR Dispatch Notice, and if any portion of the RMR Generation requirement has not been cleared in the IFM, the entire portion of the RMR Generation requirement will be represented as a RMR Generation Self-Schedule in the RUC.

**31.5.2 Metered Subsystem RUC Obligation.**

MSS Operators are permitted to make an annual election to opt-in or opt-out of RUC participation. MSS Operators that elect to Load follow are automatically considered to opt-out of the RUC participation. Prior to the deadline for the annual CRR Allocation and CRR Auction process, as specified in Section 36, an MSS Operator that has selected not to Load follow shall notify the CAISO of its RUC participation option for the following CRR cycle.

**31.5.2.1 MSS Operator Opts-In to RUC Procurement.**

If the MSS Operator opts-in to the RUC procurement process, the Scheduling Coordinator for the MSS will be treated like any other Scheduling Coordinator that submits a Bid in the DAM with respect to RUC procurement by the CAISO and allocation of RUC costs. The CAISO will consider the CAISO Demand Forecast of the MSS Demand in setting the RUC procurement target, and the Scheduling Coordinator for the MSS will be responsible for any applicable allocation of costs related to the Bid Cost Recovery for RUC as provided in Section 11.8.

**31.5.2.2 MSS Operator Opts-out of RUC Procurement.**

If an MSS Operator opts out of the RUC procurement process, the CAISO shall not consider the CAISO Demand Forecast of the MSS Demand in setting the RUC procurement target, and will not commit

resources in RUC to serve the MSS Demand. The MSS Operator shall be responsible for meeting the Supply requirements for serving its Demand in accordance with this Section 31.5.2.2, and it will be exempt from the allocation of costs related to the Bid Cost Recovery for RUC as provided in Section 11.8. The MSS that opts out of the CAISO's RUC procurement will have two options for meeting the Supply requirements for serving its Demand, which it will select on an hourly basis depending on how it submits Self-Schedules for its Demand in the DAM.

**31.5.2.2.1 Based on CAISO Demand Forecast.**

If the Scheduling Coordinator for the MSS submits Hourly Demand Self-Schedules in the DAM that are greater than or equal to the CAISO Demand Forecast for the MSS Demand, the Scheduling Coordinator will have met its Supply requirement for such hours and will be exempt from the allocation of costs related to the Bid Cost Recovery for RUC as provided in Section 11.8.

**31.5.2.2.2 Not Based on CAISO Demand Forecast.**

If the Scheduling Coordinator for the MSS submits Hourly Demand Self-Schedules in the DAM that are less than the CAISO Demand Forecast for the MSS Demand, the Scheduling Coordinator will be exempt from the RUC cost allocation but will be monitored for its compliance with the Supply requirement based on the following performance criteria. If the MSS Demand Self-Schedule in the IFM for a given Trading Hour is less than the CAISO Demand Forecast for the MSS Demand and less than the actual metered Demand of the MSS for that Trading Hour, then penalty points will be accrued as follows: (i) if the difference between the actual metered Demand and the IFM Self-Schedule in any hour is greater than the lesser of two percent (2%) of the CAISO Demand Forecast for the MSS or five (5) MW, but less than the lesser of five percent (5%) or ten (10) MW, then the Scheduling Coordinator for the MSS will have one (1) penalty point against it for each occurrence; (ii) if the difference in any hour is more than the lesser of five percent (5%) or ten (10) MW, but less than the lesser of ten percent (10%) or twenty (20) MW, then the Scheduling Coordinator for the MSS will have two (2) penalty points against it for each occurrence; (iii) if

the difference in any hour is more than the lesser of ten percent (10%) or twenty (20) MW, then the Scheduling Coordinator for the MSS will have five (5) penalty points against it for each occurrence. The maximum penalty points that can be accrued during a single Trading Day for each MSS will be five (5). A total of more than twenty (20) penalty points within twelve (12) consecutive months will require the MSS to opt-in to RUC for the remainder of the CRR Annual Cycle and for the following CRR Annual Cycle. The provisions in this Section 31.5.2.2.2 do not apply to an MSS Operator that has elected to Load follow, and only apply to non-Load following MSS Operators.

**31.5.2.3 MSS Option to Bid RUC Capacity.**

The Scheduling Coordinator for the MSS Operator may submit RUC Availability Bids for the capacity of MSS resources and receive RUC Availability Payments and other RUC Compensation for such capacity selected in RUC, subject to the same bidding and operational requirements as any other resources providing RUC Capacity. This capability is not affected by the MSS Operator's decision to opt-in to or opt-out of RUC per Sections 31.5.2.1 and 31.5.2.2.

**31.5.3 RUC Procurement Target.**

The procurement target for RUC in any given Trading Hour will be determined based on the next day's hourly CAISO Forecast of CAISO Demand less the Energy scheduled in the Day-Ahead Schedule, and accounting for other factors, as appropriate, such as Demand Forecast error and estimated incremental HASP Bids including those from Participating Intermittent Resources. The adjustments listed in Sections 31.5.3.1 to 31.5.3.6 will be made to the CAISO Forecast of CAISO Demand to account for the conditions as provided therein. Adjustments may be made on a RUC Zone basis to ensure that RUC results in adequate local capacity procurement. The RUC procurement target-setting procedure is designed to meet the requirements of reliable grid operation without unnecessary over-procurement of RUC Capacity or over-commitment of resources. Additional detail on the process for setting the RUC procurement target is specified in the Business Practice Manuals.

**31.5.3.1 CAISO Operator Review & Adjustment.**

The CAISO Operator reviews the CAISO Forecast of CAISO Demand and all calculated adjustments as provided in Sections 31.5.3.2 through 31.5.3.6. The CAISO Operator shall accept, modify, or reject such adjustments based on Good Utility Practice. If the CAISO Operator determines it must modify or reject adjustments, the CAISO Operator shall log sufficient information as to reason, Operating Hour, and specific modification(s) made to the calculated adjustments.

**31.5.3.2 Demand Response Adjustments.**

The CAISO shall account for Demand response that is clearly communicated to the CAISO as certain to be curtailed for the next Trading Day only for the two following types of Demand response: 1) Demand response triggered by a staged System Emergency event; and 2) Demand response that is triggered by a price or an event known in advance. If an LSE informs the CAISO of anticipated Demand response prior to Market Close of the DAM, the CAISO Forecast of CAISO Demand used as the RUC procurement target will be reduced accordingly.

**31.5.3.3 MSS Adjustment.**

As specified in section 31.5.2.1, MSS Operators are permitted to make an annual election to opt-in or opt-out of RUC participation. If the MSS Operator opts-in to the RUC procurement process, the CAISO considers the CAISO's Demand Forecast of the MSS Demand in setting the RUC procurement target. If an MSS Operator opts-out of the RUC procurement process, the CAISO does not consider the CAISO's Demand Forecast of the MSS Demand in setting the RUC procurement target. An MSS Operator that has elected to opt-out of RUC, or has elected to Load follow and therefore has also elected to opt-out of RUC, is required to provide sufficient resources in the Day-Ahead Market, and in the case of a Load following MSS Operator, follow its Load within the MSS Deviation Band. To reflect these options and to prevent committing additional capacity or resources for any differences between the CAISO Demand Forecast for the MSS and the MSS Self-Scheduled quantities in the IFM, the CAISO replaces the CAISO Demand Forecast for such MSS with the quantity of Demand in Self-Schedules submitted by the Scheduling Coordinator for the MSS in the IFM.



**31.5.3.4 Eligible Intermittent Resource Adjustment.**

Scheduling Coordinators for Eligible Intermittent Resources may submit Bids, including Self-Schedules, in the Day-Ahead Market and the quantity ultimately scheduled from Eligible Intermittent Resources may differ from the CAISO forecasted deliveries from the Eligible Intermittent Resources. The CAISO may adjust the forecasted Demand either up or down for such differences by RUC Zone in which the Eligible Intermittent Resource resides. To the extent the scheduled quantity for an Eligible Intermittent Resource in the IFM is less than the quantity forecasted by CAISO, the CAISO makes a Supply side adjustment in RUC by using the CAISO forecasted quantity for the Eligible Intermittent Resource as the expected delivered quantity. To the extent the scheduled quantity for an Eligible Intermittent Resource in the IFM is greater than the quantity forecasted by the CAISO, the CAISO makes a Demand side adjustment to the RUC Zone Demand equal to the difference between the Day-Ahead Schedule and the CAISO forecasted quantity.

**31.5.3.5 Real-Time Expected Incremental Supply Self-Schedule Adjustment.**

In order to avoid over procurement of RUC, the CAISO shall, using a similar-day approach, estimate the HASP Self-Schedules for resources that usually submit HASP Self-Schedules that are greater than their Day-Ahead Schedules. The CAISO Operator may set the length of the Self-Schedule moving average window. Initially this moving average window shall be set by default to seven (7) days; in which case the weekday estimate is based on the average of five (5) most recent weekdays and the weekend estimate is based on the average of the two (2) most recent weekend days. To the extent weather conditions differ significantly from the historical days, additional adjustment may be necessary. After determining the estimate of Real-Time Self-Schedules, using a similar day forecasting approach, the CAISO adjusts the CAISO Forecast of CAISO Demand of a RUC Zone based on the forecasted quantity changes in Supply as a result of Self-Schedules submitted in the RTM. This adjustment for forecasted Real-Time Self-

Schedules may result in positive or negative adjustments. Demand adjustments to the CAISO Forecast of CAISO Demand result when there is a net forecast decrease in Real-Time Self-Schedule Supply relative to the Day-Ahead Schedule Supply. Supply adjustments to the individual resources occur when there is a net forecast increase in Real-Time Self-Schedule Supply relative to the Day-Ahead Schedule Supply of the individual resource.

**31.5.3.6 Day-Ahead Ancillary Service Procurement Deficiency Adjustment.**

While the CAISO intends to procure one hundred percent (100%) of its forecasted Operating Reserve requirement in the IFM based on the CAISO Forecast of CAISO Demand as specified in Section 8.3.1, the CAISO shall make adjustments to the CAISO Forecast of CAISO Demand used in RUC to ensure sufficient capacity is available or resources committed in cases that the CAISO is unable to procure one hundred percent (100%) of its forecasted Operating Reserve requirement in the IFM; provided, however, that the CAISO shall not procure specific Ancillary Services products in RUC, nor will the RUC optimization consider AS-related performance requirements of available capacity.

**31.5.3.7 RUC Zones.**

**31.5.3.7.1 Use of RUC Zones.**

The CAISO shall adjust the CAISO Forecast of CAISO Demand by RUC Zone for the conditions described in Sections 31.5.3.2 through 31.5.3.6. If any adjustments are made throughout the affected RUC Zone, such adjustments will be made consistent with the subset of system LDFs for the Nodes that define the RUC Zone(s). The CAISO will adjust the CAISO Forecast of CAISO Demand of each affected RUC Zone, preserving the LDFs within each RUC Zone, but the relative weighting of the LDFs across the system will deviate from the original LDFs. RUC costs will be pooled together to establish the RUC Compensation Costs. As described in Section 11.8.3, Settlement of RUC Compensation Costs will not be on a RUC Zone basis.

**31.5.3.7.2 Designation of RUC Zones.**

The CAISO shall define RUC Zones as areas that represent UDC or MSS Service Areas, Local Capacity Areas, or any other collection of Nodes. RUC Zones will be designated by the CAISO as necessary and to the extent that the CAISO has developed sufficient data on historical CAISO Demand and weather conditions to allow it to perform Demand Forecasts. The mapping of RUC Zones to Nodes shall be static data and shall be maintained in the Master File. The CAISO may add new Nodes to a RUC Zone if new Nodes are added to the FNM. The status of each RUC Zone shall remain active for as long as the CAISO maintains regional forecasting capabilities, but once a RUC Zone is designated the CAISO will only adjust the CAISO Forecast of CAISO Demand as necessary to address RUC procurement constraints and not as a normal course for all CAISO Market functions. The actual RUC Zones used by the CAISO in its operation of RUC are posted on the CAISO Website.

**31.5.4 RUC Procurement Constraints.**

In addition to the resource Constraints and network Constraints employed by SCUC as discussed in Section 27.4.1, the CAISO shall employ the following three Constraints in RUC:

- (a) To ensure that sufficient RUC Capacity is procured to meet the CAISO Forecast of CAISO Demand, the CAISO will enforce the power balance between the total Supply, which includes Day-Ahead Schedules and RUC Capacity, and the total Demand, which includes the CAISO Forecast of CAISO Demand and IFM export Schedules. The CAISO may adjust the CAISO Forecast of CAISO Demand to increase the RUC procurement target if there is AS Bid insufficiency in the IFM.
- (b) To ensure that RUC will neither commit an excessive amount of Minimum Load Energy nor procure an excessive amount of RUC Capacity from Scheduling Points the CAISO will verify that the sum of Day-Ahead Schedules, Schedules of

Generation Units, net imports and Participating Loads plus the Minimum Load Energy committed by RUC is not greater than a configurable percentage of the system CAISO Forecast of CAISO Demand.

- (c) The CAISO can limit the amount of RUC Capacity it will procure from resources that could otherwise be started during the Operating Day based on operational factors such as: 1) historical confidence that a Short Start Unit actually starts when needed based on the assessment of the CAISO Operators of the historical performance of Short Start Units; 2) need to conserve the number of run-hours and number of starts per year for critical loading periods; and 3) seasonal Constraints such as Overgeneration. The CAISO will verify that the total Day-Ahead Schedules and RUC Capacity from such resources is not greater than a configurable percentage of the total available capacity of all such resources.

### **31.5.5 Selection and Commitment of RUC Capacity.**

Capacity that is not already scheduled in the IFM may be selected as RUC Capacity through the RUC process of the DAM. The RUC optimization will select RUC Capacity and produce nodal RUC Prices by minimizing total Bid cost based on RUC Availability Bids and Start-Up and Minimum Load Bids. RUC will not consider Start-Up and Minimum Load Bids for resources already committed in the IFM. The RUC Capacity of a resource is the incremental amount of capacity selected in RUC above the resource's Day-Ahead Schedule. The resource's Day-Ahead Schedule plus its RUC Capacity comprise the resource's RUC Schedule. The CAISO will only issue RUC Start-Up Instructions to resources that must start in the Day-Ahead in order to be available to meet Real-Time Demand. RUC Schedules will be provided to Scheduling Coordinators even if a RUC Start-Up Instruction is not issued at that time. RUC shall not reverse commitments issued through the IFM. If the RUC process cannot find a feasible solution given the resources committed in the IFM, the RUC process will adjust Constraints as described in Section

31.5.4 to arrive at a feasible solution that accommodates all the resources committed in the IFM, and any necessary de-commitment of IFM committed units shall be effectuated through an Exceptional Dispatch.

**31.5.6 Eligibility for RUC Compensation.**

All RUC Capacity is eligible for the RUC Availability Payment except for: (i) RUC Capacity from RMR Units that has been designated as RMR Dispatch and included in RUC as a Self-Schedule; (ii) Resource Adequacy Capacity; and (iii) RUC Capacity that corresponds to the resource's Minimum Load, which is compensated through the Bid Cost Recovery as described in Section 11.8. Resources not committed in the IFM that are committed in RUC, including RMR Units that were not designated for RMR Dispatches and Resource Adequacy Resources, are also eligible for RUC Cost Compensation, which includes Start-Up and Minimum Load Cost compensation, and Bid Cost Recovery, subject to the resource actually following its Dispatch Instructions as verified by the CAISO pursuant to procedures set forth in the Business Practice Manuals.

**31.5.7 Rescission of Payments for Undispatchable and Undelivered RUC Capacity.**

If capacity committed in RUC provided from a Generating Unit, Participating Load, System Unit or System Resource is Undispatchable Capacity or Undelivered Capacity during the relevant Settlement Interval, then payments will be rescinded as described in this Section 31.5.7 and settled in accordance with Section 11.2.2.2. If the CAISO determines that non-compliance of a Participating Load, Generating Unit, System Unit or System Resource with an operating order or Dispatch Instruction from the CAISO, or with any other applicable technical standard under the CAISO Tariff, causes or exacerbates system conditions for which the WECC imposes a penalty on the CAISO, then the Scheduling Coordinator of such Participating Load, Generating Unit, System Unit or System Resource shall be assigned that portion of the WECC penalty which the CAISO reasonably determines is attributable to such non-compliance, in addition to any other penalties or sanctions applicable under the CAISO Tariff. The rescission of payments in this Section 31.5.7 shall not apply to a capacity payment for any particular RUC Capacity if the RUC Availability Payment is less than or equal to zero.

**31.5.7.1 Rescission of Payments for Undispatchable RUC Capacity.**

The CAISO shall calculate the Real-Time ability of each Generating Unit, Participating Load, System Unit or System Resource to deliver Energy from or capacity committed in RUC for each Settlement Interval based on its maximum operating capability, actual telemetered output, and Operational Ramp Rate as described in Section 30.10. System Resources that receive an award for RUC Capacity in the Day-Ahead Market are required to electronically tag (E-Tag as prescribed by the WECC) RUC Capacity. If the amounts of RUC Capacity in an electronic tag differ from the amounts of RUC Capacity for the System Resource, the Undispatchable Capacity will equal the amount of the difference, and will be settled in accordance with the provisions of Section 11.2.2.2.1. If the Undispatchable Capacity is capacity committed in RUC and is from a Generating Unit, System Unit or System Resource that is a Resource Adequacy Resource, there is no payment obligation to the CAISO for the Undispatchable Capacity. The CAISO will report the instance of non-compliance by the Resource Adequacy Resource to the appropriate Local Regulatory Authority.

**31.5.7.2 Rescission of Payments for Undelivered RUC Capacity.**

For each Settlement Interval in which a Generating Unit, Participating Load, System Unit or System Resource fails to supply Energy from capacity committed in RUC in accordance with a Dispatch Instruction, or supplies only a portion of the Energy specified in the Dispatch Instruction, the RUC Availability Payment will be reduced to the extent of the deficiency, in accordance with the provisions of Section 11.2.2.2.2.

**31.6 Timing of Day-Ahead Scheduling.**

**31.6.1** The CAISO may at its sole discretion implement any temporary variation or waiver of the timing requirements of this Section 31 and Section 6.5.3 (including the omission of any step) if any of the following criteria are met:

- (i) such waiver or variation of timing requirements is reasonably necessary to preserve System Reliability, prevent an imminent or threatened System Emergency or to retain Operational Control over the CAISO Controlled Grid during an actual System Emergency.
- (ii) because of error or delay, the CAISO requires additional time to fulfill its responsibilities;
- (iii) problems with data or the processing of data cause a delay in receiving or issuing Bids or publishing information on the CAISO's secure communication system;
- (iv) problems with telecommunications or computing infrastructure cause a delay in receiving or issuing Day-Ahead Schedules or publishing information on the CAISO's secure communication system.

**31.6.2** If the CAISO temporarily implements a waiver or variation of such timing requirements, the CAISO will publish the following information on the CAISO's secure communication system as soon as practicable:

- (i) the exact timing requirements affected;
- (ii) details of any substituted timing requirements;
- (iii) an estimate of the period for which this waiver or variation will apply; and
- (iv) reasons for the temporary waiver or variation.

**31.6.3** If, despite the variation of any time requirement or the omission of any step, the CAISO either fails to receive sufficient Bids or fails to clear the Day-Ahead Market, the CAISO may abort the Day-Ahead Market and require all Bids to be submitted in the HASP and RTM.

**31.6.4 Demand Information.**

By 6:00 a.m. on the day preceding the Trading Day, each Scheduling Coordinator shall provide to the CAISO a Demand Forecast specified by UDC Service Area for which it will submit a Bid for each of the Settlement Periods of the following Trading Day. The CAISO shall aggregate the Demand information by UDC Service Area and transmit the aggregate Demand information to each UDC serving such aggregate Demand.

**31.7 Extremely Long-Start Commitment Process.**

The CAISO shall perform the Extremely Long-Start Commitment Process (ELC Process) after the regular DAM results are posted. During the ELC Process the CAISO shall use a 48-hour simultaneous SCUC to assist it in determining the commitment of ELS Resources. ELS Resources are flagged in the Master File and are the only resources eligible to be committed in the ELC Process.

**31.7.1 Execution of the Extremely Long-Start Commitment Process.**

Each day after the DAM results are posted, the CAISO shall conduct the ELC Process to determine commitment of ELS Resources to be available to the CAISO Markets in the second day out. The CAISO will use the latest CAISO Forecast of CAISO Demand available to the CAISO for the Trading Day two days ahead of the current day that the ELC Process is executed. For the purpose of conducting the ELC Process, the CAISO will set the Ancillary Services requirements for the second day out based on the CAISO Forecast of CAISO Demand and forecasted firm imports. The CAISO shall execute a 48-hour simultaneous SCUC process to inform the decisions made in the ELC Process. The result of the 48-hour simultaneous SCUC process shall be reviewed by the CAISO Operator. The CAISO Operator shall use its operator judgment consistent with Good Utility Practice to determine whether the commitment instructions to the ELS Resources for the second day in the 48-hour Time Horizon should be implemented. The ELC Process shall not dispatch Energy for the ELC Process Time Horizon and



therefore the commitment instructions do not include megawatts schedules greater than the Minimum Load. The Energy and Ancillary Service requirements are re-evaluated by the IFM executed the day after the applicable ELC Process. The Commitment Statuses of the ELS Resources are passed to the Bid validation process for use in the DAM for the Trading Day two days after the current day when the ELC Process is executed.

### **31.7.2 Inputs Used in the Extremely Long-Start Commitment Process.**

#### **31.7.2.1 Energy Bids and Ancillary Services Bids for the First Day of the ELC Process Time Horizon.**

The commitment results that have been determined in the DAM for the Trading Day as reflected in the Day-Ahead Schedule and RUC Schedule issued on the current day that the ELC Process is executed, representing the first day of the 48-hour ELC Process, are modeled as self-committed. These resources are modeled as self-scheduled at the greater of the Day-Ahead Schedule for Energy or RMR Generation requirement, plus any RUC Awards for the purpose of running the 48-hour SCUC optimization in the ELC Process. This self-scheduled consideration is only for modeling purposes and does not affect eligibility for BCR of such resources for that Trading Day. The Self-Provided Ancillary Services and the Ancillary Service Awards produced by the IFM application on the current day that the ELC Process is executed are fixed in the applicable ELC Process and, therefore, the ELC Process does not procure any additional Ancillary Services for the first day of the ELC Process Time Horizon.

#### **31.7.2.2 Energy Bids and Ancillary Services Bids for the Second Day of the ELC Process Time Horizon.**

For all resources that are not ELS Resources, Bids for Supply of Energy and Ancillary Services submitted for the first Trading Day of the ELC Process as submitted for the DAM for the same Trading Day are replicated as a surrogate for the Bids for the second Trading Day of the ELC Process Time Horizon. For all ELS Resources, Bids submitted for the Trading Day two days ahead of the current day on which the ELC Process is executed will be used as the Bids used for the second Trading Day of the ELC Process Time Horizon.

**31.7.2.3 Outages Considerations.**

Any resource and transmission Outages and de-rates, including Ramp Rate de-rates, are considered in the applicable Commitment Intervals in the two-day Time Horizon.

**31.7.2.4 Initial and Boundary Conditions.**

The CAISO will make the following assumptions in the ELC Process regarding resources already committed:

- (1) A resource that is committed by the IFM in a Trading Hour in the Trading Day is considered committed in the same hour in the same Trading Day within the ELC Process Time Horizon.
- (2) A resource that has an RMR Generation requirement in a Trading Hour in the Trading Day is considered committed in the same hour in the same Trading Day within the ELC Process Time Horizon.
- (3) A resource that has a RUC Schedule in a Trading Hour in the Trading Day is considered committed in the same hour in the same Trading Day within the ELC Process Time Horizon.

**31.7.2.5 Constraints.**

The ELC Process optimization will enforce the same Constraints that are enforced in RUC on the day the ELC Process is executed. These include but are not limited to the following:

- (1) The Energy balancing Constraints to meeting CAISO Forecast of CAISO Demand adjustable by RUC Zones.
- (2) The resource Constraints including capacity, Ramp Rates, Energy Limits, Forbidden Operating Regions, Minimum Run Time and Minimum Down Time Constraints, considering any Outages in the ELC Process Time Horizon.

- (3) The transmission Constraints including branch limits, Transmission Interface limits, and Nomograms, considering any Outages in the ELC Process Time Horizon.
- (4) Both Self-Provided Ancillary Services and Ancillary Services Awards are fixed for the first day of the ELC Process Time Horizon. The AS requirements, as used in the IFM, remain the same for the first day of the ELC Process Time Horizon optimization. The Ancillary Services requirements for the second day of the ELC Process Time Horizon are specified for the ELC Process optimization using the Ancillary Services procurement process.

### **31.7.3 Output of Extremely Long-Start Commitment Process.**

The results of the ELC Process are produced by 1500 hours two days ahead of the Trading Day. The results of the ELC Process indicate the commitment decisions for ELS Resources that were made in the ELC Process the day before. These commitment decisions are binding and the DAM applications model the committed ELS Resources as resources that are under a contractual obligation to provide. The CAISO Commitment Period or Self-Commitment Period determination for the ELS Resources depends on the DAM results and the Clean and Generated Bids, following the same rules that apply to other resources. All Commitment Intervals for the ELS Resources will be classified as CAISO Commitment Periods, unless there is a Self-Schedule or Self-Provided AS for that interval.

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**[NOT USED]**

**[Ten Sheet Numbers Reserved for Future Filings.]**

### **33. HOUR-AHEAD SCHEDULING PROCESS (HASP).**

The HASP is the hour-ahead process during the Real-Time which consists of the following activities. The HASP includes a special hourly run of the Real-Time Unit Commitment (RTUC), which is also one of the component processes of the RTM. The RTUC utilizes a SCUC optimization and runs every fifteen (15) minutes, as fully described in Section 34. This Section 33 describes the special features of the specific hourly HASP run of the RTUC. The HASP combines provisions for the CAISO to issue hourly pre-dispatch instructions to System Resources that submit Energy Bids to the RTM and for the procurement of Ancillary Services on an hourly basis from System Resources, with provisions for Scheduling Coordinators to self-schedule changes to their Day-Ahead Schedules as provided in Section 33.1, and submit Bids to export Energy at Scheduling Points. The HASP also performs the MPM-RRD procedure with respect to the Bids that will be used in the HASP optimization and in the RTM processes for the same Trading Hour.

#### **33.1 Submission of Bids for the HASP and RTM.**

Scheduling Coordinators may submit Bids that will be used for the HASP and the RTM processes starting from the time Day-Ahead Schedules have been posted until seventy-five (75) minutes prior to each applicable Trading Hour in the Real-Time. The HASP and RTM processes do not accept Demand Bids for CAISO Demand, or Self-Schedules for exports other than those utilizing ETC or TOR rights. Export Bids that are not Self-Schedules may be submitted in HASP. The rules for submitted Bids specified in Section 30 apply to Bids submitted to the HASP and RTM. After the Market Close of the HASP and the RTM the CAISO performs a validation process consistent with the provisions set forth in Section 30.7 and the following additional rules. The CAISO will generate a 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. Bids submitted to the HASP and the RTM to supply Energy and Ancillary Services will be considered in the various HASP and RTM processes, including the MPM-RRD process, the HASP optimization, the STUC, the RTUC and the RTD.

### **33.2 The HASP Optimization.**

After the Market Close for the HASP and RTM for the relevant Trading Hour, the Bids have been validated and the MPM-RRD process has been performed, the HASP optimization determines feasible but non-binding HASP Advisory Schedules for Generating Units for each fifteen-minute interval of the Trading Hour, as well as binding hourly HASP Intertie Schedules and binding hourly HASP AS Awards from Non-Dynamic System Resources for that Trading Hour. The HASP may also commit resources whose Start-Up Times are within its Time Horizon. The HASP, like the other runs of the RTUC, utilizes the same SCUC optimization and FNM as the IFM, with the FNM updated to reflect changes in system conditions as appropriate, to ensure that HASP Intertie Schedules are feasible. Instead of clearing against Demand Bids as in the IFM, the HASP clears Supply against the CAISO Forecast of CAISO Demand plus submitted Export Bids, to the extent the Export Bids are selected in the MPM-RRD process. The HASP optimization also factors in forecasted unscheduled flow at the Interties. The HASP optimization produces Settlement prices for hourly imports and exports to and from the CAISO Balancing Authority Area reflected in the HASP Intertie Schedule and for the HASP AS Awards for System Resources.

### **33.3 Treatment of Self-Schedules in HASP.**

Scheduling Coordinators may submit Self-Schedules for Supply of Energy to the HASP. This includes Self-Schedules by Participating Load that is submitting Bids as a negative Generating Unit. Scheduling Coordinators may not submit Self-Schedules for CAISO Demand in HASP. Scheduling Coordinators may submit Self-Schedules for exports at Scheduling Points. The HASP optimization clears Bids, including Self-Schedules, while preserving all priorities in this process consistent with Section 31.4. The HASP optimization does not adjust submitted Self-Schedules unless it is not possible to balance Supply and the CAISO Forecast of CAISO Demand plus Export Bids and manage Congestion using the available Economic Bids, in which case the HASP performs non-economic adjustments to Self-Schedules. The MWh quantities of Self-Schedules of Supply that clear in the HASP constitute a feasible Dispatch for the

RTM at the time HASP is run, but the HASP results do not constitute a final Schedule for Generating Units because these resources may be adjusted non-economically in the RTD if necessary to manage Congestion and clear Supply and Demand. Self-Schedules submitted for Generation Units that clear in the HASP will be issued HASP Advisory Schedules. Scheduling Coordinators representing Participating Intermittent Resources whose output is being used to satisfy a resource adequacy requirement must submit Self-Schedules in HASP in accordance with the forecast provided by the independent forecast service provider. The submission of a change to an ETC Self-Schedule beyond the deadline specified in Section 16.9.1, that is permitted pursuant to the terms of the applicable ETC, shall not be deemed to be an unbalanced ETC Self-Schedule for the purposes of Settlement, consistent with the ETC and TOR Self-Schedule Settlement treatment described in Section 11.5.7.

#### **33.4 MPM-RRD for the HASP and the RTM.**

After the Market Close of the HASP and RTM, after the CAISO has validated the Bids pursuant to section 30.7, and prior to running the HASP optimization, the CAISO conducts the MPM-RRD process, the results of which will be utilized in the HASP optimization and all RTM processes for the Trading Hour. The MPM-RRD process for the HASP and RTM produces results for each fifteen-minute interval of the Trading Hour and thus may produce up to four mitigated Bids for any given resource for the Trading Hour. A single mitigated Bid for the entire Trading Hour is calculated using the minimum Bid price of the four mitigated Bid curves at each Bid quantity level. The Bids are mitigated only for the Bid quantities that are above the minimum quantity cleared in the CCR across all four fifteen-minute intervals. For a Condition 1 RMR Unit, if the dispatch level produced through the ACR is greater than the dispatch level produced through the CCR, and for a Condition 2 RMR Unit that is dispatched through the ACR, the resource will be flagged as an RMR Dispatch in the RTM and shall constitute a Dispatch notice pursuant to the RMR Contract.

**33.5 [NOT USED]**

**33.6 HASP Results.**

The CAISO publishes the binding HASP Intertie Schedules and HASP AS Awards for System Resources, as well as HASP Advisory Schedules and HASP AS Awards for internal Generating Units no later than forty-five (45) minutes prior to the Trading Hour.

**33.7 Ancillary Services in the HASP and the RTUC.**

To maintain required Ancillary Services when changes in forecasts of Demand and resource Outages occur after the Day-Ahead AS Awards are established, the CAISO utilizes the RTUC runs, including the HASP, to procure additional Ancillary Services needed to meet Reliability Criteria. The HASP meets the expected need for additional Ancillary Services for the Trading Hour by utilizing the optimal mix of Ancillary Services from System Resources and from Generating Units. Only the AS from System Resources are binding AS Awards, and these are for the full Trading Hour. Those Generating Units designated in the HASP to provide Ancillary Services for the same Trading Hour are given non-binding advisory AS Awards as a result of the HASP because the use of Generating Units to provide AS will be re-optimized by a subsequent RTUC that is run closer to the time the AS will actually be needed, as described in Section 34.2. The HASP AS Awards for System Resources are settled at hourly ASMPs that are calculated in the HASP as described in Section 33.8. All Operating Reserves procured in HASP are Contingency Only Operating Reserves.

**33.8 HASP Prices for HASP Intertie Schedules and HASP AS Awards.**

The RTUC will produce fifteen-minute LMPs for the four fifteen-minute intervals for the applicable Trading Hour. The fifteen-minute LMPs corresponding to the Scheduling Points are then used to derive a simple average hourly price for the Settlement of hourly Intertie Schedules at each Scheduling Point. The RTUC will also produce fifteen-minute ASMPs for the four fifteen-minute intervals for the applicable Trading Hour. These fifteen-minute ASMPs are then used to derive an average hourly price for the Settlement of



hourly HASP AS Awards. The RTUC run will also produce fifteen-minute Shadow Prices for each of the Interties for the four fifteen-minute intervals for the applicable Trading Hour. These fifteen-minute Shadow Prices are then used to derive an average hourly price for charging hourly Intertie AS Award providers for Congestion on the Interties. HASP Intertie Schedules and HASP AS Awards are settled in accordance with Sections 11.4 and 11.10.1.2 respectively.

**33.9 Cessation of the HASP.**

If, despite the variation of any time requirement or omission of any step, the CAISO is unable to operate the HASP, the CAISO may abort the HASP and perform all required functions through the RTM processes.

**34. REAL-TIME MARKET.**

The RTM is the market conducted by the CAISO during any given Operating Day in which Scheduling Coordinators may provide Real-Time Imbalance Energy and Ancillary Services. The Real-Time Market consists of the Real-Time Unit Commitment (RTUC), the Short-Term Unit Commitment (STUC) and the Real-Time Dispatch (RTD) processes. The Short-Term Unit Commitment (STUC) runs once per hour at the top of the hour and utilizes the SCUC optimization to commit Medium Start, Short Start and Fast Start Units to meet the CAISO Demand Forecast. The CAISO shall dispatch all resources, including Participating Load pursuant to submitted Bids or pursuant to the provisions below on Exceptional Dispatch. The Time Horizon of the STUC is approximately 255 minutes, starting with the fourth fifteen-minute interval of the next Trading Hour and extending for the next four Trading Hours. The RTUC runs every fifteen (15) minutes and utilizes the SCUC optimization to commit Fast Start and some Short Start resources and to procure any needed AS on a fifteen-minute basis. Any given run of the RTUC will have a Time Horizon of approximately sixty (60) to 105 minutes (four to seven fifteen-minute intervals) depending on when during the hour the run occurs. Not all resources committed in a given STUC or RTUC run will necessarily receive CAISO commitment instructions immediately, because during the Trading Day the CAISO may issue a commitment instruction to a resource only at the latest possible time that allows the resource to be ready to provide Energy when it is expected to be needed. The RTD uses a Security Constrained Economic Dispatch (SCED) algorithm every five minutes throughout the Trading Hour to determine optimal Dispatch Instructions to balance Supply and Demand and maintain required Ancillary Services quantities for the next binding target interval. The RTD optimization utilizes up to a sixty-five-minute Time Horizon (thirteen (13) five-minute intervals), but the CAISO issues Dispatch Instructions only for the next target five-minute Interval. The RTUC, STUC and RTD processes of the RTM use the same FNM used in the DAM and the HASP, subject to any necessary updates of the FNM pursuant to changes in grid conditions after the DAM has run.

**34.1 Inputs to the Real-Time Market.**

The RTM utilizes results produced by the DAM and HASP for each Trading Hour of the Trading Day, including the combined commitments contained in the Day-Ahead Schedules, Day Ahead AS Awards, RUC Awards, HASP Intertie Schedules, HASP Self-Schedules, HASP Intertie AS Awards and the MPM-RRD that is run as part of the HASP to determine reliability needs and mitigated bids for each relevant Trading Hour. These results, plus the short-term Demand Forecast, Real-Time Energy Bids, Real-Time Ancillary Service Bids, updated FNM, State Estimator output, resource outage and de-rate information constitute the inputs to the RTM processes. Bids submitted in HASP for all Generating Units and Participating Load shall be used in the Real-Time Market.

**34.2 Real-Time Unit Commitment.**

The Real-Time Unit Commitment (RTUC) process uses SCUC and is run every fifteen (15) minutes to: (1) make commitment decisions for Fast Start and Short Start resources having Start-Up Times within the Time Horizon of the RTUC process, and (2) procure required additional Ancillary Services and calculate ASMP used for settling procured Ancillary Service capacity for the next fifteen-minute Real-Time Ancillary Service interval. RTUC is run four times an hour, at the following times for the following Time Horizons: (1) at approximately 7.5 minutes prior to the next Trading Hour, in conjunction with the HASP run, for T-45 minutes to T+60 minutes; (2) at approximately 7.5 minutes into the current hour for T-30 minutes to T+60 minutes; (3) at approximately 22.5 minutes into the current hour for T-15 minutes to T+60 minutes; and (4) at approximately 37.5 minutes into the current hour for T to T+60 minutes where T is the beginning of the next Trade Hour. The HASP, described in Section 33, is a special RTUC run that is performed at approximately 7.5 minutes before each hour and has the additional responsibility of: (1) pre-dispatching Energy and awarding Ancillary Services for hourly dispatched System Resources for the Trading Hour that begins 67.5 minutes later, and (2) performing the necessary MPM-RRD for that Trading Hour.

### **34.2.1 Commitment of Fast Start and Short Start Resources.**

RTUC produces binding and advisory Start-Up and Shut-Down Dispatch Instructions for Fast Start and Short Start resources that have Start-Up Times that would allow the resource to be committed prior to the end of the relevant Time Horizon of the RTUC run. A Start-Up Dispatch Instruction is considered binding if the resource could not achieve the target start time as determined in the current RTUC run in a subsequent RTUC run as a result of the Start-Up Time of the resource. A Start-Up Instruction is considered advisory if it is not binding, such that the resource could achieve its target Start-Up Time as determined in the current RTUC run in a subsequent RTUC run based on its Start-Up Time. A Shut-Down Instruction is considered binding if the resource could achieve the target Shut-Down Time as determined in the current RTUC in a subsequent RTUC run. A Shut-Down Dispatch Instruction is considered advisory if the resource Shut-Down Instruction is not binding such that the resource could achieve its target Shut-Down time as determined in the current RTUC run in a subsequent RTUC run. A binding Dispatch Instruction that results in a change in Commitment Status will be issued, in accordance with Section 6.3, after review and acceptance of the Start-Up Instruction by the CAISO Operator. An advisory Dispatch Instruction changing the Commitment Status of a resource may be modified by the CAISO Operator to a binding Dispatch Instruction and communicated in accordance with Section 6.3 after review and acceptance by the CAISO Operator. Only binding and not advisory Dispatch Instructions will be issued by the CAISO.

### **34.2.2 Real-Time Ancillary Services Procurement.**

If the CAISO determines that additional Ancillary Services are required, other than those procured in the DAM and the HASP, the RTUC will procure Ancillary Services on a fifteen-minute basis as necessary to meet reliability requirements and will determine Real-Time Ancillary Service interval ASMPs for such AS for the next Commitment Period. All Operating Reserves procured in the RTM are considered Contingency Only Operating Reserves. Any Ancillary Service awarded in RTUC will be taken as fixed for

the three five-minute RTD intervals of its target fifteen-minute interval. In the RTUC, all resources certified and capable of providing Operating Reserves that have submitted Real-Time Energy Bids shall also submit applicable Spinning or Non-Spinning Reserves Bids, respectively, depending on whether the resource is online or offline. The CAISO will utilize the RTUC to procure Operating Reserves to restore its Operating Reserve requirements in cases when: (1) Operating Reserves awarded in DAM or HASP have been dispatched to provide Energy, (2) resource(s) awarded to provide Operating Reserves in the DAM or HASP are no longer capable of providing such awarded Operating Reserves, or (3) the Operator determines that additional Operating Reserves are necessary to maintain Operating Reserves within WECC/MORC criteria. The CAISO will utilize the RTUC to procure additional Regulation capacity in Real-Time in cases when: (1) resource(s) awarded to provide Regulation in the DAM or HASP are no longer capable of providing such awarded Regulation, or (2) the Operator determines that additional Regulation is necessary to maintain sufficient control consistent with NERC/WECC criteria and Good Utility Practice.

### **34.3 Real-Time Dispatch.**

The RTD can operate in three modes: RTED, RTCD and RTMD. The RTD (RTED and RTCD mode) uses a Security Constrained Economic Dispatch (SCED) algorithm every five (5) minutes throughout the Trading Hour to determine optimal Dispatch Instructions to balance Supply and Demand and maintain required Ancillary Service quantities for the next binding target interval. The Real-Time Economic Dispatch (RTED) will be used under most circumstances and will optimally dispatch resources based on their Energy Bids, excluding Contingency Only Operating Reserves except when needed to avoid an imminent System Emergency. The Real-Time Contingency Dispatch (RTCD) will be invoked when a transmission or generation contingency occurs and will include all Contingency Only Operating Reserves in the optimization. The Real Time Manual Dispatch (RTMD) will be invoked as a fall-back mechanism only when the RTED or RTCD fails to provide a feasible Dispatch. These three modes of the RTD are described in Sections 34.3.1 to 34.3.3.

**34.3.1 Real-Time Economic Dispatch.**

RTED mode of operation for RTD normally runs every five (5) minutes starting at approximately 7.5 minutes prior to the start of the next Dispatch Interval and produces a binding Dispatch Instruction for Energy for the next Dispatch Interval and advisory Dispatch Instructions for as many as twelve future Dispatch Intervals over the RTD optimization Time Horizon of sixty-five (65) minutes. After being reviewed by the CAISO Operator, only binding Dispatch Instructions are communicated for the next Dispatch Interval in accordance with Section 6.3. RTED will produce a Dispatch Interval LMP for each PNode for the Dispatch Interval associated with the binding Dispatch Instructions. The RTED Dispatch target is the middle of the interval between five (5) minutes boundary points.

**34.3.2 Real-Time Contingency Dispatch.**

RTCD mode of operation for RTD is run in response to a significant Contingency event, such that waiting until the next normal RTD run is not adequate and/or Operating Reserve identified as Contingency Only need to be activated in response to the event. The CAISO Operator may activate the Operating Reserve identified as Contingency Only either on a resource specific basis or for all such resources. When activating Contingency Only reserves in RTCD, the original Energy Bids associated with the resources providing Operating Reserve will be used for the RTCD. RTCD uses SCED to produce an optimized set of binding Dispatch Instructions for a single ten-minute Dispatch Interval instead of a normal five-minute Dispatch Interval. After being reviewed by the CAISO Operator, only binding Dispatch Instructions are communicated for the next Dispatch Interval in accordance with Section 6.3. When activating a RTCD and returning to normal RTED run after a RTCD run, five-minute Dispatch Interval LMPs will be produced for each PNode be based on the last available price from either the RTCD or normal RTED run relative to a five-minute target Dispatch Interval.

### **34.3.3 Real-Time Manual Dispatch.**

RTMD mode of operation for RTD is a merit-order run activated upon CAISO Operator request as a backup process in case the normal RTED process fails to converge. The RTMD run will provide the CAISO Operator a list of resources and quantity of MW available for Dispatch in merit-order based on Operational Ramp Rate but otherwise ignores Transmission Losses and network Constraints. The CAISO Operator may dispatch resources from the list by identifying the quantity of Imbalance Energy that is required for the system and/or directly selecting resources from the merit order taking into consideration actual operating conditions. After Dispatches have been selected, reviewed and accepted by the CAISO Operator, Dispatch Instructions will be communicated in accordance with Section 6.3. While the RTMD mode is being used for Dispatch a uniform five-minute MCP will be produced for all PNodes based on the merit order Dispatch. Until RTMD is actually run and RTMD-based Dispatch Instructions are issued after RTED fails to converge, all five-minute Dispatch Interval LMPs will be set to the last LMP at each Node produced by the last RTED run that converged.

### **34.4 Short-Term Unit Commitment.**

At the top of each Trading Hour, immediately after the RTUC run is completed, the CAISO performs an approximately five (5) hour Short-Term Unit Commitment (STUC) run using SCUC and the CAISO Forecast of CAISO Demand to commit Medium Start Units and Short Start Units with Start-Up Times greater than the Time Horizon covered by the RTUC. The Time Horizon for the STUC optimization run will extend three hours beyond the Trading Hour for which the RTUC optimization was run, and will replicate the Bids used in that Trading Hour for these additional hours. The CAISO revises these replicated Bids each time the hourly STUC is run, to utilize the most recently submitted Bids. A Start-Up Instruction produced by STUC is considered binding if the resource could not achieve the target Start-Up Time as determined in the current STUC run in a subsequent RTUC or STUC run as a result of the Start-Up Time of the resource. A Start-Up Instruction produced by STUC is considered advisory if it is not binding, such that the resource could achieve its target start time as determined in the current RTUC run

in a subsequent STUC or RTUC run based on its Start-Up Time. A binding Dispatch Instruction produced by STUC that results in a change in Commitment Status will be issued, in accordance with Section 6.3, after review and acceptance of the Start-Up Instruction by the CAISO Operator. The STUC will only decommit a resource to the extent that resource's physical characteristics allow it to be cycled in the same Time Horizon for which it was decommitted. STUC does not produce prices for Settlement.

### **34.5 General Dispatch Principles.**

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

- (1) The CAISO shall issue AGC instructions electronically as often as every four seconds from its Energy Management System (EMS) to resources providing Regulation and on Automatic Generation Control to meet NERC and WECC performance requirements;
- (2) In each run of the RTED or RTCD the objective will be to meet the projected Energy requirements over the Time Horizon of that run, subject to transmission and resource operational Constraints, taking into account the short term CAISO Forecast of CAISO Demand adjusted as necessary by the CAISO Operator to reflect scheduled changes to Interchange and non-dispatchable resources in subsequent Dispatch Intervals;
- (3) Dispatch Instructions will be based on Energy Bids for those resources that are capable of intra-hour adjustments and will be determined through the use of SCED except when the CAISO must utilize the RTMD;
- (4) When dispatching Energy from awarded Ancillary Service capacity the CAISO will not differentiate between Ancillary Services procured by the CAISO and Submissions to Self-Provide an Ancillary Service;



- (5) The Dispatch Instructions of a resource for a subsequent Dispatch Interval shall take as a point of reference the actual output obtained from either the State Estimator solution or the last valid telemetry measurement and the resource's operational ramping capability;
- (6) In determining the Dispatch Instructions for a target Dispatch Interval while at the same time achieving the objective to minimize Dispatch costs to meet the forecasted conditions of the entire Time Horizon, the Dispatch for the target Dispatch Interval will be affected by: (a) Dispatch Instructions in prior intervals, (b) actual output of the resource, (c) forecasted conditions in subsequent intervals within the Time Horizon of the optimization, and (d) operational Constraints of the resource, such that a resource may be dispatched in a direction for the immediate target Dispatch Interval that is different than the direction of change in Energy needs from the current Dispatch Interval to the next immediate Dispatch Interval;
- (7) Through Start-Up Instructions the CAISO may instruct resources to start up or shut down, or may reduce Load for Participating Loads, over the Time Horizon for the RTM based on submitted Bids, Start-Up Costs and Minimum Load Costs consistent with operating characteristics of the resources that the SCED is able to enforce. In making Start-Up or Shut-Down decisions in the RTM, the CAISO may factor in limitations on number of run hours or Start-Ups of a resource to avoid exhausting its maximum number of run hours or Start-Ups during periods other than peak loading conditions;
- (8) The CAISO shall only start up resources that can start within the Time Horizon used by the RTM optimization methodology;

- (9) The RTM optimization may result in resources being shut down consistent with their Bids and operating characteristics provided that: (1) the resource does not need to be on-line to provide Energy, (2) the resource is able to start up within the RTM optimization Time Horizon, (3) the Generating Unit is not providing Regulation or Spinning Reserve, and (4) Generating Units online providing Non-Spinning Reserve may be shut down if they can be brought up within ten (10) minutes as such resources are needed to be online to provide Non-Spinning Reserves; and
- (10) for resources that are both providing Regulation and have submitted Energy Bids for the RTM, Dispatch Instructions will be based on the Regulation Ramp Rate of the resource rather than the operational Ramp Rate.

**34.6 Dispatch Instructions for Generating Units and Participating Load.**

The CAISO may issue Dispatch Instructions covering:

- (a) Ancillary Services;
- (b) Energy, which may be used for:
  - (i) Congestion relief;
  - (ii) provision of Imbalance Energy; or
  - (iii) replacement of an Ancillary Service;
- (c) agency operation of Generating Units, Participating Loads or Interconnection schedules, for example:
  - (i) output or Demand that can be Dispatched to meet Applicable Reliability Criteria;
  - (ii) Generating Units that can be Dispatched for Black Start;
  - (iii) Generating Units that can be Dispatched to maintain governor control regardless of their Energy schedules;

- (d) the operation of voltage control equipment applied on Generating Units as described in this CAISO Tariff;
- (e) MSS Load following instructions provided to the CAISO, which the CAISO incorporates to create their Dispatch Instructions; or
- (f) necessary to respond to a System Emergency or imminent emergency.

**34.7 Utilization of the Energy Bids.**

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

**34.8 Dispatch of Energy From Ancillary Services.**

The CAISO may issue Dispatch Instructions to Participating Generators, Participating Loads, System Units and System Resources contracted to provide Ancillary Services (either procured through the CAISO Markets, Self-Provided by Scheduling Coordinators, or dispatched in accordance with the RMR Contract) for the Supply of Energy. During normal operating conditions, the CAISO shall Dispatch those Participating Generators, Participating Loads, System Units and System Resources that have contracted to provide Spinning and Non-Spinning Reserve, except for those reserves designated as Contingency Only, in conjunction with the normal Dispatch of Energy. Contingency Only reserves are Operating Reserve capacity that have been designated, either by the Scheduling Coordinator or the CAISO, as available to supply Energy in the Real-Time only in the event of the occurrence of an unplanned Outage,

a Contingency or an imminent or actual System Emergency. The CAISO may designate any reserve not previously identified as Contingency Only by Scheduling Coordinator as Contingency Only reserves, as necessary to maintain WECC MORC requirements. In the event of an unplanned Outage, a Contingency or a threatened or actual System Emergency, the CAISO may dispatch Contingency Only reserves. If Contingency Only reserves are dispatched through the RTCD, which as described in Section 34.3.2, only Dispatches in the event of a Contingency. Such Dispatch and pricing will be based on the original Energy Bids. If Contingency Only reserves are dispatched in response to a System Emergency that has occurred because the CAISO has run out of Economic Bids when no Contingency event has occurred, the RTED will Dispatch such Contingency Only reserves using maximum Bid prices as provided in Section 39.6.1 as the Energy Bids for such reserves and will set prices accordingly. If a Participating Generator, Participating Load, System Unit or System Resource that is supplying Operating Reserve is dispatched to provide Energy, the CAISO shall replace the Operating Reserve as necessary to maintain WECC MORC criteria. If the CAISO uses Operating Reserve to meet Real-Time Energy requirements, and if the CAISO needs Operating Reserves to satisfy MORC requirements, the CAISO shall restore the Operating Reserves to the extent necessary to meet MORC requirements through either the procurement of additional Operating Reserve in the RTM or the Dispatch of other Energy Bids in SCED to allow the resources that were providing Energy from the Operating Reserve to return to their Dispatch Operating Point. The Energy Bid Curve is not used by the AGC system when Dispatching Energy from Regulation. The upper portion of the resource capacity from its Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve. For a resource providing Regulation Up or Operating Reserves the remaining Energy Bid Curve shall be allocated to any RTM AS Awards in the following order from higher to lower capacity where applicable: (a) Spinning Reserve; and (b) Non-Spinning Reserve. For resources providing Regulation Up, the applicable upper Regulation Limit shall be used as the basis of allocation if it is lower than the upper portion of the Energy Bid Curve. The remaining portion of the Energy Bid Curve, if there is any, shall constitute a Bid for RTM Energy.

**34.9 Exceptional Dispatch.**

The CAISO may perform Exceptional Dispatches for the circumstances described in this Section 34.9, which may require the issuance of forced Shut-Downs or forced Start-Ups. The CAISO shall conduct all Exceptional Dispatches consistent with Good Utility Practice. Dispatch Instructions issued pursuant to Exceptional Dispatches shall be entered manually by the Operator into the RTM optimization software so that they will be accounted for and included in the communication of Dispatch Instructions to Scheduling Coordinators. Exceptional Dispatches are not derived through the use of the RTM optimization software and are not used to establish the LMP at the applicable PNode. The CAISO will record the circumstances that have led to the Exceptional Dispatch. Imbalance Energy delivered or consumed pursuant to the various types of Exceptional Dispatch is settled according to the provisions in Section 11.5.6.

**34.9.1 System Reliability Exceptional Dispatches.**

The CAISO may manually dispatch Generation Units, System Units, Participating Loads, Dynamic System Resources, and Condition 2 RMR Units pursuant to Section 41.9, in addition to or instead of resources dispatched by RTM optimization software during a System Emergency, or to prevent an imminent System Emergency or a situation that threatens System Reliability and cannot be addressed by the RTM optimization and system modeling. To the extent possible, the CAISO shall utilize available and effective Bids from resources before dispatching resources without Bids. To deal with any threats to System Reliability, the CAISO may also dispatch in the Real-Time Non-Dynamic System Resources that have not been or would not be selected by the RTM for Dispatch, but for which the relevant Scheduling Coordinator has submitted a Bid into the HASP.

**34.9.2 Other Exceptional Dispatch.**

The CAISO may also manually dispatch resources in addition to or instead of resources dispatched by the RTM optimization software to: (1) perform Ancillary Services testing; (2) perform pre-commercial operations testing for Generating Units; (3) mitigate for Overgeneration; (4) provide for Black Start; (5) provide for Voltage Support; (6) accommodate TOR or ETC Self-Schedule changes after the Market Close of the HASP; or (7) to reverse a commitment instruction issued through the IFM that is no longer optimal as determined through RUC. If the CAISO dispatches an RMR Unit for Voltage Support, the RMR Unit will be compensated under its RMR Contract and not as an Exceptional Dispatch under the CAISO Tariff.

**34.9.3 Transmission-Related Modeling Limitations.**

The CAISO may also manually Dispatch resources in addition to or instead of resources dispatched by the RTM optimization software, during or prior to the Real-Time as appropriate, to address transmission-related modeling limitations in the Full Network Model. Transmission-related modeling limitations for the purposes of Exceptional Dispatch, including for settlement of such Exceptional Dispatch as described in Section 11.5.6, shall consist of any FNM modeling limitations that arise from transmission maintenance, lack of Voltage Support at proper levels as well as incomplete or incorrect information about the transmission network, for which the Participating TOs have primary responsibility. The CAISO shall also manually Dispatch resources under this Section 34.9.3 in response to system conditions including threatened or imminent reliability conditions for which the timing of the Real-Time Market optimization and system modeling are either too slow or incapable of bringing the CAISO Controlled Grid back to reliable operations in an appropriate time-frame based on the timing and physical characteristics of available resources to the CAISO.

**34.10 Uneconomic Adjustments in the RTM.**

All Self-Schedules are respected by the SCED and SCUC to the maximum extent possible and are protected from curtailment in the Congestion Management process to the extent that there are effective Economic Bids that can relieve Congestion. If all Economic Bids for the RTM are exhausted, all Self-Schedules between the Minimum Load and the lowest energy level of the first Energy Bid point will be subject to uneconomic adjustments based on assigned scheduling priorities. Through this process, imports and exports may be reduced to zero, Demand may be reduced to zero, and Generation may be reduced to a lower operating limit(or Regulation Limit) (or to a lower Regulation Limit plus any qualified Regulation Down Award or Self-Provided Ancillary Services, if applicable). Any Self-Schedules below the Minimum Load level are treated as fixed Self-Schedules and are not subject to uneconomic adjustments for Congestion Management but may be subject to decommitment via an Exceptional Dispatch if necessary as a last resort to relieve Congestion that could not otherwise be managed.

**34.10.1 Increasing Supply.**

The scheduling priorities as defined in the RTM optimization to meet the need for increasing Supply as reflected from higher to lower priority are as follows:

- (a) Non-Participating Load reduction, exports explicitly identified in a Resource Adequacy Plan to be served by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports, or Self-Schedules for exports at Scheduling Points in HASP served by Generation from non-Resource Adequacy Capacity or from non-RUC Capacity;
- (b) Self-Schedules for exports at Scheduling Points in HASP not offered by Generation from non-Resource Adequacy Capacity or not offered by Generation from non-RUC Capacity, except those exports explicitly identified in a Resource Adequacy Plan to be served by Resource Adequacy Capacity explicitly identified and linked in a Supply Plan to the exports as set forth in Section 34.10.1(a);

- (c) Contingency Only Operating Reserve if activated by Operator to provide Energy  
(as indicated by the Contingency Flag and the Contingency condition);
- (d) Economic Bids submitted in the HASP or RTM.

**34.10.2 Decreasing Supply.**

The scheduling priorities as defined in the RTM optimization to meet the need for decreasing Supply as reflected from higher to lower priority are as follows:

- (a) Non-Participating Load increase;
- (b) Reliability Must Run (RMR) Schedule (Day-Ahead manual pre-dispatch or Manual RMR Dispatches or Dispatches that are flagged as RMR Dispatches following the MPM-RRD process);
- (c) Transmission Ownership Right (TOR) Self-Schedule;
- (d) Existing Rights (ETC) Self-Schedule;
- (f) Regulatory Must-Run and Regulatory Must-Take (RMT) Self-Schedule;
- (g) Participating Load increase;
- (h) Day-Ahead Supply Schedule;
- (i) Self-Schedule submitted in HASP; and
- (j) Economic Bids submitted in the HASP or RTM.

These dispatch priorities as defined in the RTM optimization may be superseded by operator actions and procedures as necessary to ensure reliable operations.

**34.11 Means of Dispatch Communication.**

The CAISO dispatches Regulation by AGC to Participating Generators and, for Dynamic System Resources, through dedicated communication links that satisfy the CAISO's standards for external imports of Regulation. The CAISO communicates all other Dispatch Instructions electronically, except



that, at the CAISO's discretion, the CAISO may communicate Dispatch Instructions by telephone, or facsimile. Scheduling Coordinators shall confirm the Dispatch Instructions that are communicated orally by repeating them to the CAISO employee providing the Dispatch Instruction. Except in the case of deteriorating system conditions or an actual or threatened System Emergency, and except for Dispatch Instructions for Regulation, the CAISO sends all Dispatch Instructions to the Scheduling Coordinator. The recipient Scheduling Coordinator shall immediately communicate the Dispatch Instruction to the operator of the resource. The CAISO may, with the prior permission of the applicable Scheduling Coordinator, communicate with and give Dispatch Instructions to the operators of the resource directly without having to communicate through their Scheduling Coordinator. The CAISO shall record the communications between the CAISO and Scheduling Coordinators relating to Dispatch Instructions in a manner that permits auditing of the Dispatch Instructions, and of the response of the resources, as applicable. In situations of deteriorating system conditions or System Emergency, the CAISO reserves the right to communicate directly with the resource(s) as required to ensure System Reliability. Scheduling Coordinators are required to advise the CAISO immediately of any change in resource availability that prevents the recipient of a Dispatch Instruction from performing in accordance with that Dispatch Instruction.

**34.11.1 Response Required by Resources to CAISO Dispatch Instructions.**

Resources must:

- (a) unless otherwise stated in the Dispatch Instruction, comply with a Dispatch Instruction immediately upon receipt;
- (b) respond to all Dispatch Instructions in accordance with Good Utility Practice;
- (c) meet voltage criteria in accordance with the provisions in the CAISO Tariff;
- (d) meet any applicable Operational Ramp Rates;

- (e) respond to Dispatch Instructions for Ancillary Services within the required time periods and (in the case of Participating Generators providing Regulation) respond to AGC from the EMS; and
- (f) if a time frame is stated in a Dispatch Instruction, respond to a Dispatch Instruction within the stated time frame.

**34.11.2 Failure to Conform to Dispatch Instructions.**

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

considered declined. A decline of such a Non-Dynamic System Resource for a Dispatch Instruction received at least forty (40) minutes prior to the Trading Hour will be subject to Uninstructed Deviation Penalties as specific in Section 11.23. A decline of such a Non-Dynamic System Resource for a Dispatch Instruction received less than forty (40) minutes prior to the Trading Hour will not be subject to Uninstructed Deviation Penalties. A Non-Dynamic System Resource that only partially accepts a Dispatch Instruction is subject to Uninstructed Deviation Penalties for the portion of the Dispatch Instruction that is declined.

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

**34.12 Metered Subsystems.**

Scheduling Coordinators that represent MSSs may submit Bids for Supply of Energy to the RTM, irrespective of whether the MSS is a Load following MSS. All Bids submitted for MSS generating resources for the RTM and all Dispatch Instructions shall be generating resource-specific. MSS non-Load following resources are responsible for following Dispatch Instructions. Load following MSS Operators shall provide the CAISO with an estimate of the number of MWs the applicable generating resource(s) will be generating over the next two hours in five-minute interval resolution. The Dispatch Instructions for Load following resources are incorporated with Generation estimates provided by MSS Operators. Such MSS Load following resources can deviate from the Dispatch Instructions in Real-Time to facilitate the following of Load without being subject to the Uninstructed Deviation Penalty as further described in Section 11.23 of the CAISO Tariff. The State Estimator will estimate all MSS Load in Real-Time and will incorporate the information provided by the Load following MSS Operator in clearing the RTM and its Dispatch Instructions.

**34.13 Treatment of Resource Adequacy Capacity in the Real-Time Market.**

Resource Adequacy Resources required to offer their Resource Adequacy Capacity in accordance with Section 40 shall be required to submit Energy Bids for: (1) all such Resource Adequacy Capacity and (2) any Ancillary Services capacity awarded or self-provided in the Day-Ahead, the HASP or RTM. In the absence of submitted Bids, as part of the validation described in 30.7, Generated Bids will be used for Resource Adequacy Resources required to offer their Resource Adequacy Capacity in accordance with Section 40. For any capacity from a Resource Adequacy Resource not required to offer Resource Adequacy Capacity in accordance with Section 40 that was awarded or is self-providing Operating Reserves capacity in the Day-Ahead Market, Scheduling Coordinators must submit an Energy Bid for no less than the amount of awarded or self-provided Operating Reserves capacity above their Day-Ahead

Schedule. Resource Adequacy Resources that are not required to offer their Resource Adequacy Capacity in accordance with Section 40 may voluntarily submit Energy Bids. Submitted Energy Bids shall be subject to the maximum and minimum Bid requirements and Mitigation Measures as set forth in Section 39.

**34.14 Real-Time Operational Activities in the Hour Prior to the Settlement Period.**

**34.14.1 Confirm Interchange Transaction Schedules (ITSs).**

Also in the hour prior to the beginning of the Operating Hour the CAISO will:

- (a) adjust Interchange transaction schedules (ITSs) as required under Existing Contracts in accordance with the procedures in the CAISO Tariff for the management of Existing Contracts;
- (b) adjust ITSs as required by changes in transfer capability of transmission paths occurring after Market Close of the HASP; and
- (c) agree on ITS changes with adjacent Balancing Authorities.

**34.15 Rules For Real-Time Dispatch of Imbalance Energy Resources.**

**34.15.1 Resource Constraints.**

The SCED shall enforce the following resource physical Constraints:

- (a) Minimum and maximum operating resource limits. Outages and limitations due to transmission clearances shall be reflected in these limits. The more restrictive operating or regulating limit shall be used for resources providing Regulation so that the SCED shall not Dispatch them outside their Regulating Range.
- (b) Forbidden Operating Regions. Resources can only be ramped through these regions. The SCED shall not Dispatch resources within their Forbidden Operating Regions unless at the maximum applicable Ramp Rate to clear the Forbidden Operating Region in consecutive Dispatch Intervals. Resources ramping through a Forbidden Operating Region shall not set LMP at its location and cannot provide Ancillary Services and will not be called upon to provide

Ancillary Services, unless the resource can cross the Forbidden Operating Region in less than twenty (20) minutes.

- (c) Operational Ramp Rates and Start-Up Times. The submitted Operational Ramp Rate for resources that are not providing Regulation, and the submitted Regulation Ramp Rate for resources that are providing Regulation shall be used for all Dispatch Instructions. The Ramp Rate for Non-Dynamic System Resources cleared in the HASP will not be observed. Rather, the ramp of the Non-Dynamic System Resource will respect inter-Balancing Authority Area Ramping conventions established by WECC. Ramp Rates for Dynamic System Resources will be observed like Participating Generators in the RTD. Each Energy Bid shall be Dispatched only up to the amount of Imbalance Energy that can be provided within the Dispatch Interval based on the applicable Operational Ramp Rate or Regulation Ramp Rate. The Dispatch Instruction shall consider the relevant Start-Up Time as, if the resource is off-line, the relevant Ramp Rate function, and any prior commitments such as Schedule changes across hours and previous Dispatch Instructions. The Start-Up Time shall be determined from the Start-Up Time function and when the resource was last shut down. The Start-Up Time shall not apply if the corresponding resource is on-line or expected to start. The CAISO Markets optimization considers fast and slow Ramping resources. Fast Ramping resources can ramp from PMin to PMax based on their Operational Ramp Rate in twenty (20) minutes or less. Slow Ramping resources take more than twenty (20) minutes to ramp from PMin to PMax based on their Operational Ramp Rate. The CAISO determines whether it is appropriate to procure Ancillary Services or Energy from fast Ramping and slow Ramping resources based on the RTUC optimization.

- (d) Maximum Number of Daily Start-Ups. The SCED shall not cause a resource to exceed its daily maximum number of Start-Ups.
- (e) Minimum Up and Down time. The SCED shall not start up off-line resources before their Minimum Down Time expires and shall not shut down on-line resources before their minimum up time expires.
- (f) Operating (Spinning and Non-Spinning) Reserve. The SCED shall Dispatch Spinning and Non-Spinning Reserve subject to the limitations set forth in Section 34.16.3.
- (g) Non-Dynamic System Resources. If Dispatched, each Non-Dynamic System Resource flagged for hourly pre-dispatch in the next Trading Hour shall be Dispatched to operate at a constant level over the entire Trading Hour. The HASP shall perform the hourly pre-dispatch for each Trading Hour once prior to the Operating Hour. The hourly pre-dispatch shall not subsequently be revised by the SCED and the resulting HASP Intertie Schedules are financially binding and are settled pursuant to section 11.4.
- (h) Daily Energy use limitation to the extent that Energy limitation is expressed in a resource's Bid. If the Energy Limits are violated for purposes of Exceptional Dispatches for System Reliability, the Bid will be settled as provided in Section 11.5.6.1.

**34.16 Ancillary Services in the Real-Time Market.**

**34.16.1 [NOT USED]**

**34.16.2 Dispatch of Self-Provided Ancillary Services.**

Where a Scheduling Coordinator has chosen to self-provide the whole of the additional Operating Reserve required to cover any Interruptible Imports which it has submitted through Self-Schedules in the Day-Ahead Market and has identified specific Generating Units, Participating Loads, System Units or System Resources as the providers of the additional Operating Reserve concerned, the CAISO shall Dispatch only the designated Generating Units, Participating Loads, System Units or System Resources in the event of the CAISO being notified that the on demand obligation is being curtailed. The Scheduling Coordinator scheduling an Interruptible Import will be responsible for Operating Reserves associated with the Interruptible Import, regardless of whether the Scheduling Coordinator is an LSE or not. For all other Submissions to Self-Provide an Ancillary Service, the Energy Bid shall be used to determine the Dispatch, subject to the limitation on the Dispatch of Spinning Reserve and Non-Spinning Reserve set forth in Section 34.10.

**34.16.3 Ancillary Services Requirements for RTM Dispatch.**

The following requirements apply to the Dispatch of Ancillary Services in the RTM:

**34.16.3.1 Regulation.**

- (a) Regulation provided from Generating Units or System Resources must meet the standards specified in this Tariff and Part A of Appendix K;
- (b) The CAISO will Dispatch Regulation in merit order of Bid prices as determined by the EMS. Dispatch of Regulation by EMS does not set the RTM LMP.
- (c) in the event of an unscheduled increase in system Demand or a shortfall in Generation output and Regulation margin drops, the CAISO will use Dispatch Energy in the RTM or Dispatch Operating Reserve, to restore Regulation margin; and
- (d) when scheduled Operating Reserve is used for restoration of Regulation reserve, the CAISO shall arrange for the replacement of that Operating Reserve;



**34.16.3.2 Operating Reserve.**

- (a) Spinning Reserve:
  - (i) Spinning Reserve provided from Generating Units and Interconnection schedules must meet the standards specified in Part B of Appendix K;
  - (ii) the CAISO will Dispatch Spinning Reserve as may be required to meet the Applicable Reliability Criteria;
  - (iii) the CAISO may Dispatch Spinning Reserve as balancing Energy to return Regulation Generating Units to their Set Points and restore full Regulation margin; and
  - (iv) the CAISO will Dispatch Spinning Reserve in merit order of Energy Bid prices as determined by the SCED;
- (b) Non-Spinning Reserve:
  - (i) Non-Spinning Reserve provided from Generating Units, Demands, and external imports of System Resources must meet the standards specified in Part C of Appendix K
  - (ii) the CAISO may Dispatch Non-Spinning Reserve in place of Spinning Reserve to meet Applicable Reliability Criteria;
  - (iii) the CAISO will Dispatch Non-Spinning Reserve in merit order of Energy Bid prices as determined by the SCED ; and
  - (iv) the CAISO may Dispatch Non-Spinning Reserve to replace Spinning Reserve if there is a shortfall in Spinning Reserve because of a deficiency of balancing Energy;

**34.16.3.3 Replacement of Operating Reserve.**

- (a) if pre-arranged Operating Reserve is used to meet balancing Energy requirements, the CAISO may replace such Operating Reserve by Dispatch of additional balancing Energy available from Energy Bids submitted in the HASP for the RTM or procurement of additional reserves based on an economic optimization of a resource's RTM Ancillary Service Bid and its Energy Bid.;
- (b) any additional Operating Reserve needs may also be met the same way; and
- (c) where the CAISO elects to rely upon Energy Bids, the CAISO shall select the resources with the lowest incremental Energy Bid price as established by SCED.

**34.16.3.4 Voltage Support.**

- (a) Voltage Support provided from Generating Units shall meet the standards specified in this Tariff and the Part E of Appendix K;
- (b) the CAISO may Dispatch Generating Units to increase or decrease MVar output within the power factor limits of 0.9 lagging to 0.95 leading (or within other limits specified by the CAISO in any exemption granted pursuant to Section 8.2.3.3 of the CAISO Tariff) at no cost to the CAISO when required for System Reliability;
- (c) may Dispatch each Generating Unit to increase or decrease MVar output outside of established power factor limits, but within the range of the Generating Unit's capability curve, at a price calculated in accordance with CAISO Tariff;
- (d) If Voltage Support is required in addition to that provided pursuant to 34.16.3.4 (b) and (c), the CAISO will reduce output of Participating Generators certified in accordance with Appendix K . The CAISO will select Participating Generators in the vicinity where such additional Voltage Support is required; and
- (e) the CAISO will monitor voltage levels at Interconnections to maintain them in accordance with the applicable inter-Balancing Authority Area agreements.

**34.16.4 Inter-hour Dispatch of Resources With Real-Time Energy Bids.**

Dispatch Instructions associated with the ramp between the HASP Bid in one hour to the HASP Bid in the immediately succeeding Operating Hour shall be determined optimally by the SCED if the CAISO has Bids for either or both relevant Operating Hours. For any Operating Hour(s) for which Bids have been submitted Dispatch Instructions will be optimized such that the Dispatch Operating Point is within the Bid range(s). For any Operating Hour without submitted Bids, Dispatch Instructions will be optimized such that the Dispatch Operating Point conforms to the Schedule within the Operating Hour. Energy resulting from the Standard Ramp shall be deemed Standard Ramping Energy and will be settled in accordance with Section 11.5.1. Energy resulting from any ramp extending beyond the Standard Ramp will be deemed Ramping Energy Deviation and will be settled in accordance with Section 11.5.1. Energy delivered or consumed as a result of CAISO Dispatch of a resource's Energy Bid in one Operating Hour to a Dispatch Operating Point such that the resource cannot return to its successive Operating Hour Schedule or to an infra-marginal operating point by the beginning of the next Operating Hour is Residual Imbalance Energy and shall be settled as Instructed Imbalance Energy as provided for in Section 11.5.1 and also may be eligible for recovery of its applicable Energy Bid Costs in accordance with Section 11.8. Similarly, Energy delivered or consumed as a result of CAISO Dispatch of a resource's Energy Bid in a future Operating Hour to a Dispatch Operating Point different from its current Operating Point prior to the end of the current Operating Hour is also considered Residual Imbalance Energy and shall be settled as Instructed Imbalance Energy as provided for in Section 11.5.1 and also may be eligible for recovery of its applicable Energy Bid Costs in accordance with Section 11.8. When Ramping Energy Deviation and Residual Imbalance Energy coexist within a given Dispatch Interval, the Ramping Energy Deviation shall be the portion of Instructed Imbalance Energy that is produced or consumed within the Schedule-change band defined by the accepted HASP Bids of the two consecutive Settlement Periods; the Residual Imbalance Energy shall be the portion of Instructed Imbalance Energy that is produced or consumed outside the Schedule-change band.

**34.16.5 Inter-hour Dispatch of Resources Without Real-Time Energy Bids.**

Dispatch Instructions shall be issued for each Dispatch Interval as needed to prescribe the ramp between a resource's accepted HASP Bid in one Trading Hour to its accepted HASP Bid in the immediately succeeding Operating Hour. Such Dispatch Instructions shall be based on the lesser of: (1) the applicable Operational Ramp Rate as provided for in Section 30.10 and (2) the Ramp Rate associated with the Standard Ramp. The Dispatch Instructions for Ramping of Generating Units without Real-Time Energy Bids in both Operating Hours shall ramp the resource between hourly Schedules symmetrically across hourly boundaries in twenty (20) to sixty (60) minutes assuming congestion can be resolved utilizing Economic Bids. The minimum twenty (20)-minute ramp is required for smooth hourly Schedule changes and is consistent with Intertie scheduling agreements between Balancing Authority Areas. Resources with slower Ramp Rates would have longer ramps, and at the extreme, would ramp from the middle of an hour to the middle of the next hour. Energy resulting from the Standard Ramp shall be deemed Standard Ramping Energy and will be settled in accordance with Section 11.5.1. Energy resulting from any ramp extending beyond the Standard Ramp will be deemed Ramping Energy Deviation and will be settled in accordance with Appendix N, Part D-1, Section 2.1.2.

**34.16.6 Intra-Hour Exceptional Dispatches.**

For the special case where an Exceptional Dispatch begins in the new hour and the rules above would result in the violation of the resources inter-temporal constraint(s), the following rules are applied and the Energy is settled as Exceptional Dispatch Energy as described in Section 11.5.6.

- (a) If the ramp time is greater than one hour or greater than what can be achieved when RTM receives the Constraint, RTM starts the ramp at the earliest possible time and continues Ramping the resource in the new Trading Hour.

- (b) If the ramp time results in starting the ramp less than ten (10) minutes before the start of the hour, RTM instead starts the ramp at ten (10) minutes before the start of the hour and ramps the resource at a uniform rate so that it meets the Constraint by the start time of the Exceptional Dispatch.
- (c) If the new hour's Day-Ahead Schedule is beyond the Exceptional Dispatch Constraint, RTM resumes the basic Ramping rules after the Exceptional Dispatch Constraint is met, but limits the Ramp Rate as necessary to ensure that the resource does not complete its ramp before ten (10) minutes after the hour.

**34.17 Dispatch Information and Instructions.**

**34.17.1 Dispatch Information To Be Supplied by the CAISO.**

Communication of Dispatch information provided by the CAISO shall be in accordance with Section 6.3.

**34.17.2 Dispatch Information To Be Supplied by Scheduling Coordinator.**

Each Scheduling Coordinator shall be responsible for the submission of Bids and Dispatch of Generation and Demand in accordance with its Day-Ahead Schedule. Each Scheduling Coordinator shall keep the CAISO apprised of any change or potential change in the current status of all Generating Units, Interconnection schedules and Inter-SC Trades. This will include any changes in Generating Unit capacity that could affect planned Dispatch and conditions that could affect the reliability of a Generating Unit. Each Scheduling Coordinator shall immediately pass to the CAISO any information which it receives from a Generator which the Generator provides to the Scheduling Coordinator pursuant to Section 36.11.1. Each Scheduling Coordinator shall immediately pass to the CAISO any information it receives from a MSS Operator which the MSS Operator provides to the Scheduling Coordinator regarding any change or potential change in the current status of all Generating Units, System Units,

Interconnection schedules and Inter-Scheduling Coordinator Energy Trades. This information includes any changes in MSS System Units and Generating Unit capacity that could affect planned Dispatch and conditions that could affect the reliability of the System Unit or Generating Unit.

**34.17.3 Dispatch Information To Be Supplied by UDCs.**

Each UDC shall keep the CAISO informed of any change or potential change in the status of its transmission lines and station equipment at the point of Interconnection with the CAISO Controlled Grid. Each UDC shall keep the CAISO informed as to any event or circumstance in the UDC's service territory that could affect the reliability of the CAISO Controlled Grid. This would include adverse weather conditions, fires, bomb threats, etc.

**34.17.4 Dispatch Information To Be Supplied by PTOs.**

Each PTO shall report any change or potential change in equipment status of the PTO's transmission assets turned over to the control of the CAISO or in equipment that affects transmission assets turned over to the control of the CAISO immediately to the CAISO (this will include line and station equipment, line protection, Remedial Action Schemes and communication problems, etc.). Each PTO shall also keep the CAISO immediately informed as to any change or potential change in the PTO's transmission system that could affect the reliability of the CAISO Controlled Grid. This would include adverse weather conditions, fires, bomb threats, etc.

Each PTO shall schedule all Outages of its lines and station equipment which are under the Operational Control of the CAISO in accordance with the appropriate procedures in Section 9.3. Each PTO shall coordinate any requests for or responses to Forced Outages on its transmission lines or station equipment which are under the Operational Control of the CAISO directly with the appropriate CAISO Control Center as defined in Section 7.1.

**34.17.5 Dispatch Information To Be Supplied by Balancing Authorities.**

The CAISO and each adjacent Balancing Authority shall keep each other informed of any change or potential change in the status of the Interconnection and any changes in the Interconnection's TTC. The CAISO and each adjacent Balancing Authority shall keep each other informed of situations such as adverse weather conditions, fires, etc., that could affect the reliability of any Interconnection. Each Balancing Authority of the Balancing Authority Areas in the California area, as defined by the WECC Regional Security Plan, shall keep the CAISO informed of all information required by WECC for use by the Reliability Coordinator.

The CAISO and each adjacent Balancing Authority shall follow all applicable NERC and WECC scheduling procedures. This will include checking the Interconnection schedules for the next Settlement Period prior to the start of the Energy ramp going into that hour. The CAISO and each adjacent Balancing Authority shall check and agree on actual MWh net Interchange after the hour for the previous Settlement Period. One Balancing Authority Area shall change its actual number to reflect that of the other Balancing Authority Area in accordance with WECC standard procedures.

The CAISO and each adjacent Balancing Authority shall exchange MW, MVar, terminal and bus voltage data with each other on a four second update basis. MWh data for the previous hour shall be exchanged once per hour. All MW and MWh data for both the CAISO Balancing Authority Area and the adjacent Balancing Authority Areas must originate from the same metering equipment. All provisions in Sections 4.6.1.1(i) and 4.6.1.1 (ii) refer to information and data obtained from metering used for Balancing Authority Area operations and not metering used for billing and Settlement.

**34.18 [NOT USED]**

**34.19 Pricing Imbalance Energy.**

**34.19.1 General Principles.**

Instructed and Uninstructed Imbalance Energy shall be paid or charged the applicable Resource-Specific Settlement Interval LMP except for hourly pre-dispatched Instructed Imbalance Energy, which shall be settled as set forth in Section 11.5.2. These prices are determined using the Dispatch Interval LMPs. The Dispatch Interval LMPs shall be based on the Bid of the marginal Generating Units, System Units, and Participating Loads dispatched by the CAISO to increase or reduce Demand or Energy output in each Dispatch Interval as provided in Section 34.19.2.1.

The CAISO will respond to the Dispatch Instructions issued by the SCED to the extent practical in the time available and acting in accordance with Good Utility Practice. The CAISO will record the reasons for any variation from the Dispatch Instructions issued by the SCED.

**34.19.2 Determining Real-Time LMPs.**

**34.19.2.1 Dispatch Interval Real-Time LMPs.**

**34.19.2.2 Computation.**

For each Dispatch Interval, the CAISO will compute updated Supply and Demand curves, using the Generating Units, System Units, Dynamic System Resources and Participating Load Dispatched according to the CAISO's SCED during that time period to meet Imbalance Energy requirements. The RTM transactions will be settled at the Dispatch Interval LMPs in accordance with Section 11.5.

**34.19.2.3 Eligibility to Set the Real-Time LMP.**

All Generating Units, Participating Loads, Dynamic System Resources, System Units, or COGs subject to the provisions in Section 27.7, with Bids, including Default Energy Bids, that are unconstrained due to Ramp Rates or other temporal Constraints are eligible to set the LMP, provided that the Generating Unit, Participating Load, Dynamic System Resource, or System Unit is Dispatched within its submitted Economic Bid range. If a resource is Dispatched beyond its Economic Bid range, the CAISO enforces a resource-specific Constraint on the resource due to an RMR or Exceptional Dispatch, or the resource is



Ramping through a Forbidden Operating Region, the resource will not be eligible to set the LMP.

Resources identified as MSS Load following resources are not eligible to set the LMP. A resource constrained at an upper or lower operating limit, a boundary of a Forbidden Operating Region or dispatched for a quantity of Energy such that its full Ramping capability is constraining the ability of the resource to be dispatched for additional Energy in target interval, cannot be marginal (i.e., it is constrained by the Ramping capability) and thus is not eligible to set the Dispatch Interval LMP. Non-Dynamic System Resources are not eligible to set the Dispatch Interval LMP. Dynamic System Resources are eligible to set the Dispatch Interval LMP. A Constrained Output Generator that has the ability to be committed or shut off within the two-hour Time Horizon of the RTM will be eligible to set the Dispatch Interval LMP if any portion of its Energy is necessary to serve Demand. Dispatches of Regulation resources by EMS in response to AGC will not set the RTM LMP. Dispatches of Regulation resources to a Dispatch Operating Point by RTM SCED will be eligible to set the RTM LMP.

**34.19.2.4 Real-Time LMP When Responding To A Contingency.**

In cases when a Contingency occurs and the CAISO must activate its Operating Reserves, it may perform a Real-Time Contingency Dispatch (RTCD) for a target interval 10 minutes from the current time. When activating a Contingency Dispatch and returning to normal Dispatch in RTM, LMPs shall be based on the last available price from either the Contingency Dispatch or normal Dispatch run relative to the five-minute pricing target.

**34.19.2.5 Price for Uninstructed Deviations for Participating Intermittent Resources.**

Deviations associated with each Participating Intermittent Resource in a Scheduling Coordinator's portfolio shall be settled as provided in Section 11.12 at the monthly weighted average Dispatch Interval LMP, as calculated in accordance with Section 11.5.4.1 at each Pnode associated with the Participating Intermittent Resource, and using the monthly weighted average with weights equal to total Real-Time Generation.

**35 Market Validation and Price Correction.**

**35.1 Market Validation.**

The CAISO shall monitor the Market Clearing software solutions for the Day-Ahead Market, the RUC process, the Hour-Ahead Scheduling Process, and the Real-Time Market for all market intervals to determine whether prices are calculated accurately, consistent with the provisions of the CAISO Tariff. To the extent reasonably practicable, the CAISO shall correct erroneous prices identified through such monitoring and re-run the relevant CAISO Markets prior to publication of prices on its Open Access Same-Time Information System (OASIS) or provision of prices directly to Market Participants, if applicable.

**35.2 Timing of the Price Correction Process.**

Prices for each Trading Day shall become subject to the CAISO's price correction process once the CAISO publishes them on its OASIS or provides them directly to Market Participants, if applicable. The price correction process for each Trading Day shall end no later than 1700 hours of the eighth calendar day following that Trading Day. The CAISO may establish an earlier end-time for the price correction process in the applicable Business Practice Manual and may complete the price correction process for any Trading Day earlier than the end-time established in this Section 35 or in the Business Practice Manual. The CAISO shall provide notification on the CAISO Website when it has completed the price correction process for each Trading Day. If the CAISO does not provide such notification, the price correction process will be deemed complete at 1700 hours of the eighth calendar day following that Trading Day, unless an earlier time is established by the applicable Business Practice Manual.

**35.3 Finality of Prices Subject to the Price Correction Process.**

All prices shall be considered provisional until the CAISO has completed the price correction process regarding them. All prices for each Trading Day shall be considered final for purposes of this Section 35 once the price correction process for that Trading Day has ended, except that the CAISO may adjust, re-run, or otherwise correct such prices after the conclusion of the price correction process to the extent authorized by the provisions of the CAISO Tariff other than this Section 35.

**35.4 Scope of Price Corrections.**

The CAISO may correct all financially binding prices whenever the CAISO identifies an invalid market solution or invalid prices in an otherwise valid market solution. The circumstances in which the CAISO may determine that an invalid market solution or invalid prices exist include the following: the occurrence of data input failure; the occurrence of hardware or software failure; or a result that is inconsistent with the CAISO Tariff.

**35.5 Price Correction Methodology.**

The CAISO shall correct prices to conform with the relevant provisions of the CAISO Tariff to the extent such correction is practicable. To the extent such correction is not practicable, the CAISO shall correct prices so that they are as close as reasonably possible to the prices that should have resulted under the relevant provisions of the CAISO Tariff, using the most accurate data available, and in a manner that is consistent with the prevalent system conditions existing at that time. The CAISO shall correct prices using the first applicable and practicable correction method of the following:

- (a) The CAISO shall selectively recalculate incorrect financially binding prices when the invalid prices are isolated and can be corrected such that no other financially binding prices are affected by the correction.
- (b) If the correction method in Section 35.5(a) is not applicable and practicable, the CAISO shall conduct a market re-run for an invalidated market interval when all market inputs applicable to the market interval to be re-run are either (i) preserved from the original market run, for data that was not the cause of the invalidated price, (ii) corrected, in the case of invalid initial data in the initial Market Clearing, or (iii) recreated or replicated data using the best available alternate data sources, in the case of missing data in the initial Market Clearing.

- (c) If the correction methods in Sections 35.5(a) and 35.5(b) are not applicable and practicable, the CAISO shall use, in place of prices for the binding interval of an invalidated market solution, replicated prices from binding or advisory intervals from the validated market solution in which the market conditions were most similar to the market conditions in the invalidated market solution, for the affected interval. In no case will an invalidated Day-Ahead Market solution be replaced with a valid Day-Ahead Market solution from a previous Trading Day. The method set forth in this Section 35.5(c) shall apply in the Day-Ahead Market only when some but not all hourly market intervals within a valid market run are deemed to be invalid and the market is not re-run pursuant to the method set forth in Section 35.5(b), above.

The CAISO shall include details concerning the CAISO's price correction methodology in the applicable Business Practice Manual.

### **35.6 Weekly Price Correction Report.**

The CAISO shall summarize all price corrections that occur within a week in a report that shall be posted on the CAISO Website by the seventh day of the following week. For all price corrections that occur during each week, the price correction report shall specify: (a) which market intervals were affected, (b) which price locations were affected, (c) a brief description of the reason for the price correction, and (d) the method of price corrective action undertaken.