

Business Requirements Specification

FERC 831 Import Bidding and Market Parameters

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Revision History

Date	Version	Description
02/03/2021	1.1	<ul style="list-style-type: none"> • Removed BRQs 015, 055, 060, 065. • To support the project’s dual implementations, Section 6 was split into two main subsections to identify the BRQs for each implementation. • Split out original BRQs 095, 105, 115 into implementation specific BRQs (see Section 6) • Updated Order No. 831 Compliance BRQs: 095-A, 105-A, 115-A • Updated Order No. 831-related Enhancements BRQs: 090, 110, 115 • Enhanced Section 6.1.2 and 6.2.2 Titles. • Removed BRQ085. • Added BRQ123
03/31/2021	1.2	<ul style="list-style-type: none"> • Clarification of Cost-verified Bid in Section 3: Acronyms, Terms, and Definitions

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1 Introduction

This business requirements specification (BRS) supports the FERC 831 Import Bidding and Market Parameters project.

1.1 Project Summary

The FERC 831 Import Bidding and Market Parameters project focuses on process and system modifications related to CAISO’s Federal Energy Regulatory Commission (FERC) Order No. 831 compliance filing. In its compliance filing, CAISO revised the tariff to raise the energy bid cap from \$1,000/MWh to \$2,000/MWh. CAISO also revised the tariff to require suppliers within the CAISO balancing authority area (BAA), that submit energy bids above \$1,000/MWh, to base bids on verifiable actual or expected costs.

The CAISO’s associated policy initiative objective is to ensure all supply bids priced above \$1,000/MWh represent verified costs, when supply is needed to meet the ISO’s load responsibility.

The FERC 831 project addresses two topics related to the changes CAISO proposed:

- The “penalty prices” at which CAISO markets will relax market constraints under the increased energy bid cap.
 - A methodology to establish market constraint relaxation penalty prices under a \$2,000/MWh hard energy bid cap.
- A price-screening methodology for import bids greater than \$1,000/MWh.

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2 Intellectual Property Ownership

Intellectual Property covers a broad array of information and materials, including written works, computer programs, software, business manuals, processes, symbols, logos and other work products. Determining ownership of Intellectual Property is very important in preserving the rights of the California ISO, and helps to avoid Intellectual Property infringement issues. In considering the business requirements or service requirements to be performed, the business owner of the project must determine Intellectual Property Ownership.

2.1 Guidelines

Intellectual Property ownership must be considered by all applicable stakeholders before the services are performed. The level of analysis is two-fold:

- One, the business owner must determine if the Intellectual Property necessary to perform the services is owned by the California ISO or whether it must be obtained from a third party. Once the California ISO has secured the proper Intellectual Property rights to perform the services (i.e., the Intellectual Property is owned by the California ISO or we have licensed it from a third party), the California ISO can undertake the next step.
- The second step in the analysis is to consider whether new Intellectual Property will be created as a result of the business requirements or service requirements to be performed, and how that Intellectual Property will be owned and protected by the California ISO.

In order to assist the business owner in the analysis previously described, refer to the California Intellectual Property Policy available at: <http://www.caiso.com/rules/Pages/LegalPoliciesNotices/Default.aspx>, which provides a brief tutorial on what Intellectual Property is and how the California ISO can protect its Intellectual Property. Contact the Legal Department if you have any questions regarding Intellectual Property.

2.2 Checklist

Not applicable

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3 Acronyms, Terms, and Definitions

Section 3 captures acronyms, terms, and definitions as used throughout the BRS.

Acronym	
BAA	Balancing Authority Area
CCDEBE	Commitment Costs and Default Energy Bid Enhancements
DA	Day-Ahead
DAM	Day Ahead Market
DEB	Default Energy Bid
IFM	Integrated Forward Market
ISO	Independent System Operator
ITPD	Information Technology Product Development
ITPM	Information Technology Product Management
MVQA	Market Validation Quality & Analysis
MWh	Mega Watt hour
OASIS	Open Access Same Time Information System
PCA	Price Corrections Application
PSTD	Power Systems Technology Development
RA	Resource Adequacy
RT	Real-time
RTM	Real-Time Market
RTO	Regional Transmission Organization
SIBR	Scheduling Infrastructure and Business Rules
T	Trade Date
TBD	To Be Determined
UAT	User Acceptance Testing

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Term	Definition
Constraint Relaxation Threshold	A CAISO annually calculated MW threshold value used to determine when the parameters specified in CAISO Tariff section 27.4.3.3.4 trigger each Balancing Authority Area who participates in the CAISO Markets, to account for small supply shortfalls as defined by the Balancing Authority Area’s NERC BAL-001-2 Requirement R2. CAISO will post each Balancing Authority Area’s annual values on a CAISO public portal.
Cost-verified bid	An offer for the Supply or Demand of Energy or Ancillary Services, including Self-Schedules, submitted by Scheduling Coordinator for specific resources (Tariff definition of “Bid” per Tariff Appendix A). A cost-verified bid may include a bid based on an approved Manual Consult or a bid based on an accepted automated Reference Level Change Request., or a bid accepted in SIBR based on a calculated DEB value.
Hard cap	The hard energy bid cap, a configurable parameter defined as \$2,000/MWh.
Highest supply bid	Highest supply bid is a cost-verified bid.
Resource-specific resources	Resource-specific resources include CAISO generating units, EIM participating resources, and resource-specific import bids. A resource-specific system resource, a term used in the CAISO tariff, is a resource with specific generation design characteristics registered in Master File and modeled as either a generating unit or a system resource.
Soft cap	The soft energy bid cap, a configurable parameter defined as \$1,000/MWh.
Summer Season	Most recent day where CAISO DA SMEC was above \$200/MWh in at least one hour in the Summer Season as April 1 - October 31. The Summer Season is used in the Max Import Bid Price calculation.
Winter Season	Most recent day where CAISO DA SMEC was above \$200/MWh in at least one hour in the Winter Season as January 1 – March 31 and November 1 – December 31. The Winter Season is used in the Max Import Bid Price calculation.

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4 Details of Business Need/Problem

4.1 Description

Business Opportunity/Problem Statement:	
What	<p>The Federal Energy Regulatory Commission (FERC) is revising its regulations to address incremental energy offer caps. FERC requires that each regional transmission organization (RTO) and independent system operator (ISO): (1) cap each resource's incremental energy offer at the higher of \$1,000/megawatt-hour (MWh) or that resource's verified cost-based incremental energy offer; and (2) cap verified cost-based incremental energy offers at \$2,000/MWh when calculating locational marginal prices (LMP). Further, FERC clarifies that the verification process for cost-based incremental offers above \$1,000/MWh should ensure that a resource's cost-based incremental energy offer reasonably reflects that resource's actual or expected costs. FERC's Final Rule will improve price formation by reducing the likelihood that offer caps will suppress LMPs below the marginal cost of production, while compensating resources for the costs they incur to serve load, by enabling RTOs/ISOs to dispatch the most efficient set of resources when short-run marginal costs exceed \$1,000/MWh, by encouraging resources to offer supply to the market when it is most needed, and by reducing the potential for seams issues.</p>
When	<p>The CAISO intends to implement this BRS in June 2021; however, some elements may need to be implemented on March 21, 2021 depending on the CAISO's pending motion in its Order No. 831 compliance proceeding.</p>
Why the opportunity / problem	<p>The CAISO submitted its proposed tariff changes to comply with FERC Order No. 831 in September 2019. In its proposed tariff changes, the CAISO did not submit a separate filing requesting authority to cost-verify or price screen import bids above \$1,000/MWh. However, the CAISO decided to further address this topic in this initiative because of the CAISO balancing authority area's increasing dependence on imports.</p> <p>In addition, a number of stakeholders objected to the CAISO's proposal in the compliance filing to continue to set the power balance constraint penalty price at the hard energy bid cap, which under Order No. 831 increases from \$1,000/MWh to \$2,000/MWh. This would result in market prices being set to \$2,000/MWh if the market has to relax the power balance constraint. Consequently, this initiative also addresses this topic.</p>
Whose impacted	<p>Market Participants, PSTD, Market Analysis and Forecasting, Customer Service, ITPM/ITPD</p>

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5 Business Impacts

5.1 Business Practice Manual (BPM)

BPM	Description of Impact(s)
Definitions & Acronyms	Update BPM to reflect: <ul style="list-style-type: none"> • Add 'penalty price' definition • Add 'price screening' definition
Market Instruments	Update BPM to reflect: Describe the Hourly Energy Price Shaping Factor for the import prices that will be estimated.
Market Operations	Update BPM to reflect: <ul style="list-style-type: none"> • Integrated Forward Market (IFM) Parameter Values • Real Time Market Parameters Logic of the price discovery.

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5.2 Other

Impact	Yes / No	Impact Description
Market Simulation	Yes	The ISO will need to perform a formal market simulation to show bids clearing the market above \$1,000/MWh.
Market Participant Impact	Yes	<ul style="list-style-type: none"> • Sharing with market participants the 'hourly energy price shaping factor' • Some entities submitting bids are being validated against a bid cap which changes daily
External Training	Yes	<ul style="list-style-type: none"> • Define what will be different for SCs after the project implements • Explain penalty prices • Describe the import bid screening procedure • New reports and/or changes to existing reports
Policy Initiative	Yes	Proposal documentation and changes.

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6 Business Requirements

The sections below describe the Business processes and the associated business requirements involved in the project. These may represent high-level functional, non-functional, reporting, and/or infrastructure requirements. These business requirements directly relate to the high-level scope items determined for the project.

6.1 Order No. 831 Compliance

6.1.1 Business Process: N/A

6.1.1.1 Business Requirements (System impacted: SIBR)

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
FERC831-050	The System shall cap the default minimum load cost and the reasonableness threshold minimum load cost at a value equivalent to \$2,000/MWh based on the resource’s default minimum load cost divided by the resource’s Pmin. If the resource’s Pmin is below 1 MW, a Pmin value of 1 MW will be used for this calculation.	Core	SIBR
FERC831-080	The hard cap configurable parameter shall be changed from \$1000/MWh to \$2000/MWh.	Core	SIBR

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6.1.2 Business Process: Manage Day-Ahead and Real-Time Market

6.1.2.1 Business Requirements (Systems impacted: IFM, RTM)

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
FERC831-095-A	<p>The DA scheduling run shall always scale all market constraint penalty prices to a \$2000/MWh hard energy bid cap for all hours for all hours in the day-ahead time horizon and entire market footprint and entire market footprint.</p> <p><i>Reference:</i> Final Proposal Appendix A for examples.</p>	Core	IFM/RTM
FERC831-100-A	<p>The System shall scale the day-ahead market pricing run to the \$2000/MWh hard energy bid cap for the entire market footprint.</p>	Core	IFM
FERC831-105-A	<p>The RT scheduling run shall always scale all market constraint penalty prices to a \$2000/MWh hard energy bid cap for all intervals in the real-time market time horizon and entire EIM footprint.</p>	Core	RTM
FERC831-115-A	<p>The RT Market shall set the pricing run energy prices based on constraint penalty prices scaled to the hard bid cap (\$2000/MWh).</p>	Core	IFM/RTM

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6.2 Order No. 831-related Enhancements

6.2.1 Business Process: N/A

6.2.1.1 Business Requirements (System impacted: SIBR)

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
FERC831-001	<p>The System shall validate that a resource-specific resource has a cost-verified energy bid greater than \$1000/MWh, or the CAISO-calculated maximum allowed import bid price is greater than \$1000/MWh.</p> <p>If either of these conditions apply in the day-ahead market, the bid cap for applicable resource types shall be raised to \$2000/MWh as indicated in BRQs FERC831-010, FERC831-025, and FERC831-030, for those hours in which the conditions apply. In addition, the \$2000/MWh cap shall cascade to the same hours of the real-time market.</p> <p>If either of these conditions apply in the real-time market, the bid cap for applicable resource types shall be raised to \$2000/MWh as indicated in BRQs FERC831-010, FERC831-025, and FERC831-030, for those hours in which the conditions apply.</p> <p><i>Examples:</i></p> <p>In the day-ahead market, there is a cost-verified bid above \$1000/MWh in HE 17, but at or below \$1000/MWh for all other hours. In addition, the maximum allowed import bid price is above \$1000/MWh for HE 19, but at or below \$1000/MWh for all other hours. As a result, system shall raise the bid cap for applicable resource types from \$1000/MWh to \$2000/MWh for bids submitted for HE 17 and</p>	Core	SIBR

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	<p>19 in the day-ahead market. In addition, the bid cap for the same applicable resource types shall be raised from \$1000/MWh to \$2000/MWh for HE 17 and 19 in the real-time market. Now, in the real-time market, there is a cost-verified bid above \$1000/MWh in HE 15, but at or below \$1000/MWh for all other hours. In addition, the maximum allowed import bid price is above \$1000/MWh for HE 21, but at or below \$1000 for all other hours. As a result, system shall raise the bid cap for applicable resource types from \$1000/MWh to \$2000/MWh for bids submitted for HE 15 and 21 in the real-time market, and keep the bid cap at \$2000 for HE 17 and 19 in the real-time market due to the cascading rule.</p>		
FERC831-005	<p>The System shall consider a cost-verified bid to be any of the following:</p> <ul style="list-style-type: none"> • Accepted energy bid based on an approved manual consult submission. • Accepted energy bid based on automated reference level change request. • Accepted energy bid based on associated DEB value. • SIBR-generated energy bid for resources that have bidding obligations into the CAISO Markets. 	Core	SIBR
FERC831-010	<p>When an import is a non-resource specific RA resource, the System shall cap the resource to the higher of the soft bid cap, the max import bid price, or the highest price cost-verified bid when the conditions are set to increase to the hard bid cap (\$2000/MWh).</p> <p>Implementation Note: Reference BRQ FERC831-001.</p>	Core	SIBR



FERC831-020	<i>Existing Rule:</i> Resource specific system resources would be handled per CCDEBE rules.	<i>Existing</i>	SIBR
FERC831-025	When an import is non-resource specific non-RA , the System shall limit the resource to the soft bid cap, unless the conditions are set to increase to the hard bid cap (\$2000/MWh). Implementation Note: Reference BRQ FERC831-001.	Core	SIBR
FERC831-030	The System shall limit virtual bids to the soft bid cap (\$1000/MWh), unless the conditions are set to increase to the hard bid cap (\$2000/MWh). Implementation Note: Reference BRQ FERC831-001.	Core	SIBR
FERC831-035	The System shall impose a start time for notifying Scheduling Coordinators whether the hard bid cap is set at \$1000/MWh or \$2000/MWh for non-resource specific non-RA imports and virtual bids. <i>Implementation Note:</i> This notification shall be displayed by T – Deadline (e.g., T – 45 minutes) where T is the DA or RT market close. Reference: BRQs FERC831-025 and 030. Implementation Note: Reference BRQ FERC831-001.	Core	SIBR
FERC831-040	The System shall treat the day-ahead ‘Start time’ as a configurable parameter, in minutes, initially set to 45 minutes. The day-ahead configurable parameter shall be adjustable separately from the real-time parameter.	Core	SIBR
FERC831-045	The System shall treat the real-time ‘Start time’ as a configurable parameter, in minutes, initially set to 45 minutes.	Core	SIBR

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FERC831-070	<p>The System shall display a notification indicating that the bid cap will be set for the applicable day-ahead and real-time market.</p> <p>Implementation Note: Refer to Appendix B for detailed logic and notification text.</p> <p>Implementation Note: Reference BRQ FERC831-001.</p>	Core	SIBR
FERC831-075	<p>The System shall store the resource, configuration (if MSG), bid segment price, and identifying IDs or submission times for the energy bid segment with the highest price, which was used by SIBR for determining whether the \$1000/MWh or \$2000/MWh cap applies.</p>	Core	SIBR

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6.2.2 Business Process: Manage Day-Ahead and Real-Time Market

6.2.2.1 Business Requirements (Systems impacted: IFM, RTM)

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
FERC831-090	The System shall receive EIM BAA-specific constraint relaxation thresholds.	Core	IFM/RTM
FERC831-095	<p>If the conditions are met for any hour of the day-ahead market time horizon, the System shall scale all market constraint penalty prices in the scheduling run to a \$2000/MWh hard energy bid cap for all hours in the day-ahead and all the hours in the real-time market time horizons and entire market footprint. Otherwise, the System shall keep all constraint penalty prices in the scheduling run scaled with respect to the \$1000/MWh hard energy bid cap.</p> <p><i>Implementation Note:</i> Reference BRQ FERC831-001.</p> <p><i>Implementation Note:</i> an existing payload from SIBR to IFM/RTM will contain information pertaining to whether there is a cost-verified energy bid greater than \$1000/MWh. The System will use this information, as well as the calculated maximum import bid price received via a payload, to determine whether to scale constraint penalty prices as described in this BRQ.</p> <p>Reference: Final Proposal Appendix A for examples.</p>	Core	IFM/RTM

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FERC831-100	<p>When the day-ahead market scheduling run scales to the hard energy bid cap (\$2000/MWh), the System shall scale the day ahead market pricing run to the hard energy bid cap for the entire market footprint.</p>	Core	IFM
FERC831-105	<p>If the conditions are met for any hour of the real-time market, the System shall scale all market constraint penalty prices in the scheduling run to a \$2000/MWh hard energy bid cap for all intervals in the real-time market time horizon and entire EIM footprint. Otherwise, the System shall keep all constraint penalty prices in the scheduling run scaled with respect to the \$1000/MWh hard energy bid cap.</p> <p><i>Implementation Note:</i> Reference BRQ FERC831-001.</p> <p>Implementation note: an existing payload from SIBR to IFM/RTM will contain information pertaining to whether there is a cost-verified energy bid greater than \$1000/MWh. The System will use this information, as well as the calculated maximum import bid price received via a payload, to determine whether to scale constraint penalty prices as described in this BRQ.</p>	Core	RTM
FERC831-110	<p>When the real-time market scheduling run scales to the hard energy bid cap (\$2000/MWh) and the power balance constraint infeasibility (supply shortage) is less than or equal to the constraint relaxation threshold, the System shall set the pricing run energy prices based on the highest-priced economic bid cleared in the scheduling run.</p>	Core	IFM/RTM
FERC831-115	<p>When the real-time market scheduling run scales to the hard energy bid cap</p>	Core	IFM/RTM

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	(\$2000/MWh) and the power balance constraint infeasibility (supply shortage) is greater than the constraint relaxation threshold, the System shall set the pricing run energy prices based on constraint penalty prices scaled to the hard bid cap (\$2000/MWh).		
FERC831-120	The power balance constraint infeasibility constraint relaxation threshold comes from a variation of the NERC-defined Control Performance Standard 2 (CPS2) and is given by $10B_i \times (F_s - FTL_{Low})$, where B_i is the frequency bias setting for a balancing authority (expressed as MW/0.1 Hz), F_s is the scheduled frequency in Hz, and FTL_{Low} is the low frequency trigger limit.	Core	n/a
FERC831-123	When the EIM BAA power balance constraint infeasibility is positive (and less than or equal to the threshold), the EIM BAA pricing run energy prices shall not be lower than \$1000/MWh.	Core (requirement owner: Tomas Tinoco De Rubira)	IFM/RTM

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6.2.3 Business Process: TBD

6.2.3.1 Business Requirements (System impacted: OASIS)

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
FERC831-280	The System shall receive the ‘hourly energy price shaping factor’.	Core	OASIS
FERC831-285	The System shall publish the ‘hourly energy price shaping factor’ for the day-ahead and real-time markets.	Core	OASIS
FERC831-290	On an annual basis, the System shall publish the static constraint relaxation threshold value(s) for the CAISO BAA and each EIM BAA. Reference: ‘Revised Final Proposal’: Page 17 - Table 1 Frequency Bias Settings and Calculated Threshold Values.	Core	OASIS
FERC831-295	On an annual basis, the System shall receive the constraint relaxation threshold.	Core	OASIS

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6.2.4 Business Process: Market/Business Simulation

This section shall provide a basis for the development of the Market/Business Simulation Scenarios. These requirements will provide guidance on the market participant impacts, inputs into the Scenarios, endpoints to the Scenarios and reasons for potential Scenarios. The guidance on market participant impacts shall be gathered from the requirements that impact rules, interfaces, applications/reports, new system processes, new/modified data models and new user roles. The source and sink systems shall be determined through the development of the system context diagram and the web service requirements. The Reason for the Potential Scenario column will be to offer guidance regarding what potential Scenarios, and their context, may be needed for this project. This section applies to all policy development projects, market enhancements, technology enhancements, operation enhancements, Energy Imbalance Market (EIM) implementations and Reliability Coordination (RC) service implementations.

In the Reason for Potential Scenario column, the Business Analyst must select one or more of the following reasons:

1. **Rule Impacts:** Generalized changes in market rules, bidding rules, settlements rules, market design changes, or other business rules.
2. **Interface changes:** Changes that impact templates (e.g. the Resource Adequacy {RA} supply plan), user interface (UI), and application programming interface (API) (e.g. retrievals of new shadow settlement data).
3. **New application/report:** Changes that cause addition/modification of market software or reports, especially when market data input is required by the market participant.
4. **New system process:** Modification of data flow in systems, especially if the new process requires the market participant to demonstrate proficiency prior to production.
5. **New/Modified model data:** Addition or substantial modification of model data as a market solution provided by the ISO.
6. **New user role:** The addition or modification of access permissions for a user role applied to specific business units within an EIM entity or market participant organization (e.g. Load Serving Entity (LSE) as a Local Regulatory Authority (LRA) role). Scenarios are beneficial for market participants taking on a new function or process within their organization.

6.2.4.1 Business Requirements

ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
	<i>The Market Monitoring and Market Simulation requirements are deemed by the project team to be captured after the Development/Design Specification (DDS) is complete.</i>			

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6.2.5 Business Process: Information Security Adherence

Based on the scopes of work, systems' impacts and absence of any new risk exposures regarding access to systems by external parties, there are no **new specific information security adherence requirements for this BRS.**

6.2.5.1 Business Requirements

ID#	Business Feature	Requirement Type	Manual or Auto	Potential Application(s) Impacted
N/A	<i>Not applicable</i>			

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7 Appendix A – Maximum Import Bid Price

7.1 Maximum Import Bid Price Calculation

The Maximum Import Bid Price (MIBP) calculation is performed as follows:

$$\text{MIBP} = \text{Energy Price} * 1.1$$

Where Energy Price = Electric Hub Price * Hourly Energy Price Shaping Factor

And Hourly Energy Price Shaping Factor = $[1 + (\text{CAISO Hourly DA SMEC} - \text{CAISO Average DA SMEC of on/off peak hrs}) / (\text{CAISO Average DA SMEC of on/off peak hrs})]$

The following calculation steps are intended to describe how the Maximum Import Bid Price calculation will be performed. The numbers and dates used are for illustrative purposes only.

Step 1: Source Electric Hub Prices

CAISO will use the highest bilateral electric hub price for each peak and off-peak period from either the Mid-Columbia or Palo Verde electric trading hub price indices. In this example, the peak price for Mid-Columbia and the off-peak price for Palo Verde are selected.

Hub	TOU	Price (\$/MWh)
Mid-Columbia	Peak	150.00
Mid-Columbia	Off-Peak	87.00
Palo Verde	Peak	125.00
Palo Verde	Off-Peak	90.00

Step 2: Apply Lookback Implementation Logic to find most recent high-priced day

Using the logic described in section 7.2 below, find the most recent high-priced day where CAISO DA SMEC was above \$200/MWh in at least one hour. In this example, the calculation is being performed in the summer season (e.g., on 9/25/2020) as defined below and the most recent high-priced day is found to be 9/15/2020.

Trade Date	Hour	DA SMEC (\$/MWh)
9/15/2020	1	37
9/15/2020	2	35
9/15/2020	3	34
9/15/2020	4	33
9/15/2020	5	35
9/15/2020	6	37
9/15/2020	7	40

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9/15/2020	8	35
9/15/2020	9	30
9/15/2020	10	28
9/15/2020	11	31
9/15/2020	12	34
9/15/2020	13	38
9/15/2020	14	42
9/15/2020	15	49
9/15/2020	16	55
9/15/2020	17	57
9/15/2020	18	84
9/15/2020	19	215
9/15/2020	20	110
9/15/2020	21	59
9/15/2020	22	50
9/15/2020	23	41
9/15/2020	24	39

Step 3: Calculate average DA SMEC per peak and off-peak period for prices sourced above

Trade Date	TOU	Average DA SMEC (\$/MWh)
9/15/2020	Off-Peak	36.29
9/15/2020	On-Peak	58.47

Step 4: Calculate Hourly Energy Price Shaping Factor

Source DA SMEC prices for calculation trade date and apply calculation of Hourly Energy Price Shaping Factor as described above.

Trade date	Hour	Peak flag	DA SMEC (\$/MWh)	Hourly shaping factor
9/25/2020	1	Off-Peak	28	0.772
9/25/2020	2	Off-Peak	30	0.827
9/25/2020	3	Off-Peak	31	0.854
9/25/2020	4	Off-Peak	33	0.909
9/25/2020	5	Off-Peak	31	0.854
9/25/2020	6	On-Peak	37	0.633
9/25/2020	7	On-Peak	40	0.684

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9/25/2020	8	On-Peak	41	0.701
9/25/2020	9	On-Peak	40	0.684
9/25/2020	10	On-Peak	46	0.787
9/25/2020	11	On-Peak	45	0.770
9/25/2020	12	On-Peak	40	0.684
9/25/2020	13	On-Peak	47	0.804
9/25/2020	14	On-Peak	75	1.283
9/25/2020	15	On-Peak	80	1.368
9/25/2020	16	On-Peak	120	2.052
9/25/2020	17	On-Peak	125	2.138
9/25/2020	18	On-Peak	250	4.276
9/25/2020	19	On-Peak	400	6.841
9/25/2020	20	On-Peak	380	6.499
9/25/2020	21	On-Peak	290	4.960
9/25/2020	22	On-Peak	150	2.565
9/25/2020	23	Off-Peak	140	3.858
9/25/2020	24	Off-Peak	100	2.756

Step 5: Calculate Maximum Import Bid Price

Apply calculated Hourly Energy Price Shaping Factor to Electric Hub Price and apply multiplier to calculate Maximum Import Bid Price, as described above.

Trade date	Hour	Peak flag	Hourly shaping factor	Electric Hub Price (\$/MWh)	Max Import Bid Price (\$/MWh)
9/25/2020	1	Off-Peak	0.772	90.00	76.39
9/25/2020	2	Off-Peak	0.827	90.00	81.85
9/25/2020	3	Off-Peak	0.854	90.00	84.58
9/25/2020	4	Off-Peak	0.909	90.00	90.04
9/25/2020	5	Off-Peak	0.854	90.00	84.58
9/25/2020	6	On-Peak	0.633	150.00	104.41
9/25/2020	7	On-Peak	0.684	150.00	112.88
9/25/2020	8	On-Peak	0.701	150.00	115.70
9/25/2020	9	On-Peak	0.684	150.00	112.88
9/25/2020	10	On-Peak	0.787	150.00	129.81
9/25/2020	11	On-Peak	0.770	150.00	126.99
9/25/2020	12	On-Peak	0.684	150.00	112.88

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9/25/2020	13	On-Peak	0.804	150.00	132.63
9/25/2020	14	On-Peak	1.283	150.00	211.64
9/25/2020	15	On-Peak	1.368	150.00	225.75
9/25/2020	16	On-Peak	2.052	150.00	338.63
9/25/2020	17	On-Peak	2.138	150.00	352.74
9/25/2020	18	On-Peak	4.276	150.00	705.48
9/25/2020	19	On-Peak	6.841	150.00	1128.77
9/25/2020	20	On-Peak	6.499	150.00	1072.33
9/25/2020	21	On-Peak	4.960	150.00	818.36
9/25/2020	22	On-Peak	2.565	150.00	423.29
9/25/2020	23	Off-Peak	3.858	90.00	381.97
9/25/2020	24	Off-Peak	2.756	90.00	272.83

7.2 Lookback Implementation Logic

The following section outlines the logic that CAISO internal systems will use to source the most recent high-priced day that is used in the Max Import Bid Price calculation. “Summer Season” is defined for the calculation as April 1 – October 31. “Winter Season” is defined for the calculation as January 1 – March 31 and November 1 – December 31.

To find most recent day where CAISO DA SMEC was above \$200/MWh in at least one hour in the Summer Season:

- If trade date is within Summer Season, look backwards from trade date (or most recently available DA SMEC data) to beginning of Summer Season (April 1) and select the first day where an hour of DA SMEC was greater than \$200/MWh.
 - If there is no hour of DA SMEC greater than \$200/MWh within the current year’s Summer Season, look back to current year – 1 Summer Season (e.g., for 2020, look back to 2019). Look backwards from end of Summer Season (Oct 31) to beginning of Summer Season (Apr 1) and select the first day where an hour of DA SMEC was greater than \$200/MWh.
 - If there is no hour of DA SMEC greater than \$200/MWh within the current year - 1 Summer Season, look back to current year – 2 Summer Season (e.g., 2018). Look backwards from end of Summer Season (Oct 31) to beginning of Summer Season (Apr 1) and select the first day where an hour of DA SMEC was greater than \$200/MWh.
 - If there is no hour of DA SMEC greater than \$200/MWh within the current year - 2 Summer Season, look back to current year – 3 Summer Season (e.g., 2017). Look backwards from end of Summer Season (Oct 31) to beginning of Summer Season (Apr 1) and select the first day where an hour of DA SMEC was greater than \$200/MWh.

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- If there are no hours of DA SMEC greater than \$200/MWh within current year’s Summer Season, current year – 1 Summer Season, current year – 2 Summer Season, or current year – 3 Summer Season (e.g., 2020, 2019, 2018, or 2017), sort hourly DA SMEC in descending order and choose the day with the next-highest hourly DA SMEC. This day can fall within the current year’s Summer Season or any of the three “lookback” years’ Summer Seasons.

To find most recent day where CAISO DA SMEC was above \$200/MWh in at least one hour in the Winter Season as defined for the Max Import Bid Price calculation as January 1 – March 31 and November 1 – December 31, hereafter referred to as the “Winter Season”:

- If trade date is within Winter Season, look backwards from trade date (or most recently available DA SMEC data) to beginning of Winter Season (Jan 1) and select the first day where an hour of DA SMEC was greater than \$200/MWh.
 - If there is no hour of DA SMEC greater than \$200/MWh within the current year’s Winter Season, look back to current year – 1 Winter Season (e.g., for 2020, look back to 2019). Look backwards from end of Winter Season (Dec 31) to beginning of Winter Season (Jan 1) [skipping Apr 1 – Oct 31] and select the first day where an hour of DA SMEC was greater than \$200/MWh.
 - If there is no hour of DA SMEC greater than \$200/MWh within the current year - 1 Winter Season, look back to current year – 2 Winter Season (e.g., 2018). Look backwards from end of Winter Season (Dec 31) to beginning of Winter Season (Jan 1) [skipping Apr 1 – Oct 31] and select the first day where an hour of DA SMEC was greater than \$200/MWh.
 - If there is no hour of DA SMEC greater than \$200/MWh within the current year - 2 Winter Season, look back to current year – 3 Winter Season (e.g., 2017). Look backwards from end of Winter Season (Dec 31) to beginning of Winter Season (Jan 1) [skipping Apr 1 – Oct 31] and select the first day where an hour of DA SMEC was greater than \$200/MWh.
- If there are no hours of DA SMEC greater than \$200/MWh within current year’s Winter Season, current year – 1 Winter Season, current year – 2 Winter Season, or current year – 3 Winter Season (e.g., 2020, 2019, 2018, or 2017), sort hourly DA SMEC in descending order and choose the day with the next-highest hourly DA SMEC. This day can fall within the current year’s Winter Season or any of the three “lookback” years’ Winter Seasons.

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8 Appendix B – SIBR Logic

8.1 Bid Cap Logic

In general, the CAISO should communicate to Scheduling Coordinators when the bid cap has been raised to \$2,000/MWh for any hour of the Day-Ahead or Real-Time market. The following scenarios outline how the bid cap can be raised in the DA and RT markets, and how Scheduling Coordinators will be informed of changes to the bid cap.

Scenario 1: MIBP > \$1,000/MWh in DA only

The DA Maximum Import Bid Price (MIBP) exceeds \$1,000/MWh for a set of hours [A, B]. The RT MIBP does not exceed \$1,000/MWh for any hours.

- The bid cap is raised to \$2,000/MWh in both DA and RT markets for the set of hours [A, B].
- If a DA cost-verified bid greater than \$1,000/MWh is submitted for an additional set of hours [W, X], the bid cap is raised to \$2,000/MWh in both DA and RT markets for the set of hours [W, X] as well.

Scenario 2: MIBP > \$1,000/MWh in DA and RT

The DA MIBP exceeds \$1,000/MWh for one set of hours [A, B]. The RT MIBP exceeds \$1,000/MWh for another set of hours [C, D].

- The bid cap is raised to \$2,000/MWh in the DA market for the set of hours [A, B].
- The bid cap is raised to \$2,000/MWh in the RT market for the sets of hours [A, B] and [C, D].
- If a DA cost-verified bid greater than \$1,000/MWh is submitted for an additional set of hours [W, X], the bid cap is raised to \$2,000/MWh in the DA and RT markets for the set of hours [W, X] as well.
- If a RT cost-verified bid greater than \$1,000/MWh is submitted for an additional set of hours [Y, Z], the bid cap is raised to \$2,000/MWh in the RT market for the set of hours [Y, Z] as well.

Scenario 3: MIBP > \$1,000/MWh in RT only

The DA MIBP does not exceed \$1,000/MWh for any hours. The RT MIBP exceeds \$1,000/MWh for a set of hours [C, D].

- The bid cap is raised to \$2,000/MWh in the RT market for the set of hours [C, D].
- If a RT cost-verified bid greater than \$1,000/MWh is submitted for an additional set of hours [Y, Z], the bid cap is raised to \$2,000/MWh in the RT market for the set of hours [Y, Z] as well.

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Scenario 4: Cost-verified bid > \$1,000/MWh submitted prior to market close

Assume the MIBP has not exceeded \$1,000/MWh. A cost-verified bid greater than \$1,000/MWh is submitted to SIBR for a specific set of hours.

- If the cost-verified bid is submitted for the DA market for hours [W, X], the bid cap is raised to \$2,000/MWh in the DA and RT markets for the set of hours [W, X].
- If the cost-verified bid is submitted for the RT market for hours [Y, Z], the bid cap is raised to \$2,000/MWh in the RT market for the set of hours [Y, Z].

If prior to this bid submission, the bid cap sits at \$1,000/MWh, and the cost-verified bid is submitted within 30 minutes of DA market close, the CAISO will hold the DA market open to ensure participants have enough time to adjust or resubmit their bids.

At the point of the first bid submission greater than \$1,000/MWh, SIBR will alert that the bid cap has changed to \$2,000/MWh. A notification message will be sent to participants indicating that the market is being held open for an additional 30 minutes. For example, if the bid is received at 9:35 AM, the market will be held open until 10:05 AM.

Note that due to tight operational timelines in the RT market, CAISO will be unable to hold open bidding for the RT market. The DA market will be held until 10:30 AM at the latest.

Scenario 5: No submitted cost-verified bids > \$1,000/MWh; SIBR inserts bid > \$1,000/MWh

Assume the MIBP has not exceeded \$1,000/MWh for any hour in the DA or RT calculation, and there are no submitted cost-verified bids greater than \$1,000/MWh at the close of the DA market. Also assume that a must-offer resource with a bidding obligation did not submit a bid, and the must-offer resource's Default Energy Bid (DEB) value exceeds \$1,000/MWh. In this case, SIBR will insert a bid at the value of the must-offer resource's DEB.

- If the inserted bid is applicable for the DA market for hours [W, X], the bid cap is raised to \$2,000/MWh in the DA and RT markets for the set of hours [W, X].
- If the inserted bid is applicable for the RT market for hours [Y, Z], the bid cap is raised to \$2,000/MWh in the RT market for the set of hours [Y, Z].

SIBR will insert this bid for the must-offer resource upon market close (e.g., 10 AM). For the DA market only, the CAISO will then reopen the market for 30 minutes in order to give resources time to submit or adjust their bids. SIBR will alert that the bid cap has changed to \$2,000/MWh and the market is being re-opened for 30 minutes. A notification message will be sent to participants indicating that the market is being re-opened as well.

Note that due to tight operational timelines in the RT market, CAISO will be unable to hold open bidding for the RT market. The DA market will be held until 10:30 AM at the latest.

Scenario 6: Cost-verified bid > \$1,000/MWh submitted, then revised down to < \$1,000/MWh, prior to market close

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Assume the MIBP has not exceeded \$1,000/MWh for any hour in the DA or RT calculation. An SC submits a cost-verified bid greater than \$1,000/MWh at some point prior to market close, setting the conditions to raise the bid cap to \$2,000/MWh; this is the only cost-verified bid greater than \$1,000/MWh that SIBR has received. However, after this submission but prior to market close, the SC revises this “contingent” bid down below \$1,000/MWh. Because of this, the conditions no longer exist to keep the bid cap at \$2,000/MWh, so the bid cap is lowered to \$1,000/MWh.

The CAISO will hold the DA market open to ensure participants have enough time to revise or re-submit their bids. At the time of bid revision below \$1,000/MWh, SIBR will alert that the bid cap has been lowered to \$1,000/MWh and the market is being held open for an additional 30 minutes. A notification message will be sent to participants indicating that the market is being held as well.

For example, if the bid is revised at 9:50 AM, the market will be held open until 10:20 AM. At the time of revised market close, any bids still above \$1,000/MWh will be capped at \$1,000/MWh.

Note that due to tight operational timelines in the RT market, CAISO will be unable to hold open bidding for the RT market. The DA market will be held until 10:30 AM at the latest.

8.2 Notification Logic

For each scenario described above, SIBR will take the following actions to notify market participants that the bid cap has been raised.

Scenario	Notification
1	<ul style="list-style-type: none"> • SIBR receives the DA MIBP calculation by approximately 9:00 AM. • By the configurable start time described in FERC831-035 and 040, e.g., 9:15 AM, SIBR shall display a notification in its User Interface that indicates the bid cap has been raised to \$2,000/MWh in the DA and RT market for the applicable set of hours. • SIBR shall also fire a rule on submitted DA and RT bids between the configurable start time and respective market close indicating that the bid cap has been set to \$2,000/MWh in the respective markets for the applicable set of hours. • The notification and rule should remain in place until the close of the last RT market interval in which the bid cap was raised to \$2,000/MWh.
2	<ul style="list-style-type: none"> • SIBR receives the DA MIBP calculation by approximately 9:00 AM; SIBR receives the RT MIBP calculation by approximately 9:45 PM. • By the configurable start time described in FERC831-035 and 040, SIBR shall display a notification in its User Interface that indicates the bid cap has been raised to \$2,000/MWh for the applicable set of hours. For example, this notification will

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	<p>appear at 9:15 AM for the DA market; for the RT market, the notification will appear at 10:00 PM for HE1 market close, 11:00 PM for HE2, market close, etc.</p> <ul style="list-style-type: none"> SIBR shall also fire a rule on submitted DA and RT bids between the configurable start time and respective market close indicating that the bid cap has been set to \$2,000/MWh in the respective markets for the applicable set of hours. The notification and rule should remain in place until close of the last RT market interval in which the bid cap was raised to \$2,000/MWh.
3	<ul style="list-style-type: none"> SIBR receives the RT MIBP calculation by approximately 9:45 PM. By the configurable start time described in FERC831-035 and 040, e.g., 10:00 PM for HE1 market close, 11:00 PM for HE2, market close, etc., SIBR shall display a notification in its User Interface that indicates the bid cap has been raised to \$2,000/MWh for the applicable set of hours. SIBR shall also fire a rule on submitted RT bids between the configurable start time and respective RT hour market close indicating that the bid cap has been set to \$2,000/MWh in the RT market for the applicable set of hours. The notification and rule should remain in place until close of the last RT market interval in which the bid cap was raised to \$2,000/MWh.
4	<ul style="list-style-type: none"> Depending on the market for which the bid cap is set (e.g., DA market only, DA and RT markets, RT market only), SIBR displays a notification and fires a rule for the DA and RT market timeframes at the configurable start time as described above, for cost-verified bids received prior to the configurable start time. For bids received between the configurable start time and 30 minutes prior to DA market close, e.g., between 9:15 AM and 9:30 AM, SIBR displays a notification and fires a rule for the DA and RT market timeframes as described above, as soon as practicable after the bid is submitted and approved. For bids received after 30 minutes prior to DA market close, e.g., after 9:30 AM, SIBR displays a notification and fires a rule for the DA and RT market timeframes as described above, as soon as practicable after the bid is submitted and approved. This notification and rule will also indicate for how long the CAISO plans hold the DA market open.
5	<ul style="list-style-type: none"> At the time of market close, e.g., 10:00 AM for DAM or T – 75 minutes for RTM (10:45 PM for HE1, etc.), SIBR will insert bids for must-offer resources who have not bid at their DEB value.

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	<ul style="list-style-type: none"> When the inserted bids are greater than \$1,000/MWh, SIBR will display a notification and fire a rule indicating that the bid cap has been raised to \$2,000/MWh for the specific set of hours.
6	<ul style="list-style-type: none"> Depending on the market for which the bid cap is revised down (e.g., DA market only, DA and RT markets, RT market only), SIBR displays a notification and fires a rule for the DA and RT market timeframes as soon as practicable after the “contingent” bid is revised. If the “contingent” bid is revised after 30 minutes prior to DA market close, e.g., after 9:30 AM, SIBR displays a notification and fires a rule for the DA and RT market timeframes as described above, as soon as practicable after the “contingent” bid is revised. This notification and rule will also indicate for how long the CAISO plans hold the DA market open.