

**Attachment B**

**Clean Tariff**

**Tariff Amendment to Enhance Market Parameters and  
Import Bidding Related to Order No. 831**

**California Independent System Operator Corporation**

**February 22, 2021**

**6.5.2.3.7 Constraint Relaxation Threshold**

Annually, the CAISO will post on its OASIS the Constraint Relaxation Thresholds for the CAISO Balancing Authority Area and the Balancing Authority Areas participating in the Energy Imbalance Market.

**6.5.2.3.8 Energy Bid Parameters**

Prior to Market Close, to the extent practicable, the CAISO will notify Scheduling Coordinators whether they may submit Demand Bids, Export Bids, Virtual Bids and Bids for Non-Resource-Specific System Resources above the Soft Energy Bid Cap.

**6.5.2.3.9 Hourly Shaping Factor**

Daily, to the extent practicable, the CAISO will post on OASIS the hourly shaping factors used to calculate the Maximum Import Bid Price for the Day-Ahead Market and the Real-Time Market.

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**27.1.2 Ancillary Service Prices**

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**27.1.2.3 Ancillary Services Pricing – Insufficient Supply**

The CAISO will develop Scarcity Reserve Demand Curves as further described in an applicable Business Practice Manual that will apply to both the Day-Ahead Market and the Real-Time Market during periods in which supply is insufficient to meet the minimum procurement requirements for Regulation Down, Non-Spinning Reserve, Spinning Reserve and Regulation Up as required by Section 8.3. The CAISO shall review the performance of the Scarcity Reserve Demand Curves and assess whether changes are necessary every three (3) years or more frequently, if the CAISO determines more frequent reviews are appropriate. When supply is insufficient to meet any of the minimum procurement requirements for Regulation Down, Non-Spinning Reserve, Spinning Reserve and Regulation Up, the Scarcity Reserve Demand Curve Values for the affected Ancillary Services, as set forth in this Section 27.1.2.3 and as reflected in the Scarcity Demand Curve Value described in Section 27.1.2.3.5, shall apply to determine the Shadow Prices of the affected Ancillary Services. ASMPs for an Ancillary Service type will not sum these Shadow Prices across Ancillary Service Regions, if there is insufficient supply for the Ancillary Service type in both the Expanded System Region and an Ancillary Service Sub-Region.

#### **27.1.2.3.1 Regulation Down Pricing – Insufficient Supply**

When the shortage of supply to meet the Regulation Down requirement in the Expanded System Region or in an Ancillary Service Sub-Region is less than or equal to thirty-two (32) MW, the Scarcity Reserve Demand Curve Value for Regulation Down shall be fifty (50) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5. When the shortage of supply to meet the Regulation Down requirement in the Expanded System Region is less than or equal to eighty-four (84) MW but greater than thirty-two (32) MW, the Scarcity Reserve Demand Curve Value for Regulation Down shall be sixty (60) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5. When the shortage of supply to meet the Regulation Down requirement in the Expanded System Region is greater than eighty-four (84) MW, the Scarcity Reserve Demand Curve Value for Regulation Down shall be seventy (70) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5.

#### **27.1.2.3.2 Non-Spinning Reserve Pricing – Insufficient Supply**

When the shortage of supply to meet the Non-Spinning Reserve requirement in the Expanded System Region or in an Ancillary Service Sub-Region is less than or equal to seventy (70) MW, the Scarcity Reserve Demand Curve Value for Non-Spinning Reserve shall be fifty (50) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5. When the shortage of supply to meet the Non-Spinning Reserve requirement in the Expanded System Region is less than or equal to two-hundred ten (210) MW but greater than seventy (70) MW, the Scarcity Reserve Demand Curve Value for Non-Spinning Reserve shall be sixty (60) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5. When the shortage of supply to meet the Non-Spinning Reserve requirement in the Expanded System Region is greater than two-hundred ten (210) MW, the Scarcity Reserve Demand Curve Value for Non-Spinning Reserve shall be seventy (70) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3,

as specified in the tables in Section 27.1.2.3.5.

**27.1.2.3.3 Spinning Reserve Pricing – Insufficient Supply**

The Scarcity Reserve Demand Curve Value for Spinning Reserve in the Expanded System Region or in an Ancillary Service Sub-Region shall be ten (10) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5.

**27.1.2.3.4 Regulation Up Pricing – Insufficient Supply**

The Scarcity Reserve Demand Curve Value for Regulation Up in the Expanded System Region or in an Ancillary Service Sub-Region shall be twenty (20) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in Section 27.1.2.3.5.

**27.1.2.3.5 Scarcity Demand Curve Value Tables**

<b>Scarcity Demand Curve Value (\$/MWh) When Energy Pricing Parameters based on Soft Energy Bid Cap as Specified In Section 27.4.3.2</b>				
	<b>Percent of Soft Energy Bid Cap</b>			
<b>Reserve</b>	<b>Expanded System Region</b>	<b>System Region and Sub-Region</b>	<b>Expanded System Region</b>	<b>System Region and Sub-Region</b>
Regulation Up	20%	20%	\$200	\$200
Spinning	10%	10%	\$100	\$100
Non-Spinning Shortage > 210 MW	70%	70%	\$700	\$700
Non-Spinning Shortage > 70 & ≤ 210 MW	60%	60%	\$600	\$600
Non-Spinning Shortage ≤ 70 MW	50%	50%	\$500	\$500
<b>Upward Sum</b>	<b>100%</b>	<b>100%</b>	<b>\$1000</b>	<b>\$1000</b>
Regulation Down Shortage > 84 MW	70%	70%	\$700	\$700
Regulation Down Shortage > 32 & ≤ 84 MW	60%	60%	\$600	\$600
Regulation Down Shortage ≤ 32 MW	50%	50%	\$500	\$500

<b>Scarcity Demand Curve Value (\$/MWh) When Energy Pricing Parameters based on Hard Energy Bid Cap as Specified In Section 27.4.3.3</b>				
	<b>Percent of Hard Energy Bid Cap</b>			
<b>Reserve</b>	<b>Expanded System Region</b>	<b>System Region and Sub-Region</b>	<b>Expanded System Region</b>	<b>System Region and Sub-Region</b>
Regulation Up	20%	20%	\$400	\$400
Spinning	10%	10%	\$200	\$200
Non-Spinning Shortage > 210 MW	70%	70%	\$1,400	\$1,400
Non-Spinning Shortage > 70 & ≤ 210 MW	60%	60%	\$1,200	\$1,200
Non-Spinning Shortage ≤ 70 MW	50%	50%	\$1,000	\$1,000
<b>Upward Sum</b>	<b>100%</b>	<b>100%</b>	<b>\$2,000</b>	<b>\$2,000</b>
Regulation Down Shortage > 84 MW	70%	70%	\$1,400	\$1,400
Regulation Down Shortage > 32 & ≤ 84 MW	60%	60%	\$1,200	\$1,200
Regulation Down Shortage ≤ 32 MW	50%	50%	\$1,000	\$1,000

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**27.4.3 CAISO Markets Scheduling and Pricing Parameters**

**27.4.3.1 Generally**

The SCUC and SCED optimization software for the CAISO Markets utilize a set of configurable scheduling and pricing parameters to enable the software to reach a feasible solution and set appropriate prices in instances where Effective Economic Bids are not sufficient to allow a feasible solution. The scheduling parameters specify the criteria for the software to adjust Non-priced Quantities when such adjustment is necessary to reach a feasible solution. The scheduling parameters are configured so that the SCUC and SCED software will utilize Effective Economic Bids as far as possible to reach a feasible solution, and will skip Ineffective Economic Bids and perform adjustments to Non-priced Quantities pursuant to the scheduling priorities for Self-Schedules specified in Sections 31.4 and 34.10. The scheduling parameters utilized for relaxation of enforced internal and Intertie Transmission Constraints are specified in Section 27.4.3.2.1 and 27.4.3.3.1. The pricing parameters specify the criteria for

establishing market prices in instances where one or more Non-priced Quantities are adjusted by the Market Clearing software. The pricing parameters are specified in Sections 27.4.3.2.2, 27.4.3.2.3, 27.4.3.2.4, 27.4.3.3.2, 27.4.3.3.3, and 27.4.3.3.4. The complete set of scheduling and pricing parameters used in all CAISO Markets is maintained in the Business Practice Manuals.

#### **27.4.3.2 Parameters Related to Soft Energy Bid Cap**

For CAISO Market intervals for which the conditions specified in Section 27.4.3.3 do not apply, the CAISO will apply the parameters specified in Sections 27.4.3.2.1 through 27.4.3.2.4 and the Ancillary Services Scarcity Prices in Section 27.1.2.3.5.

##### **27.4.3.2.1 Scheduling Parameters for Transmission Constraint Relaxation**

In the IFM, the enforced internal and Intertie Transmission Constraint scheduling parameter is set to \$5,000 per MWh for the purpose of determining when the SCUC and SCED software in the IFM will relax an enforced Transmission Constraint rather than adjust Supply or Demand bids or Non-priced Quantities as specified in Sections 31.3.1.3, 31.4 and 34.12 to relieve Congestion on the constrained facility. This scheduling parameter is set to \$1,500 per MWh for the RTM. The effect of this scheduling parameter value is that if the optimization can re-dispatch resources to relieve Congestion on a Transmission Constraint at a cost of \$5,000 per MWh or less for the IFM (or \$1,500 per MWh or less for the RTM), the Market Clearing software will utilize such re-dispatch, but if the cost exceeds \$5,000 per MWh in the IFM (or \$1,500 per MWh for the RTM) the market software will relax the Transmission Constraint. The corresponding scheduling parameter in RUC is set to \$1,250 per MWh.

##### **27.4.3.2.2 Pricing Parameters for Transmission Constraint Relaxation**

For the purpose of determining how the relaxation of a Transmission Constraint will affect the determination of prices in the IFM and RTM, the pricing parameter of the Transmission Constraint being relaxed is set to the Soft Energy Bid Cap. In the case of Contingency-related Transmission Constraints, the CAISO will determine the amount of relaxation required to clear the market using the most limiting condition among the applicable Contingencies and the base case. The CAISO will establish prices based on the parameter pricing specified in this Section as it applies to the most limiting Contingency and base case. The corresponding pricing parameter used in the RUC is set at the maximum RUC Availability Bid price specified in Section 39.6.1.2.

#### **27.4.3.2.3 Insufficient Supply to Meet Self-Schedule Demand in IFM**

In the IFM, when available supply is insufficient to meet all self-scheduled Demand, self-scheduled Demand is reduced to the point where the available supply is sufficient to clear the market. For price-setting purposes in such cases, the cleared self-scheduled Demand is deemed to be willing to pay the Soft Energy Bid Cap price.

#### **27.4.3.2.4 Insufficient Supply to Meet CAISO Forecast of CAISO Demand in the RTM**

In the RTM, in the event that Energy offers are insufficient to meet the CAISO Forecast of CAISO Demand, the SCUC and SCED software will relax the system energy-balance constraint. In such cases the software utilizes a pricing parameter set to the Soft Energy Bid Cap for price-setting purposes.

#### **27.4.3.3 Parameters Related to Hard Energy Bid Cap**

- (a) **Integrated Forward Market and Real-Time Market.** The scheduling and pricing parameters in Sections 27.4.3.3.1 through 27.4.3.3.4 will apply for all Trading Hours of the IFM and Real-Time Market for the same Trading Day if the CAISO has accepted a Bid with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price exceeds the Soft Energy Bid Cap for any Trading Hour of the IFM.
- (b) **Real-Time Market Only.** If the CAISO has not accepted a Bid with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price does not exceed the Soft Energy Bid Cap for any Trading Hour of the IFM for the same Trading Day, the parameters in Sections 27.4.3.3.1 through 27.4.3.3.4 will apply
  - (i) in any Trading Hour of the Real-Time Market for which the CAISO has accepted a Bid with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price exceeds the Soft Energy Bid Cap; and
  - (ii) for all intervals of the applicable Real-Time Market run for which these conditions apply in at least one interval of the applicable market run.

#### **27.4.3.3.1 Scheduling Parameters for Transmission Constraint Relaxation**

In the IFM, the enforced internal and Intertie Transmission Constraint scheduling parameter is set to \$10,000 per MWh for the purpose of determining when the SCUC and SCED software in the IFM will relax an enforced Transmission Constraint rather than adjust Supply or Demand bids or Non-priced Quantities as specified in Sections 31.3.1.3, 31.4 and 34.12 to relieve Congestion on the constrained facility. This scheduling parameter is set to \$3,000 per MWh for the RTM. The effect of this scheduling parameter value is that if the optimization can re-dispatch resources to relieve Congestion on a Transmission Constraint at a cost of \$10,000 per MWh or less for the IFM (or \$3,000 per MWh or less for the RTM), the Market Clearing software will utilize such re-dispatch, but if the cost exceeds \$10,000 per MWh in the IFM (or \$3,000 per MWh for the RTM) the market software will relax the Transmission Constraint. The corresponding scheduling parameter in RUC is set to \$1,250 per MWh.

#### **27.4.3.3.2 Pricing Parameters for Transmission Constraint Relaxation**

In the case of Contingency-related Transmission Constraints, the CAISO will determine the amount of relaxation required to clear the market using the most limiting condition among the applicable Contingencies and the base case. The CAISO will establish prices based on the parameter pricing specified in this Section as it applies to the most limiting Contingency and base case. The corresponding pricing parameter used in the RUC is set at the maximum RUC Availability Bid price specified in Section 39.6.1.2.

#### **27.4.3.3.3 Insufficient Supply to Meet Self-Schedule Demand in IFM**

In the IFM, when available supply is insufficient to meet all self-scheduled Demand, self-scheduled Demand is reduced to the point where the available supply is sufficient to clear the market. For price-setting purposes in such cases, the cleared self-scheduled Demand is deemed to be willing to pay the Hard Energy Bid Cap price.

#### **27.4.3.3.4 Insufficient Supply to Meet CAISO Forecast of CAISO Demand in the RTM**

In the RTM, in the event that Energy offers are insufficient to meet the CAISO Forecast of CAISO Demand, the SCUC and SCED software will relax the system energy-balance constraint. In such cases, for price-setting purposes the software utilizes a pricing parameter set to

- (a) the highest-priced cleared Economic Bid if the infeasibility detected in the scheduling run does not exceed the Constraint Relaxation Threshold, but no less than the Soft Energy



- Bid Cap price; or
- (b) the Hard Energy Bid Cap price if the infeasibility detected in the scheduling run exceeds the Constraint Relaxation Threshold.

#### **27.4.3.4 Protection of TOR, ETC and Converted Rights Self-Schedules in the IFM**

In accordance with the submitted and accepted TRTC Instructions, valid Day-Ahead TOR Self-Schedules, Day-Ahead ETC Self-Schedules and Day-Ahead Converted Rights Self-Schedules shall not be adjusted in the IFM in response to an insufficiency of Effective Economic Bids. The scheduling parameters associated with the TOR, ETC, or Converted Rights Self-Schedules will be set to values higher than the scheduling parameter associated with relaxation of an enforced internal and Intertie Transmission Constraint as specified in Section 27.4.3.2, so that when there is a congested Transmission Constraint that would otherwise subject a Supply or Demand resource submitted in a valid and balanced ETC, TOR or Converted Rights Self-Schedule to adjustment in the IFM, the IFM software will relax the Transmission Constraint rather than curtail the TOR or ETC Self-Schedule. This priority will be adhered to by the operation of the IFM Market Clearing software, and if necessary, by adjustment of Schedules after the IFM has been executed and the results have been reviewed by the CAISO operators.

#### **27.4.3.5 Effectiveness Threshold**

The CAISO Markets software includes a lower effectiveness threshold setting that governs whether the software will consider a bid “effective” for managing congestion on a congested Transmission Constraint, which in the case of Nomograms will be applied to the individual flowgates that make up the Nomogram, rather than to the Nomogram itself. The CAISO will set this threshold at two percent (2%).

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#### **30.5.2.4 Supply Bids for System Resources**

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for Resource-Specific System Resources shall also contain Start-Up Bids and Minimum Load Bids. Resource-Specific System Resources are subject to the Proxy Cost methodology or the Registered Cost methodology for Default Start-Up Bids and Default Minimum Load Bids as provided in Section 30.4, and Transaction ID as created by the CAISO. Other System Resources are not eligible to recover Start-Up Costs and Minimum Load

Costs. Resource-Specific System Resources are eligible to participate in the Day-Ahead Market on an equivalent basis as Generating Units and are not obligated to participate in RUC or the RTM if the resource did not receive a Day-Ahead Schedule unless the resource is a Resource Adequacy Resource. If the Resource-Specific System Resource is a Resource Adequacy Resource, the Scheduling Coordinator for the resource is obligated to make it available to the CAISO Market as prescribed by Section 40.6. Dynamic Resource-Specific System Resources are also eligible to participate in RTM on an equivalent basis as Generating Units. The quantity (in MWh) of Energy categorized as Interruptible Imports (non-firm imports) can only be submitted through Self-Schedules in the Day-Ahead Market and cannot be incrementally increased in the RTM. Bids submitted to the Day-Ahead Market for ELS Resources will be applicable for two days after they have been submitted and cannot be changed the day after they have been submitted. Bids for System Resources that exceed the Soft Energy Bid Cap are subject to the rules in Sections 30.7.12, as applicable.

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**30.5.8 Demand Bids, Export Bids, Virtual Bids, and Bids for Non-Resource-Specific System Resources Above the Soft Energy Bid Cap**

**30.5.8.1 Day-Ahead Market.**

Scheduling Coordinators may submit Demand Bids, Export Bids, Virtual Bids, and Bids for Non-Resource-Specific System Resources above the Soft Energy Bid Cap, not to exceed the Hard Energy Bid Cap, for any Trading Hour of the DAM in which the CAISO has accepted a Bid with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price exceeds the Soft Energy Bid Cap.

**30.5.8.2 Real-Time Market.**

Scheduling Coordinators may submit Demand Bids, Export Bids, Virtual Bids, and Bids for Non-Resource-Specific System Resources above the Soft Energy Bid Cap, not to exceed the Hard Energy Bid Cap, for any Trading Hour of the Real-Time Market in which

- (a) The conditions in Section 30.5.8.1 applied to the same Trading Hour of the Day-Ahead Market; or

- (b) The CAISO has accepted a Bid for the applicable Trading Hour of the Real-Time Market with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price exceeds the Soft Energy Bid Cap.

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**30.7.12 Validation of Bids in Excess of Soft Energy Bid Cap, Hard Energy Bid Cap, or Minimum Load Cost Hard Cap**

**30.7.12.1 Generally**

Except as otherwise stated in this Section 30.7.12, the validation rules in this Section 30.7.12 apply to all Energy Bids and Minimum Load Bids submitted by Scheduling Coordinators. The provisions of Sections 30.7.12.1 through 30.7.12.4 do not apply to Virtual Bids and Energy Bids submitted for Non-Resource-Specific System Resources; the provisions of Section 30.7.12.5 apply to Virtual Bids and Energy Bids submitted for Non-Resource-Specific System Resources. The CAISO will allow Bids for Non-Resource-Specific System Resources that are Resource Adequacy Resources and that exceed the Soft Energy Bid Cap subject to the Bid price screens described in Section 30.7.12.5.1. The CAISO will allow Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Adequacy System Resources that are not Resource Adequacy Resources and that exceed the Soft Energy Bid Cap subject to the rules specified in Section 30.7.12.5.2. The CAISO will reject Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Specific System Resources that exceed the Hard Energy Bid Cap.

**30.7.12.2 Energy Bids that Exceed the Soft Energy Bid Cap**

In addition to all other Bid validation rules that apply to Energy Bids, if a Scheduling Coordinator submits an Energy Bid price that exceeds the Soft Energy Bid Cap, the CAISO will modify the Energy Bid price for purposes of clearing the relevant CAISO Market Process to the higher of the Soft Energy Bid Cap or the resource's Default Energy Bid as modified pursuant to a Reference Level Change Request pursuant to Section 30.11.

**30.7.12.3 Energy Bids that Exceed the Hard Energy Bid Cap and Minimum Load Bids that Exceed the Minimum Load Cost Hard Cap**

All Energy Bid prices and Minimum Load Bid prices used in the CAISO Market Processes shall not exceed the Hard Energy Bid Cap or the Minimum Load Cost Hard Cap, respectively.

#### **30.7.12.4 After-Market Cost Recovery**

For any Energy Bid, except for Energy Bids for Non-Resource-Specific System Resources, Virtual Bids, Export Bids, Demand Bids, or Minimum Load Bid price submitted above the Energy Bid price or the Minimum Load Bid the CAISO uses in the CAISO Market Processes, the Scheduling Coordinators may be eligible for after-market cost recovery pursuant to Section 30.12.

#### **30.7.12.5 Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Specific System Resources**

##### **30.7.12.5.1 Bids for Non-Resource-Specific System Resources that are Resource Adequacy Resources**

The CAISO will reduce Bids for Non-Resource-Specific System Resources that are Resource Adequacy Resources that exceed the Maximum Import Bid Price to the greater of the Soft Energy Bid Cap, the Maximum Import Bid Price, or the highest-priced Energy Bid from a Resource-Specific System Resource that the CAISO has accepted for the applicable Trading Hour pursuant to Section 30.7.12.2.

##### **30.7.12.5.2 Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Specific System Resources that are not Resource Adequacy Resources**

The CAISO will accept Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Specific System Resources that are not Resource Adequacy Resources that exceed the Soft Energy Bid consistent with the conditions specified in Section 30.5.8. The CAISO will not accept Export Bids, Demand Bids, Virtual Bids, or Bids for Non-Resource-Specific System Resources that are not Resource Adequacy Resources that exceed the Hard Energy Bid Cap.

##### **30.7.12.5.3 Maximum Import Bid Price**

The CAISO calculates hourly Maximum Import Bid Prices for the Day-Ahead Market and Real-Time Market, separately, including for on-peak and off-peak hours. The CAISO calculates the Maximum Import Bid Price as 110 percent of the greater of the published bilateral electric index prices for the Mid-Columbia or Palo Verde trading hub locations, multiplied by an hourly shaping ratio. As detailed in the CAISO Business Practice Manual, the CAISO calculates the hourly shaping ratio for each hour by dividing the Day-Ahead Market System Marginal Energy Cost for the CAISO Balancing Authority Area in that hour of a previous representative Trading Day by the average Day-Ahead Market System Marginal Energy Cost for the CAISO Balancing Authority Area in all on-peak hours of the same previous representative Trading Day. If for any given Trading Hour the CAISO cannot calculate the Maximum

Import Bid Price, the applicable Maximum Import Bid Price will be the most recently available calculated Maximum Import Bid Price.

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

#### **31.6.1 Criteria for Temporary Waiver of Timing Requirements**

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; or
- (v) additional time is needed to allow for the submission of Bids in the event that the conditions specified in Section 30.5.8 change prior to the Market Close, and may require the resubmission of Bids consistent with the changed bidding requirements.

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### **34.10 Dispatch of Energy from Ancillary Services**

The CAISO may issue Dispatch Instructions to Participating Generators, Participating Loads, Proxy Demand Resources, (via communication with the Scheduling Coordinators of Demand Response

Providers) System Units and System Resources contracted to provide Ancillary Services (either procured through the CAISO Markets, Self-Provided by Scheduling Coordinators, or through Exceptional Dispatch or dispatched in accordance with a Legacy RMR Contract) for the Supply of Energy. During normal operating conditions, the CAISO may Dispatch those Participating Generators, Participating Loads, Proxy Demand Resources, 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. During normal operating conditions, the CAISO may also elect to designate any reserve not previously identified as Contingency Only by Scheduling Coordinator as Contingency Only reserves. 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 34.5.2 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 the Soft Energy Bid Cap as the Energy Bids for such reserves and will set prices accordingly. For CAISO Market intervals for which the conditions and parameters specified in Section 27.4.3.3 apply, the RTED will Dispatch such Contingency Only reserves using the Hard Energy Bid Cap 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 NERC and WECC reliability standards, including any requirements of the NRC. If the CAISO uses Operating Reserve to meet Real-Time Energy requirements, and if the CAISO needs Operating Reserves to satisfy NERC and WECC reliability standards, including any requirements of the NRC, the CAISO shall restore the Operating Reserves to the extent necessary to meet NERC and WECC reliability standards, including any requirements of the NRC 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 Target. The Energy Bid Curve is not used by the AGC system when Dispatching Energy from Regulation. For Regulation Up capacity, 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. For Regulation Down capacity, the lower portion of the resource capacity from its applicable Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve.

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## **Appendix A**

### **Master Definitions Supplement**

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#### **- Constraint Relaxation Threshold**

A MW threshold value used to determine when the parameters specified in Section 27.4.3.3.4 will trigger in each Balancing Authority Area participating in the CAISO Markets to account for small supply shortfalls configured based on the Balancing Authority Area's BAL-001-2 Requirement R2, calculated by the CAISO annually. The CAISO will post the annual values for each Balancing Authority Area on the CAISO Website or its OASIS.

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#### **- Hard Energy Bid Cap**

The maximum Energy Bid price the CAISO will use for purposes of clearing the CAISO Market Processes. The Hard Energy Bid Cap is \$2,000 per MWh.

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**- Maximum Import Bid Price**

An index-based price used to screen Bids by Non-Resource-Specific System resources that are Resource Adequacy Resources that exceed the Soft Energy Bid Cap.

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**- Scarcity Reserve Demand Curve Values**

Fixed percentages of the Soft Energy Bid Cap or Hard Energy Bid Cap reflected in the Scarcity Reserve Demand Curve that the CAISO uses to calculate Ancillary Service Shadow Prices for Regulation Up, Spinning Reserve, Non-Spinning Reserve and Regulation Down from which the CAISO determines Ancillary Service Marginal Prices when there is insufficient supply in an Ancillary Service Region or Sub-Region to meet an Ancillary Services minimum procurement requirement.

\* \* \* \* \*

**- Soft Energy Bid Cap**

The maximum Energy Bid price submitted by Scheduling Coordinators for resources the CAISO will use for purposes of clearing the CAISO Market Processes without cost verification pursuant to Section 30.11. The Soft Energy Bid Cap is \$1,000 per MWh.

\* \* \* \* \*



**Attachment C**

**Marked Tariff**

**Tariff Amendment to Enhance Market Parameters and  
Import Bidding Related to Order No. 831**

**California Independent System Operator Corporation**

**February 22, 2021**

**6.5.2.3.7 Constraint Relaxation Threshold**

Annually, the CAISO will post on its OASIS the Constraint Relaxation Thresholds for the CAISO Balancing Authority Area and the Balancing Authority Areas participating in the Energy Imbalance Market.

**6.5.2.3.8 Energy Bid Parameters**

Prior to Market Close, to the extent practicable, the CAISO will notify Scheduling Coordinators whether they may submit Demand Bids, Export Bids, Virtual Bids and Bids for Non-Resource-Specific System Resources above the Soft Energy Bid Cap.

**6.5.2.3.9 Hourly Shaping Factor**

Daily, to the extent practicable, the CAISO will post on OASIS the hourly shaping factors used to calculate the Maximum Import Bid Price for the Day-Ahead Market and the Real-Time Market.

\* \* \* \* \*

**27.1.2 Ancillary Service Prices**

\* \* \* \* \*

**27.1.2.3 Ancillary Services Pricing – Insufficient Supply**

The CAISO will develop Scarcity Reserve Demand Curves as further described in an applicable Business Practice Manual that will apply to both the Day-Ahead Market and the Real-Time Market during periods in which supply is insufficient to meet the minimum procurement requirements for Regulation Down, Non-Spinning Reserve, Spinning Reserve and Regulation Up as required by Section 8.3. ~~During the first three (3) years in which the CAISO's Scarcity Reserve Demand Curves are effective, the CAISO shall conduct an annual review of the performance of the Scarcity Reserve Demand Curves and assess whether changes are necessary, with the exception that the ISO will not conduct this assessment in any year in which the Scarcity Reserve Demand Curves are not triggered. Thereafter, t~~The CAISO shall review the performance of the Scarcity Reserve Demand Curves and assess whether changes are necessary every three (3) years or more frequently, if the CAISO determines more frequent reviews are appropriate.

When supply is insufficient to meet any of the minimum procurement requirements for Regulation Down, Non-Spinning Reserve, Spinning Reserve and Regulation Up, the Scarcity Reserve Demand Curve

Values for the affected Ancillary Services, as set forth in this Section 27.1.2.3 and as reflected in the ~~in~~ ~~the~~ Scarcity Demand Curve Value ~~table below~~ described in Section 27.1.2.3.5, shall apply to determine the Shadow Prices of the affected Ancillary Services. ASMPs for an Ancillary Service type will not sum these Shadow Prices across Ancillary Service Regions, if there is insufficient supply for the Ancillary Service type in both the Expanded System Region and an Ancillary Service Sub-Region.

Reserve	Scarcity Demand Curve Value (\$/MWh)					
	Percent of Energy Max Bid Price		Max Energy Bid Price = \$750/MWh		Max Energy Bid Price = \$1000/MWh	
	Expanded System Region	System Region and Sub-Region	Expanded System Region	System Region and Sub-Region	Expanded System Region	System Region and Sub-Region
Regulation Up	-20%	-20%	-\$150	-\$150	\$200	-\$200
Spinning	-10%	-10%	-\$75	-\$75	\$100	-\$100
Non-Spinning	-70%	-70%	-\$525	-\$525	-\$700	-\$700
Shortage > 210 MW	-60%	-60%	-\$450	-\$450	-\$600	-\$600
Shortage > 70 & ≤ 210 MW	-50%	-50%	-\$375	-\$375	-\$500	-\$500
Shortage ≤ 70 MW						
<b>Upward Sum</b>	<b>100%</b>	<b>100%</b>	<b>\$750</b>	<b>\$750</b>	<b>\$1000</b>	<b>\$1000</b>
Regulation Down	-70%	-70%	-\$525	-\$525	-\$700	-\$700
Shortage > 84 MW	-60%	-60%	-\$450	\$450 \$375	-\$600	-\$600
Shortage > 32 & ≤ 84 MW	-50%	-50%	-\$375		-\$500	-\$500
Shortage ≤ 32 MW						

### 27.1.2.3.1 Regulation Down Pricing – Insufficient Supply

When the shortage of supply to meet the Regulation Down requirement in the Expanded System Region or in an Ancillary Service Sub-Region is less than or equal to thirty-two (32) MW, the Scarcity Reserve Demand Curve Value for Regulation Down shall be fifty (50) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5 ~~maximum Energy Bid price permitted under Section 39.6.1.4~~. When the shortage of supply to meet the Regulation Down requirement in the Expanded System Region is less than or equal to eighty-four (84) MW but greater than thirty-two (32) MW, the

Scarcity Reserve Demand Curve Value for Regulation Down shall be sixty (60) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5~~the maximum Energy Bid price permitted under Section 39.6.1.1.~~ When the shortage of supply to meet the Regulation Down requirement in the Expanded System Region is greater than eighty-four (84) MW, the Scarcity Reserve Demand Curve Value for Regulation Down shall be seventy (70) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5~~the maximum Energy Bid price permitted under Section 39.6.1.1.~~

#### **27.1.2.3.2 Non-Spinning Reserve Pricing – Insufficient Supply**

When the shortage of supply to meet the Non-Spinning Reserve requirement in the Expanded System Region or in an Ancillary Service Sub-Region is less than or equal to seventy (70) MW, the Scarcity Reserve Demand Curve Value for Non-Spinning Reserve shall be fifty (50) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5~~maximum Energy Bid price permitted under Section 39.6.1.1.~~ When the shortage of supply to meet the Non-Spinning Reserve requirement in the Expanded System Region is less than or equal to two-hundred ten (210) MW but greater than seventy (70) MW, the Scarcity Reserve Demand Curve Value for Non-Spinning Reserve shall be sixty (60) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5~~maximum Energy Bid price permitted under Section 39.6.1.1.~~ When the shortage of supply to meet the Non-Spinning Reserve requirement in the Expanded System Region is greater than two-hundred ten (210) MW, the Scarcity Reserve Demand Curve Value for Non-Spinning Reserve shall be seventy (70) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, -as specified in the tables in Section 27.1.2.3.5~~maximum Energy Bid price permitted under Section 39.6.1.1.~~

#### **27.1.2.3.3 Spinning Reserve Pricing – Insufficient Supply**

The Scarcity Reserve Demand Curve Value for Spinning Reserve in the Expanded System Region or in an Ancillary Service Sub-Region shall be ten (10) percent of the Soft Energy Bid Cap for the Hard Energy

Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in the tables in Section 27.1.2.3.5maximum Energy Bid price permitted under Section 39.6.1.1.

**27.1.2.3.4 Regulation Up Pricing – Insufficient Supply**

The Scarcity Reserve Demand Curve Value for Regulation Up in the Expanded System Region or in an Ancillary Service Sub-Region shall be twenty (20) percent of the Soft Energy Bid Cap or the Hard Energy Bid Cap, as applicable based on the conditions specified in Sections 27.4.3.2 and 27.4.3.3, as specified in Section 27.1.2.3.5maximum Energy Bid price permitted under Section 39.6.1.1.

**27.1.2.3.5 Scarcity Demand Curve Value Tables**

<b><u>Scarcity Demand Curve Value (\$/MWh) When Energy Pricing Parameters based on Soft Energy Bid Cap as Specified In Section 27.4.3.2</u></b>				
	<b><u>Percent of Soft Energy Bid Cap</u></b>			
<b><u>Reserve</u></b>	<b><u>Expanded System Region</u></b>	<b><u>System Region and Sub-Region</u></b>	<b><u>Expanded System Region</u></b>	<b><u>System Region and Sub-Region</u></b>
Regulation Up	20%	20%	\$200	\$200
Spinning	10%	10%	\$100	\$100
Non-Spinning Shortage > 210 MW	70%	70%	\$700	\$700
Non-Spinning Shortage > 70 & ≤ 210 MW	60%	60%	\$600	\$600
Non-Spinning Shortage ≤ 70 MW	50%	50%	\$500	\$500
<b><u>Upward Sum</u></b>	<b><u>100%</u></b>	<b><u>100%</u></b>	<b><u>\$1000</u></b>	<b><u>\$1000</u></b>
Regulation Down Shortage > 84 MW	70%	70%	\$700	\$700
Regulation Down Shortage > 32 & ≤ 84 MW	60%	60%	\$600	\$600
Regulation Down Shortage ≤ 32 MW	50%	50%	\$500	\$500

<b><u>Scarcity Demand Curve Value (\$/MWh) When Energy Pricing Parameters based on Hard Energy Bid Cap as Specified In Section 27.4.3.3</u></b>				
	<b><u>Percent of Hard Energy Bid Cap</u></b>			
<b><u>Reserve</u></b>	<b><u>Expanded System Region</u></b>	<b><u>System Region and Sub-Region</u></b>	<b><u>Expanded System Region</u></b>	<b><u>System Region and Sub-Region</u></b>
Regulation Up	20%	20%	\$400	\$400
Spinning	10%	10%	\$200	\$200

<u>Non-Spinning Shortage &gt; 210 MW</u>	<u>70%</u>	<u>70%</u>	<u>\$1,400</u>	<u>\$1,400</u>
<u>Non-Spinning Shortage &gt; 70 &amp; ≤ 210 MW</u>	<u>60%</u>	<u>60%</u>	<u>\$1,200</u>	<u>\$1,200</u>
<u>Non-Spinning Shortage ≤ 70 MW</u>	<u>50%</u>	<u>50%</u>	<u>\$1,000</u>	<u>\$1,000</u>
<b><u>Upward Sum</u></b>	<b><u>100%</u></b>	<b><u>100%</u></b>	<b><u>\$2,000</u></b>	<b><u>\$2,000</u></b>
<u>Regulation Down Shortage &gt; 84 MW</u>	<u>70%</u>	<u>70%</u>	<u>\$1,400</u>	<u>\$1,400</u>
<u>Regulation Down Shortage &gt; 32 &amp; ≤ 84 MW</u>	<u>60%</u>	<u>60%</u>	<u>\$1,200</u>	<u>\$1,200</u>
<u>Regulation Down Shortage ≤ 32 MW</u>	<u>50%</u>	<u>50%</u>	<u>\$1,000</u>	<u>\$1,000</u>

\* \* \* \* \*

### 27.4.3 CAISO Markets Scheduling and Pricing Parameters

#### 27.4.3.1 Generally

The SCUC and SCED optimization software for the CAISO Markets utilize a set of configurable scheduling and pricing parameters to enable the software to reach a feasible solution and set appropriate prices in instances where Effective Economic Bids are not sufficient to allow a feasible solution. The scheduling parameters specify the criteria for the software to adjust Non-priced Quantities when such adjustment is necessary to reach a feasible solution. The scheduling parameters are configured so that the SCUC and SCED software will utilize Effective Economic Bids as far as possible to reach a feasible solution, and will skip Ineffective Economic Bids and perform adjustments to Non-priced Quantities pursuant to the scheduling priorities for Self-Schedules specified in Sections 31.4 and 34.10. The scheduling parameters utilized for relaxation of enforced internal and Intertie Transmission Constraints are specified in Section 27.4.3.2.14 and 27.4.3.3.1. The pricing parameters specify the criteria for establishing market prices in instances where one or more Non-priced Quantities are adjusted by the Market Clearing software. The pricing parameters are specified in Sections 27.4.3.1.2.2, 27.4.3.2.3, 27.4.3.2.4, 27.4.3.3.2, 27.4.3.3.3, and 27.4.3.3.4.3 and 27.4.3.4. The complete set of scheduling and pricing parameters used in all CAISO Markets is maintained in the Business Practice Manuals.

#### **27.4.3.2.1** Parameters Related to Soft Energy Bid Cap

For CAISO Market intervals for which the conditions specified in Section 27.4.3.3 do not apply, the CAISO will apply the parameters specified in Sections 27.4.3.2.1 through 27.4.3.2.4 and the Ancillary Services Scarcity Prices in Section 27.1.2.3.5.

#### **27.4.3.2.1** Scheduling Parameters for Transmission Constraint Relaxation

In the IFM, the enforced internal and Intertie Transmission Constraint scheduling parameter is set to \$5,000 per MWh for the purpose of determining when the SCUC and SCED software in the IFM will relax an enforced Transmission Constraint rather than adjust Supply or Demand bids or Non-priced Quantities as specified in Sections 31.3.1.3, 31.4 and 34.12 to relieve Congestion on the constrained facility. This scheduling parameter is set to \$1,500 per MWh for the RTM. The effect of this scheduling parameter value is that if the optimization can re-dispatch resources to relieve Congestion on a Transmission Constraint at a cost of \$5,000 per MWh or less for the IFM (or \$1,500 per MWh or less for the RTM), the Market Clearing software will utilize such re-dispatch, but if the cost exceeds \$5,000 per MWh in the IFM (or \$1,500 per MWh for the RTM) the market software will relax the Transmission Constraint. The corresponding scheduling parameter in RUC is set to \$1,250 per MWh.

#### **27.4.3.2.2** Pricing Parameters for Transmission Constraint Relaxation

For the purpose of determining how the relaxation of a Transmission Constraint will affect the determination of prices in the IFM and RTM, the pricing parameter of the Transmission Constraint being relaxed is set to the Soft Energy Bid Cap~~maximum Energy Bid price specified in Section 39.6.1.1~~. In the case of Contingency-related Transmission Constraints, the CAISO will determine the amount of relaxation required to clear the market using the most limiting condition among the applicable Contingencies and the base case. The CAISO will establish prices based on the parameter pricing specified in this Section as it applies to the most limiting Contingency and base case. The corresponding pricing parameter used in the RUC is set at the maximum RUC Availability Bid price specified in Section 39.6.1.2.

#### **27.4.3.2.3** Insufficient Supply to Meet Self-Schedule Demand in IFM

In the IFM, when available supply is insufficient to meet all self-scheduled Demand, self-scheduled Demand is reduced to the point where the available supply is sufficient to clear the market. For price-setting purposes in such cases, the cleared self-scheduled Demand is deemed to be willing to pay the

~~maximum Energy Bid price specified in Section 39.6.1.1-Soft Energy Bid Cap price.~~

#### **27.4.3.2.4 Insufficient Supply to Meet CAISO Forecast of CAISO Demand in the RTM**

In the RTM, in the event that Energy offers are insufficient to meet the CAISO Forecast of CAISO Demand, the SCUC and SCED software will relax the system energy-balance constraint. In such cases the software utilizes a pricing parameter set to the ~~Soft Energy Bid Cap maximum Energy Bid price specified in Section 39.6.1.1~~ for price-setting purposes.

#### **27.4.3.3 Parameters Related to Hard Energy Bid Cap**

- (a) **Integrated Forward Market and Real-Time Market.** The scheduling and pricing parameters in Sections 27.4.3.3.1 through 27.4.3.3.4 will apply for all Trading Hours of the IFM and Real-Time Market for the same Trading Day if the CAISO has accepted a Bid with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price exceeds the Soft Energy Bid Cap for any Trading Hour of the IFM.
- (b) **Real-Time Market Only.** If the CAISO has not accepted a Bid with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price does not exceed the Soft Energy Bid Cap for any Trading Hour of the IFM for the same Trading Day, the parameters in Sections 27.4.3.3.1 through 27.4.3.3.4 will apply—
  - (i) in any Trading Hour of the Real-Time Market for which the CAISO has accepted a Bid with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price exceeds the Soft Energy Bid Cap; and
  - (ii) for all intervals of the applicable Real-Time Market run for which these conditions apply in at least one interval of the applicable market run.

#### **27.4.3.3.1 Scheduling Parameters for Transmission Constraint Relaxation**

In the IFM, the enforced internal and Intertie Transmission Constraint scheduling parameter is set to \$10,000 per MWh for the purpose of determining when the SCUC and SCED software in the IFM will relax an enforced Transmission Constraint rather than adjust Supply or Demand bids or Non-priced



Quantities as specified in Sections 31.3.1.3, 31.4 and 34.12 to relieve Congestion on the constrained facility. This scheduling parameter is set to \$3,000 per MWh for the RTM. The effect of this scheduling parameter value is that if the optimization can re-dispatch resources to relieve Congestion on a Transmission Constraint at a cost of \$10,000 per MWh or less for the IFM (or \$3,000 per MWh or less for the RTM), the Market Clearing software will utilize such re-dispatch, but if the cost exceeds \$10,000 per MWh in the IFM (or \$3,000 per MWh for the RTM) the market software will relax the Transmission Constraint. The corresponding scheduling parameter in RUC is set to \$1,250 per MWh.

#### **27.4.3.3.2 Pricing Parameters for Transmission Constraint Relaxation**

In the case of Contingency-related Transmission Constraints, the CAISO will determine the amount of relaxation required to clear the market using the most limiting condition among the applicable Contingencies and the base case. The CAISO will establish prices based on the parameter pricing specified in this Section as it applies to the most limiting Contingency and base case. The corresponding pricing parameter used in the RUC is set at the maximum RUC Availability Bid price specified in Section 39.6.1.2.

#### **27.4.3.3.3 Insufficient Supply to Meet Self-Schedule Demand in IFM**

In the IFM, when available supply is insufficient to meet all self-scheduled Demand, self-scheduled Demand is reduced to the point where the available supply is sufficient to clear the market. For price-setting purposes in such cases, the cleared self-scheduled Demand is deemed to be willing to pay the Hard Energy Bid Cap price.

#### **27.4.3.3.4 Insufficient Supply to Meet CAISO Forecast of CAISO Demand in the RTM**

In the RTM, in the event that Energy offers are insufficient to meet the CAISO Forecast of CAISO Demand, the SCUC and SCED software will relax the system energy-balance constraint. In such cases, for price-setting purposes the software utilizes a pricing parameter set to

- (a) the highest-priced cleared Economic Bid if the infeasibility detected in the scheduling run does not exceed the Constraint Relaxation Threshold, but no less than the Soft Energy Bid Cap price; or
- (b) the Hard Energy Bid Cap price if the infeasibility detected in the scheduling run exceeds the Constraint Relaxation Threshold.

#### **27.4.3.54 Protection of TOR, ETC and Converted Rights Self-Schedules in the IFM**

In accordance with the submitted and accepted TRTC Instructions, valid Day-Ahead TOR Self-Schedules, Day-Ahead ETC Self-Schedules and Day-Ahead Converted Rights Self-Schedules shall not be adjusted in the IFM in response to an insufficiency of Effective Economic Bids. The scheduling parameters associated with the TOR, ETC, or Converted Rights Self-Schedules will be set to values higher than the scheduling parameter associated with relaxation of an enforced internal and Intertie Transmission Constraint as specified in Section 27.4.3.24, so that when there is a congested Transmission Constraint that would otherwise subject a Supply or Demand resource submitted in a valid and balanced ETC, TOR or Converted Rights Self-Schedule to adjustment in the IFM, the IFM software will relax the Transmission Constraint rather than curtail the TOR ~~or, ETC, or Converted Rights~~ Self-Schedule. This priority will be adhered to by the operation of the IFM Market Clearing software, and if necessary, by adjustment of Schedules after the IFM has been executed and the results have been reviewed by the CAISO operators.

#### **27.4.3.65 Effectiveness Threshold**

The CAISO Markets software includes a lower effectiveness threshold setting that governs whether the software will consider a bid “effective” for managing congestion on a congested Transmission Constraint, which in the case of Nomograms will be applied to the individual flowgates that make up the Nomogram, rather than to the Nomogram itself. The CAISO will set this threshold at two percent (2%).

\* \* \* \* \*

#### **30.5.2.4 Supply Bids for System Resources**

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for Resource-Specific System Resources shall also contain Start-Up Bids and Minimum Load Bids. Resource-Specific System Resources are subject to the Proxy Cost methodology or the Registered Cost methodology for Default Start-Up Bids and Default Minimum Load Bids as provided in Section 30.4, and Transaction ID as created by the CAISO. Other System Resources are not eligible to recover Start-Up Costs and Minimum Load Costs. Resource-Specific System Resources are eligible to participate in the Day-Ahead Market on an equivalent basis as Generating Units and are not obligated to participate in RUC or the RTM if the

resource did not receive a Day-Ahead Schedule unless the resource is a Resource Adequacy Resource. If the Resource-Specific System Resource is a Resource Adequacy Resource, the Scheduling Coordinator for the resource is obligated to make it available to the CAISO Market as prescribed by Section 40.6. Dynamic Resource-Specific System Resources are also eligible to participate in RTM on an equivalent basis as Generating Units. The quantity (in MWh) of Energy categorized as Interruptible Imports (non-firm imports) can only be submitted through Self-Schedules in the Day-Ahead Market and cannot be incrementally increased in the RTM. Bids submitted to the Day-Ahead Market for ELS Resources will be applicable for two days after they have been submitted and cannot be changed the day after they have been submitted. Bids for System Resources that exceed the Soft Energy Bid Cap are subject to the rules in Sections 30.7.12, as applicable.

\* \* \* \* \*

**30.5.8 Demand Bids, Export Bids, Virtual Bids, and Bids for Non-Resource-Specific System Resources Above the Soft Energy Bid Cap**

**30.5.8.1 Day-Ahead Market.**

Scheduling Coordinators may submit Demand Bids, Export Bids, Virtual Bids, and Bids for Non-Resource-Specific System Resources above the Soft Energy Bid Cap, not to exceed the Hard Energy Bid Cap, for any Trading Hour of the DAM in which the CAISO has accepted a Bid with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section 30.7.12, or the Maximum Import Bid Price exceeds the Soft Energy Bid Cap.

**30.5.8.2 Real-Time Market.**

Scheduling Coordinators may submit Demand Bids, Export Bidss, Virtual Bids, and Bids for Non-Resource-Specific System Resources above the Soft Energy Bid Cap, not to exceed the Hard Energy Bid Cap, for any Trading Hour of the Real-Time Market in which—

- (a) The conditions in Section 30.5.8.1 applied to the same Trading Hours of the Day-Ahead Market; or
- (b) The CAISO has accepted a Bid for the applicable Trading Hour of the Real-Time Market with an Energy Bid price that exceeds the Soft Energy Bid Cap pursuant to Section

30.7.12, or the Maximum Import Bid Price exceeds the Soft Energy Bid Cap.

\* \* \* \* \*

**30.7.12 Validation of Bids in Excess of Soft Energy Bid Cap, Hard Energy Bid Cap, or Minimum Load Cost Hard Cap**

**30.7.12.1 Generally**

Except as otherwise stated in this Section 30.7.12, the validation rules in this Section 30.7.12 apply to all Energy Bids and Minimum Load Bids submitted by Scheduling Coordinators. The provisions of Sections 30.7.12.1 through 30.7.12.4 do not apply to Virtual Bids and Energy Bids submitted for Non-Resource-Specific System Resources; the provisions of Section 30.7.12.5 apply to Virtual Bids and Energy Bids submitted for Non-Resource-Specific System Resources. The CAISO will allow Bids for Non-Resource-Specific System Resources that are Resource Adequacy Resources and that exceed the Soft Energy Bid Cap subject to the Bid price screens described in Section 30.7.12.5.1. The CAISO will allow Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Adequacy System Resources that are not Resource Adequacy Resources and that exceed the Soft Energy Bid Cap subject to the rules specified in Section 30.7.12.5.2. The CAISO will reject Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Specific System Resources that exceed the Hard Energy Bid Cap.

**30.7.12.2 Energy Bids that Exceed the Soft Energy Bid Cap**

In addition to all other Bid validation rules that apply to Energy Bids, if a Scheduling Coordinator submits an Energy Bid price that exceeds the Soft Energy Bid Cap, the CAISO will modify the Energy Bid price for purposes of clearing the relevant CAISO Market Process to the higher of the Soft Energy Bid Cap or the resource's Default Energy Bid as modified pursuant to a Reference Level Change Request pursuant to Section 30.11.

**30.7.12.3 Energy Bids that Exceed the Hard Energy Bid Cap and Minimum Load Bids that Exceed the Minimum Load Cost Hard Cap**

All Energy Bid prices and Minimum Load Bid prices used in the CAISO Market Processes shall not exceed the Hard Energy Bid Cap or the Minimum Load Cost Hard Cap, respectively.

**30.7.12.4 After-Market Cost Recovery**

For any Energy Bid, except for Energy Bids for Non-Resource-Specific System Resources, Virtual Bids,

Export Bids, Demand Bids, or Minimum Load Bid price submitted above the Energy Bid price or the Minimum Load Bid the CAISO uses in the CAISO Market Processes, the Scheduling Coordinators may be eligible for after-market cost recovery pursuant to Section 30.12.

### **30.7.12.5 Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Specific System Resources**

~~The CAISO will reject Virtual Bid prices and Bids for Non-Resource-Specific System Resources that exceed the Hard Energy Bid Cap.~~

#### **30.7.12.5.1 Bids for Non-Resource-Specific System Resources that are Resource Adequacy Resources**

~~The CAISO will reduce Bids for Non-Resource-Specific System Resources that are Resource Adequacy Resources that exceed the Maximum Import Bid Price to the greater of the Soft Energy Bid Cap, the Maximum Import Bid Price, or the highest-priced Energy Bid from a Resource-Specific System Resource that the CAISO has accepted for the applicable Trading Hour pursuant to Section 30.7.12.2.~~

#### **30.7.12.5.2 Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Specific System Resources that are not Resource Adequacy Resources**

~~The CAISO will accept Virtual Bids, Export Bids, Demand Bids, and Bids for Non-Resource-Specific System Resources that are not Resource Adequacy Resources that exceed the Soft Energy Bid consistent with the conditions specified in Section 30.5.8. The CAISO will not accept Export Bids, Demand Bids, Virtual Bids, or Bids for Non-Resource-Specific System Resources that are not Resource Adequacy Resources that exceed the Hard Energy Bid Cap.~~

#### **30.7.12.5.3 Maximum Import Bid Price**

~~The CAISO calculates hourly Maximum Import Bid Prices for the Day-Ahead Market and Real-Time Market, separately, including for on-peak and off-peak hours. The CAISO calculates the Maximum Import Bid Price as 110 percent of the greater of the published bilateral electric index prices for the Mid-Columbia or Palo Verde trading hub locations, multiplied by an hourly shaping ratio. As detailed in the CAISO Business Practice Manual, the CAISO calculates the hourly shaping ratio for each hour by dividing the Day-Ahead Market System Marginal Energy Cost for the CAISO Balancing Authority Area in that hour of a previous representative Trading Day by the average Day-Ahead Market System Marginal Energy Cost for the CAISO Balancing Authority Area in all on-peak hours of the same previous representative Trading Day. If for any given Trading Hour the CAISO cannot calculate the Maximum~~

Import Bid Price, the applicable Maximum Import Bid Price will be the most recently available calculated Maximum Import Bid Price.

\* \* \* \* \*

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

### **31.6.1 Criteria for Temporary Waiver of Timing Requirements**

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; ~~and~~
- (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; or
- (v) additional time is needed to allow for the submission of Bids in the event that the conditions specified in Section 30.5.8 change prior to the Market Close, and may require the resubmission of Bids consistent with the changed bidding requirements.

\* \* \* \* \*

## **34.10 Dispatch of Energy from Ancillary Services**

The CAISO may issue Dispatch Instructions to Participating Generators, Participating Loads, Proxy Demand Resources, (via communication with the Scheduling Coordinators of Demand Response

Providers) System Units and System Resources contracted to provide Ancillary Services (either procured through the CAISO Markets, Self-Provided by Scheduling Coordinators, or through Exceptional Dispatch or dispatched in accordance with a Legacy RMR Contract) for the Supply of Energy. During normal operating conditions, the CAISO may Dispatch those Participating Generators, Participating Loads, Proxy Demand Resources, 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. During normal operating conditions, the CAISO may also elect to designate any reserve not previously identified as Contingency Only by Scheduling Coordinator as Contingency Only reserves. 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 34.5.2 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 the ~~Soft Hard~~ Energy Bid Cap as the Energy Bids for such reserves and will set prices accordingly. For CAISO Market intervals for which the conditions and parameters specified in Section 27.4.3.3 apply, the RTED will Dispatch such Contingency Only reserves using the Hard Energy Bid Cap 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 NERC and WECC reliability standards, including any requirements of the NRC. If the CAISO uses Operating Reserve to meet Real-Time Energy requirements, and if the CAISO needs Operating Reserves to satisfy NERC and WECC reliability standards, including any requirements of the NRC, the CAISO shall restore the Operating Reserves to the extent necessary to meet NERC and WECC reliability standards, including any requirements of the NRC 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 Target. The Energy Bid Curve is not used by the AGC system when Dispatching Energy from Regulation. For Regulation Up capacity, 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. For Regulation Down capacity, the lower portion of the resource capacity from its applicable Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve.

\* \* \* \* \*

## **Appendix A**

### **Master Definitions Supplement**

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#### **- Constraint Relaxation Threshold**

A MW threshold value used to determine when the parameters specified in Section 27.4.3.3.4 will trigger in each Balancing Authority Area participating in the CAISO Markets to account for small supply shortfalls configured based on the Balancing Authority Area's BAL-001-2 Requirement R2, calculated by the CAISO annually. The CAISO will post the annual values for each Balancing Authority Area on the CAISO Website or its OASIS.

\* \* \* \* \*

#### **- Hard Energy Bid Cap**

The maximum Energy Bid Price the CAISO will use for purposes of clearing the CAISO Market Processes. The Hard Energy Bid Cap is \$2,000 per MWh.



\* \* \* \* \*

**- Maximum Import Bid Price**

An index-based price used to screen Bids by Non-Resource-Specific System resources that are Resource Adequacy Resources that exceed the Soft Energy Bid Cap.

\* \* \* \* \*

**- Scarcity Reserve Demand Curve Values**

Fixed percentages of the Soft Energy Bid Cap or Hard Energy Bid Cap reflected in the Scarcity Reserve Demand Curve that the CAISO uses to calculate Ancillary Service Shadow Prices for Regulation Up, Spinning Reserve, Non-Spinning Reserve and Regulation Down from which the CAISO determines Ancillary Service Marginal Prices when there is insufficient supply in an Ancillary Service Region or Sub-Region to meet an Ancillary Services minimum procurement requirement.

\* \* \* \* \*

**- Soft Energy Bid Cap**

The maximum Energy Bid price submitted by Scheduling Coordinators for resources, ~~except for Virtual Bids and Bids for Non-Resource-Specific System Resources,~~ the CAISO will use for purposes of clearing the CAISO Market Processes without cost verification pursuant to Section 30.11. The Soft Energy Bid Cap is \$1,000 per MWh.

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