



California ISO

**FERC Order 831 –
Import Bidding and Market Parameters
Revised Straw Proposal**

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1 Introduction

This initiative explores two topics related to the CAISO's compliance with Federal Energy Regulatory Commission (FERC) Order No. 831. The first topic is a potential cost-verification methodology for import bids greater than \$1,000/MWh. The second topic is the prices of the market constraint "penalty prices" that will be in effect under the CAISO tariff changes to comply with FERC Order No. 831. These tariff changes will increase the energy bid cap from \$1,000/MWh to \$2,000/MWh. The CAISO market uses these penalty prices to relax constraints in the market and set prices when the market must relax a constraint when there is not enough supply to meet demand.

FERC Order No. 831 requires each independent system operator (ISO) to revise its tariff to raise the energy bid cap from \$1,000/MWh to \$2,000/MWh and generally required suppliers to submit energy bids above \$1,000/MWh based on verifiable actual or expected costs.¹ The order also requires an ISO to verify costs underlying cost-based bids above \$1,000/MWh before an offer is used in the market. The order additionally provides for after-the-fact make-whole payments to the extent an ISO cannot verify a resource's costs before the market runs. The order did not require the same treatment for import or virtual offers, but was open to individual ISO's proposing different approaches. The order was also open to individual ISO's approaches for setting market constraint penalty prices.

In its proposed tariff changes to comply with FERC Order 831 submitted to FERC in September 2019, the CAISO did not propose to cost-verify import bids and proposed to allow suppliers to submit import bids up to \$2,000/MWh.² The CAISO also proposed to set the market constraint relaxation penalty prices relative to the new \$2,000/MWh bid cap. However, because of recently raised stakeholder concerns regarding these proposals, the CAISO has started this initiative to reexamine them.

This document presents two potential methodologies to cost-verify non-resource specific import bids greater than \$1,000/MWh. These methodologies differ somewhat from the CAISO's proposed approach for cost-verifying resource-specific energy bids. Rather than verifying actual or expected operating costs associated with import bids, the CAISO proposes to calculate a maximum import bid price. This maximum import bid price will be used to screen import bids. The CAISO proposes two options to stakeholders on how the maximum import bid price will be used. The first option will use the maximum import bid as a cap. If an import bid exceeds the cap, the import bid will be rejected. The second option will use the maximum bid offer as the highest-cost bid or

¹ FERC Order 831: <https://www.ferc.gov/whats-new/comm-meet/2016/111716/E-2.pdf>

² As part of the CAISO compliance to Order No. 831, the CAISO has already proposed to verify resource specific system resources' costs similarly to the cost-verification for internal resources' energy bids. See CAISO Order No. 831 Compliance Filing, transmittal letter at pp. 10-11.

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“threshold” the CAISO will allow in the market. If an import bid is below the threshold, the bid will pass through to the market. If an import bid is above the threshold, the import bid will be reduced to the highest-cost bid amount and used in the market. Under this option, an import bid may be eligible for after-the-fact cost recovery for any amount that was limited by the highest-cost bid.

This document also presents options for establishing market constraint relaxation penalty prices under the FERC Order No. 831 tariff changes. The first option is the same methodology the CAISO included in its proposed tariff changes to comply with FERC Order No. 831. This option sets the constraint relaxation penalty prices relative to the \$2,000/MWh offer cap. The second option sets the relaxation prices relative to \$2,000/MWh only when there are cost-justified energy bids greater than \$1,000/MWh in the CAISO market. This option includes a potential variation that sets energy prices at the highest economic bid in the event energy bids are greater than \$1,000/MWh and the market must relax constraints.

The CAISO seeks stakeholder feedback on these options.

2 Background

In 2016, the Federal Energy Regulatory Commission (FERC) issued FERC Order No. 831 that required ISOs to revise their tariffs to raise the energy bid cap from \$1,000/MWh to \$2,000/MWh and generally required suppliers to submit bids above \$1,000/MWh based on verifiable costs.³ These rule changes in Order No. 831 created a structure where internal supply offers above \$1,000/MWh are effectively automatically mitigated to an amount equal to a supplier's expected or actual costs.

Order No 831 required that ISOs verify the costs underlying these cost-based offers above \$1,000/MWh before an offer could be used to calculate energy prices. If an ISO could not verify the costs underlying the offer before the market clearing process begins then that offer may not be used to calculate energy prices. However, the supplier may be eligible for an after-the-fact make-whole payment if the resource is dispatched and the resource's costs can be verified after-the-fact. Suppliers will also be eligible for make-whole payments if the ISO dispatches a resource and its verified cost-based incremental energy bid exceeds \$2,000/MWh. FERC did not require the same treatment for imports or virtual bids, but was open to individual ISO/RTOs developing and justifying their own requirements for bids above \$1,000/MWh from these resources. FERC also explicitly did not specify a methodology for establishing market constraint relaxation penalty prices under the Order No. 831 changes.

The CAISO submitted its proposed tariff changes to comply with FERC Order No. 831 in September 2019 and proposed that they go into effect in fall 2020. In its proposed tariff changes,⁴ the CAISO did not propose to require suppliers to base non-resource specific import bids above \$1,000/MWh on actual costs. Instead, it proposed to allow suppliers to submit bids above \$1,000/MWh, up to the \$2,000/MWh hard cap, without the CAISO verifying that their bids represented actual costs.

The CAISO did not propose to cost-verify non-resource specific import bids because Order No. 831 did not require it. Among FERC's reasons for not requiring it, was the difficulty ISOs would have verifying import bids that do not come from a specified source. Without specifying the source, the ISO would not have its cost information. However, increased concerns have recently arisen around the lack of cost-verification of these imports because of the CAISO balancing authority area's increasing dependence on imports. Consequently, the CAISO now believes it may be prudent to have cost-verification for non-resource specific import bids consistent with its proposed resource-specific resources' bids requirements.

⁴ Developed in the CAISO's Commitment Cost and Default Energy Bid Enhancements (CCDEBE) stakeholder initiative.

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Increased concern has also recently arisen about the CAISO's proposal to scale the market constraint relaxation parameters to the \$2,000/MWh bid cap. Some stakeholders believe the CAISO's proposal to set relaxation parameters relative to the new \$2,000/MWh energy cap could unnecessarily trigger high prices in the CAISO market, including in the Energy Imbalance Market. Notably, under the CAISO's proposal submitted to comply with Order No. 831, the power balance constraint relaxation penalty price would be \$2,000/MWh. This would set energy prices at \$2,000/MWh if there was not sufficient supply to meet demand in a market interval. This would differ from the current practice of setting energy prices at \$1,000/MWh.

In order to meet the deadline for submitting its filing in compliance with FERC Order No. 831, the CAISO submitted its compliance filing to FERC on September 5, 2019. The filing did not propose any changes to the current tariff requirements that set the relaxation parameters relative to the offer cap, but explained that the CAISO would revisit that issue along with import cost-verification through a new stakeholder process. The stakeholder process would be completed in time to submit a filing with any changes that would go in effect concurrent with the implementation of the FERC Order No. 831 requirements.⁵

The CAISO tariff specifies the relevant scheduling and pricing parameters that apply when the CAISO market systems relax constraints.⁶ The tariff also specifies the scheduling and pricing parameters for relaxing transmission constraints,⁷ the pricing parameters when there is insufficient supply to meet demand (power balance constraint),⁸ and for protecting existing contracts and transmission ownership rights.⁹ These parameters are established based on the existing \$1,000/MWh maximum bid price market participants can submit to the CAISO markets. The Market Operations business practice manual (BPM) documents the full set of scheduling and pricing parameters used in the various markets that are calibrated based on the values set in the CAISO tariff.¹⁰

The power balance constraint ensures that the sum of generation and imports equals the sum of demand, including exports and transmission losses.¹¹ This constraint is set

⁵ See CAISO Transmittal Letter, Filing in Compliance with FERC Order No. 831, FERC Docket No. ER19-2757, at pp. 20-21 (September 5, 2019) (available at: <http://www.aiso.com/Documents/Sep52019-TariffAmendment-OrderNo831ComplianceFiling-ER19-2757.pdf>) (CAISO Order No. 831 Compliance Filing).

⁶ See Section 27.4.3 of the CAISO tariff. <http://www.aiso.com/Documents/Section27-CAISOMarkets-Processes-asof-Aug12-2019.pdf>.

⁷ See Sections 27.4.3.1 and 27.4.3.2 of the CAISO tariff.

⁸ See Section 27.4.3.3 and 27.4.3.4 of the CAISO tariff.

⁹ See Section 27.4.3.5 of the CAISO tariff.

¹⁰

https://bpmcm.aiso.com/BPM%20Document%20Library/Market%20Operations/BPM_for_Market%20Operations_V6_3_redline.pdf

¹¹ <http://www.aiso.com/Documents/AppendixC-LocationalMarginalPrice-asof-Aug1-2019.pdf#search=power%20balance%20constraint>

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to the maximum bid price (the “hard” bid cap) market participants can submit to the CAISO markets. This allows for bids to clear up to the hard bid cap. The additional penalty parameters outlined in the BPM, also known as “penalty prices,” are associated with constraints in the optimization and govern the conditions under which constraints may be relaxed and the setting of market prices when any constraints are relaxed. Importantly, the magnitude of the penalty factor values in the tables for each market reflect the hierarchical priority order in which the associated constraint may be relaxed in that market by the market software¹².

The power balance constraint needs to be at least as high as the highest submitted energy bid price. Otherwise, the optimization will relax the constraint rather than clear bids priced above its value.

The CAISO market utilizes both a scheduling and pricing run to produce awards (dispatches) and prices. In the scheduling run, the market optimizes all submitted bids and clears awards based on the most economic solution. In the event a solution cannot be achieved, the market will use uneconomic adjustments or relax constraints to attain a solution. The awards and resulting prices of this solution are passed to the pricing run in which, the information of the potential uneconomic adjustments and/or constraint relaxation is retained because after solving the scheduling run, the amounts of the adjustments and relaxations are known. These instances are modeled in the pricing run with slack variables with a small range beyond the solution of the scheduling run in order to have room in the optimization of the pricing run to find a solution and produce binding prices. In the event uneconomic adjustments are made or constraints are relaxed, the relevant penalty prices are applied. These penalty prices are intended to reflect scarcity conditions and are currently scaled relative to the \$1,000/MWh hard energy bid cap.

¹²

https://bpmcm.caiso.com/BPM%20Document%20Library/Market%20Operations/BPM_for_Market%20Operations_V6_3_redline.pdf

3 Stakeholder Comments

This section summarizes stakeholder comments received on the issue paper and straw proposal regarding import cost-verification the CAISO published on May 10, 2019, as well as comments submitted to FERC in response to the CAISO's Order No. 831 tariff changes related to both import verification and the price of the market constraint relaxation penalty prices.

Import Bid Cost Verification Requirements

In its import bid cost-verification straw proposal, the CAISO proposed allowing import suppliers to submit bids above \$1,000/MWh only if bids reflected actual marginal costs based on verifiable contemporaneously available information. The CAISO understood that import supply bids do not have easily verifiable marginal costs because their actual costs are driven in part by the seller's opportunities to sell energy outside of the CAISO market. To allow the CAISO sufficient time to review supplier's documentation of such costs, the CAISO proposed to audit bids above \$1,000/MWh after the market.

The CAISO received stakeholder comments on its import bid cost verification straw proposal from the California Public Utilities Commission (CPUC), Department of Market Monitoring (DMM), Pacific Gas and Electric (PG&E), Powerex, Southern California Edison (SCE), Seattle City Light (SCL), and Six Cities.

The CPUC, DMM, PG&E, SCE, and Six Cities supported the CAISO's proposal to require import bids above \$1,000/MWh to be cost verified before market operation. However, these stakeholders believe the proposal does not go far enough. They argued it is insufficient to protect the market by only reviewing bids above \$1,000/MWh after-the-fact because inflated import bids could set the system marginal energy price. Additionally, by the time the CAISO could determine an import bid was not reflective of actual costs, it would be too late — prices were already set. Stakeholders urge the CAISO to propose a before market cost verification mechanism to verify import bids above \$1,000/MWh to better protect the market from inflated bids.

Powerex and Seattle City Light did not support the CAISO's proposal because they believe it's inappropriate to require import bids to be subject to the same verification standards as internal CAISO resources. They are concerned that a strict bid cost verification requirement would negatively impact participation at the CAISO's interties and potentially exacerbate competitive conditions.

Powerex maintained external and internal resources have a couple key distinctions. External resources costs are not easily calculated because of their opportunities to sell to the CAISO market or sell energy bilaterally outside the CAISO market. Powerex states calculating opportunity costs is complex, especially for hydroelectric resources with storage. Not only do hydroelectric resources consider their opportunities to sell

outside of the CAISO market, but they consider the cost of using water to generate now versus in the future when submitting energy bids. Powerex also states external resources are different than internal resources because there is a greater pool of external resources that are available to meeting the CAISO's system-wide needs. In contrast, there is a small pool of internal resources available to meet CAISO demand. That pool of resources is further limited when the potential to exercise market power exists. Powerex believes the CAISO is addressing the wrong problem. Instead, the underlying issue the CAISO is hoping to address really relates to the California resource adequacy program.

Seattle City Light (SCL) states the CAISO's proposal skips an important first step — determining if system market power exists in the CAISO balancing authority area. SCL asserts any proposal for imports is premature until the CAISO confirms system market power exists and then proposes a solution to address the issue. However, regardless of the outcome of stakeholder effort for system market power, SCL will continue to not support any proposal to verify import bids. SCL states any proposal to verify import bids is unnecessary and could result in imports not offering to the CAISO market during times when they are needed most. SCL believes requiring imports to provide documentation of their actual costs is subjective because import resource's actual costs are not easily verified. SCL also believes the CAISO's proposal to audit import bids creates a new risk a supplier must weigh. They believe an import supplier decides on whether to bid into the CAISO market based on numerous factors that are not easily quantified. These factors include the use-limitations of hydro resources, which include the probability of refilling reservoirs and providing adequate water flow for fish. Therefore, a supplier will not want to make a quick/subjective bid decision and also ensure they have supporting documentation justifying bids above \$1,000/MWh.

Powerex and SCL do not support the CAISO's authority to audit import bids after the market runs. They maintain this proposal creates an unmanageable risk that the CAISO may determine at a later date a supplier's cost estimates did not justify an offer above \$1,000/MWh. The repercussions for this determination, a potential referral to FERC, is too big of a risk. Consequently, making an import supplier less likely to sell energy to California.

Powerex suggests that if the CAISO must cost-verify imports they should only verify offers before the market. Powerex proposes a daily ex-ante safe harbor offer price that suppliers will know prior to bid submission deadlines. This safe harbor price would reflect relevant external hub prices. This proposal would be favorable because the safe harbor price would allow suppliers to know at what price the CAISO would not require verification or a referral to FERC enforcement. They believed this approach would help reduce discouraging import offers from participating in the CAISO market, while also allowing the offer cap to only increase during tight conditions in the western bilateral energy market.

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Option 1 presented in Section 4.1, builds on this approach.

As part of the *System Market Power Mitigation Analysis* discussion, PG&E suggested a methodology to calculate a default energy bid for imports. The CAISO could calculate a default energy bid by determining the maximum of a scaled energy bilateral price and an opportunity cost adder. PG&E proposed to create an hourly energy bilateral price by multiplying the on-and-off-peak index prices of an import offers sink location relative to CAISO hourly net load. The other component, the opportunity cost adder was calculated by using the 75 percentile of the past 12 months of the CAISO's locational marginal prices at the intertie location.

The maximum import bid calculation presented in Section 4.1, builds on this approach.

Market Constraint Price Adjustments

In their FERC Order No. 831 comments, EIM participants, PG&E and the CAISO Department of Market Monitoring, opposed setting the power balance constraint to the \$2,000/MWh hard energy bid cap in all hours. They argue that it is inappropriate to use \$2,000/MWh as the penalty price when there are no cost-justified bids greater than \$1,000/MWh.

Option 2 presented in Section 0, addresses these concerns.

4 Proposals

As described above, the purpose of this initiative is to consider two topics:

1. Cost-verification of import bids greater than \$1,000/MWh.
2. Methodologies to establish the market constraint relaxation penalty prices.

The following sections discuss these topics in further detail.

4.1 Import bids greater than \$1,000/MWh

This section describes a potential proposal to modify the approach the CAISO filed with FERC to comply with Order 831. This modification would include the verification of non-resource specific import bids greater than \$1,000/MWh.¹³ This cost-verification approach differs somewhat from the approach for cost-verifying resource-specific energy bids. Rather than verifying actual or expected operating costs associated with an import bid, the CAISO proposes to calculate a maximum import bid price. The CAISO would use this import bid price to screen import bids. Depending on the proposed option selected, the CAISO would either not accept import bids above a maximum import bid price or reduce them to the greater of \$1,000/MWh or the maximum import bid price.

The CAISO currently does not have a methodology to determine costs for non-resource specific imports. These type of imports do not have easily verifiable costs because their resources are not tied to a specific resource. An import bid can also be based on different physical resources hour to hour or be based on energy from multiple resources in a single hour. In addition, import bid costs can be based on opportunity costs rather than actual physical costs to generate energy. These opportunity costs calculations can be highly complex and subjective. Consequently, identifying and estimating import costs is difficult. In its *Import Bid Cost Verification* straw proposal, the CAISO acknowledged this difficulty and did not propose to directly verify import's costs before including import bids in the market.

The CAISO now proposes a potential methodology in which it would calculate a maximum import bid price based on prevailing published index prices in the bilateral energy market. This maximum import bid price would represent a supplier's opportunity costs for selling import energy to the CAISO market. The supplier's opportunity costs is the price it could receive if it sold energy bilaterally outside of the CAISO, rather than importing into the CAISO.

¹³ As part of the CAISO compliance to Order No. 831, the CAISO has already proposed to verify resource specific system resources consistent with how it treats internal resources. See CAISO Order No. 831 Compliance Filing, transmittal letter at pp. 10-11.

The CAISO proposes two ways in which the CAISO would use the maximum import bid price:

1. Cap import bids to the maximum of \$1,000/MWh or the CAISO-calculated maximum import bid price. If an import bid is above \$1,000/MWh and the maximum import bid price, the CAISO would reject the import bid; or
2. Reduce import bids above both \$1,000/MWh and the CAISO-calculated maximum import bid price to the greater of maximum import bid price or \$1,000/MWh. Provide for after-the-fact cost recovery of the original bid amount if the import's actual costs can later be verified.

These options are discussed further in Section 4.1.2, below.

4.1.1 Maximum Import Bid Price Calculation

The CAISO would calculate the maximum import bid price using a methodology that is roughly similar to the methodology used for its hydro resource default energy bid.¹⁴ The hydro default energy bid methodology incorporates a formula that considers the published index price for day-ahead bilateral electricity transactions at a trading hub in the vicinity of a resource along with a price based on the current gas price. This component is intended to estimate the current prevailing price for electricity at each intertie. It also incorporates a component based on monthly electrical futures prices at various trading hubs to estimate a hydro resource's longer-term opportunity costs.

However, rather than estimating a specific resource's opportunity costs, the formula with which the CAISO proposes to calculate the maximum import bid price estimates the highest opportunity cost any resource could have in providing energy to import into the CAISO. This is appropriate because, as the CAISO does not have information as to the source of non-resource specific imports, this methodology sets the maximum bid import bid price at the highest potential opportunity cost for a resource in the western interconnection.

The CAISO would calculate a separate maximum import bid price as an hourly price for groups at interties in each geographic area (e.g. a price for the South Western area and a price for North Western area). The maximum import bid price would be calculated as the maximum of an hourly price based on bilateral prices in the vicinity of the CAISO intertie and a price representing long-term opportunity costs. This calculation will also incorporate a 110% multiplier. The CAISO would perform this calculation once each day and use the resulting maximum import bid price in the day-ahead market and real-

¹⁴ See *Local Market Power Mitigation Enhancements 2018 Draft Final Proposal* (Updated): http://www.aiso.com/InitiativeDocuments/DraftFinalProposal-LocalMarketPowerMitigationEnhancements-UpdatedJan31_2019.pdf

time market. The CAISO would perform this calculation separately for on and off-peak periods.

The CAISO proposes to calculate this maximum import bid price for each CAISO intertie for each hour as follows:

$$\text{Maximum import bid price} = \text{MAX (Electric Hub Price, Long-Term Opportunity Cost)} \times 1.1$$

The electric hub price approximates the prevailing bilateral price of electricity as an hourly price. The long-term opportunity cost approximates the highest opportunity cost a resource could have in the western interconnection. The calculation uses the highest of price of the electric hub price component because the component represents the highest opportunity costs an import supplier could receive if it sells in the bilateral market in that hour instead of importing into the CAISO. The calculation uses the highest of price of the long-term opportunity cost component because it represents the highest opportunity cost an import supplier could receive selling energy from a use-limited resource in the future. Because the CAISO does not know the source of imports when an import bid is submitted and because the formula is calculating a maximum import bid price, the formula assumes the resource behind an import is use-limited.

The 1.1 multiplier is to account for potential price differences between the CAISO and bilateral markets.

The following subsections further describe these components of the maximum import bid price calculation.

Electric Hub Price Component

As described above, the electric hub price component of the proposed maximum import bid price equation estimates the current prevailing hourly bilateral electricity price for groups of interties in each geographic area. It does this by converting daily published index prices that are daily values into hourly values. As described further below, the electrical hub price component uses the higher of two prices: (1) the published index price for bilateral electricity transactions, or (2) an electricity price calculated using the current natural gas price.

Both of these prices are daily prices rather than hourly prices. The electric hub price component converts these daily prices into hourly prices. For example, published electrical price indices publish a peak price and an off-peak price for each day for day-ahead bilateral energy transactions. The peak price represents the price for a 15-hour block of energy. However, the CAISO market clears import bids and sets prices hourly

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(in addition to the 15-minute process). These CAISO market hourly prices are roughly comparable to the multi-hour block bilateral price index prices, if the CAISO market prices are converted to a multi-hour block price by averaging the hourly CAISO prices.¹⁵

Similarly, the electric hub price component of the proposed maximum import bid price equation calculates an hourly electric hub price for every hour based on daily prices by adjusting the prices based on the load in each hour. It would increase the hourly maximum import bid price in the hours with higher load and decrease them in hours with lower load. It would do this by multiplying the daily price by the ratio of each hour's load forecast to the average load forecast over the day.

The electric hub price component of the maximum import bid price equation would be calculated hourly as follows:

Electric Hub Price:

$$[1+(\text{CAISO Hourly Load Forecast} - \text{CAISO Load Forecast Average}) / \text{CAISO Load Forecast Average}] \times \text{Price}^*$$

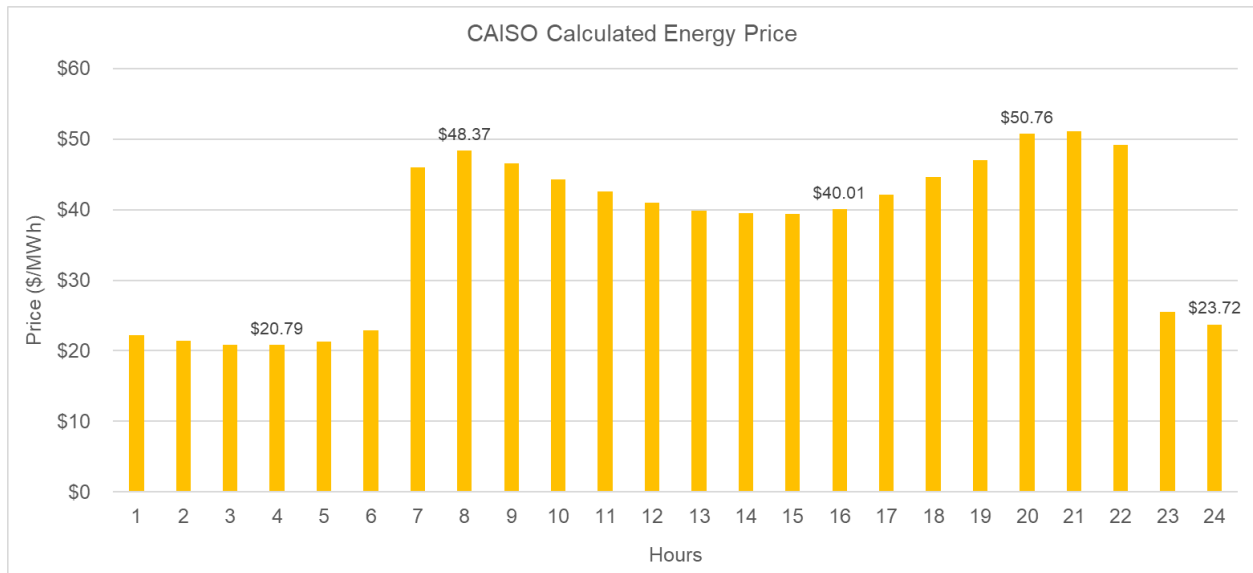
Where, Price is:

$$\text{MAX (Average Gas Price, Electric Hub Price)}$$

The “price shaping” concept is illustrated in **Example A** below.

¹⁵ *Market Surveillance Committee Opinion on System Market Power Mitigation*, Appendix A, page 19: http://www.aiso.com/Documents/MS-CraftOpiniononSystemMarketPowerMitigation-Nov5_2019.pdf

Example A:



Example A illustrates the proposed calculated energy price at Palo Verde for a representative CAISO market spring day. The Palo Verde on-peak price is \$44.50 and off-peak price is \$22.35. These prices are used with the corresponding hours the average prices were projected for. For example, on-peak pricing will be used in hours ending 0700-2200. The CAISO will shape the Palo Verde pricing by the hourly CAISO gross load forecast in these hours relative to the average gross load for these on-peak-hours. This creates a price based on the CAISO’s demand every hour. As illustrated above, Hour Ending 4’s estimated energy price is \$20.79 versus Hour Ending 20’s estimated energy price of \$50.76.

The CAISO proposes to use its gross load forecast rather than its net load forecast. This is appropriate because the gross load forecast is likely more reflective of bilateral prices throughout the west. Markets outside of California do not have as drastic of a “duck curve” compared to California.

Natural Gas Component

In addition to the price component based on electrical price indices, the CAISO proposes a second energy price component of the Electric Hub Price used in the maximum import bid price. This price component would be based on current natural gas prices using a representative generator heat rate.

This price component serves two purposes. First, it serves as a floor price to ensure the electrical hub price is at least the level of the physical cost of producing energy. Secondly, it increases the electric hub price if there is a sudden increase in gas prices that is not reflected in the bilateral hub index price published the prior evening.

The CAISO would calculate the price component each morning to use in the day-ahead and real-time markets based on current natural gas prices on the Intercontinental Exchange (ICE). In its proposed tariff changes filed with FERC resulting from CCDEBE, the CAISO already proposed provisions to update gas prices used to calculate resource's "reasonableness thresholds".¹⁶ The CAISO would use gas index prices published the prior evening for real-time market hours prior to the morning update. Consequently, this would serve to update the energy price component in the event of day to day gas fluctuations not reflected in the electrical price indices published the prior evening.

The CAISO would calculate this gas price component based on current natural gas prices using a representative generator heat rate. The natural gas price used would be the highest gas price for a gas price region defined by the CAISO in the western interconnection. This is representative of the highest cost for gas generation to produce energy for all of the potential sources of imports. It would use the heat rate of a gas turbine as this is representative of the highest cost gas generation.¹⁷

Long-Term Opportunity Costs Component

As described above, import suppliers have the opportunity to sell energy at different intertie locations. Imports are not limited to selling energy at one location because they may have several external transmission rights to different locations. Therefore, it's appropriate to consider the opportunity future revenues an import supplier may receive from different bilateral locations outside of the CAISO markets. Recall, an import supplier must decide whether to sell energy to California with the risk that CAISO's hourly prices may exceed the peak price the import supplier could recover through bilaterally contracts.

The opportunity cost component is calculated as the maximum of the monthly forward electrical price indices of the major bilateral electrical trading hubs in the western interconnection.

Because the CAISO does not know the source of imports, this calculation assumes the source of the import is use-limited and has a 12-month storage horizon. Similar to the approach adopted for the CAISO hydro default energy bid, a 12-month storage horizon is a reasonable estimation of the longest storage horizon a hydro resource could have.

¹⁶ Reasonableness thresholds are the maximum price that a supplier can request a resource specific resources default energy bid can automatically be increased to.

¹⁷ The CAISO proposes to use the latest average heat rate for a gas turbine, representing marginal generation, reported by the Energy Information Agency:
https://www.eia.gov/electricity/annual/html/epa_08_02.html

The calculation is illustrated as follows:

Long-Term Opportunity Cost:

$$MAX(M\ Index+1, \dots, M\ Index+12)$$

110% Multiplier

The CAISO proposes to apply a 110% multiplier to the calculated costs, similar to the calculation of default energy bids. The multiplier is used on the entire calculation to account for a few reasons. First, although the CAISO and bilateral prices are generally price converged, bilateral energy block prices may be lower than the CAISO hourly prices. Similarly, consistent with the design of the hydro default energy bid, a suppliers actual opportunity costs may differ from the monthly price indices and individual suppliers' actual gas prices costs may differ from published indices.

4.1.2 Potential Options for Implementing the Maximum Import Bid Price

As described above, the CAISO has developed two potential options for using the maximum import bid price. These are described below. The CAISO seeks stakeholder feedback on the merits of these two options.

Option 1 - Reject import bids above \$1,000/MWh that are greater than the CAISO - calculated maximum import bid price.

This option would cap import bids to the maximum of \$1,000/MWh or the maximum import bid price. If an import bid is above \$1,000/MWh and the maximum import bid price, the CAISO will reject the import bid. For example, if an import supplier submitted a \$1,200/MWh import bid and the CAISO calculated maximum import bid energy price was \$1,100/MWh, the CAISO would reject the \$1,200/MWh import bid.

The CAISO would reject the bid because it is higher than the maximum import bid price, which should be the maximum "reasonable" bid price. This option assumes that the CAISO does not have the ability to verify import bid costs, even after-the-fact. Consequently, this option rejects an import bid rather than reducing it to the CAISO's calculation of a maximum bid price.

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There would be no requirement for suppliers to submit import bids based on actual or expected costs. This would effectively create a “safe harbor” for import bids accepted by the CAISO that are below the CAISO - calculated maximum import bid price.

This option has the advantage that import suppliers are assured the CAISO market will not accept their bid at a price below their submitted bid price. Alternatively, this option has the disadvantage that the market will lose access to potentially needed supply.

Option 2 - Reduce import bids above \$1,000/MWh to the greater of the CAISO - calculated maximum import bid price or \$1,000/MWh. Provide for after-the-fact cost recovery of the original bid amount.

Under this option, rather than rejecting import bids greater than \$1,000/MWh and the CAISO calculated maximum import bid price, the CAISO would reduce the bid to the greater of the maximum import bid price. The original bid price would be eligible to be recovered through an after-the-fact uplift payment if the CAISO could later verify the import’s actual costs.

For example, if an import bid was submitted at \$1,500/MWh and the CAISO - calculated maximum import bid price was \$1,300/MWh, the CAISO would reduce the bid to \$1,300/MWh for use in the market. The supplier would be eligible for a \$200/MWh uplift payment if the CAISO could verify after-the-fact that the supplier actually had costs of \$1,500/MWh. Alternatively, if the CAISO’s maximum import bid price was \$950/MWh, the CAISO would reduce the bid to \$1,000/MWh for use in the market. The supplier would be eligible for a \$500/MWh uplift payment if the CAISO could verify the costs after-the-fact.

This would be conducted under a similar process that the CAISO has already proposed to FERC for resource-specific resources under its tariff changes submitted to FERC resulting from its CCDEBE initiative. The difference is that the proposed rules for resource-specific resources require suppliers to submit bids based on their expected or actual costs. Those rules calculate a reasonableness threshold, as described earlier, for each resource that is greater than the resources default energy bid. Suppliers may request adjustments to their default energy bid, but only if that request is based on contemporaneously available information that their actual or expected costs exceed the reasonableness threshold. The proposed tariff revisions specify that the CAISO can later audit reference level adjustment requests for resource-specific resources and sanction suppliers if it finds reference level adjustments that are not based on actual or expected costs.

Because of the difficulty in the CAISO estimating non-resource specific resources’ costs and the subjectivity in their calculation, the CAISO proposes no similar requirement under Option 2 that suppliers only submit import bids greater than \$1,000/MWh based

on actual or expected costs. As suppliers pointed out in response to the CAISO's previous import cost-verification straw proposal, this would likely impose unmanageable regulatory risk on suppliers that the CAISO would later disagree with their cost calculations. However, to be eligible for an after-the-fact cost recovery payment, the supplier would have to demonstrate its actual costs.

This option has the advantage that it would encourage import supply relative to Option 1 because import suppliers would know they have the potential to recover their total amount of their original bid after-the-fact, as long as they can demonstrate actual costs. However, this option suffers from the disadvantage that the CAISO may not be able to verify import costs even after-the-fact. As described earlier, imports do not have easily verifiable costs because their resources are not tied to a specific resource. In addition, supplier's costs are often driven by opportunity costs, which are complex and subjective calculations.

The CAISO seeks stakeholder feedback on Option 2. If stakeholders support this option, please provide descriptions and examples of documentation the CAISO could use for after-the-fact cost recovery.

4.2 Market constraint relaxation parameter prices based on verified bids

This section describes two options for setting the market constraint relaxation price parameters. These are also referred to as "penalty prices." They are the prices the CAISO market uses as the cost to relax a constraint when it needs to do so to reach a feasible solution.

All of these prices are scaled relative to the power balance constraint, which requires supply to equal demand. The power balance constraint relaxation penalty price is currently equal to the \$1,000/MWh bid cap. It needs to be at least as much as the bid cap so the market will use all economic supply bids before relaxing the power balance constraint.

Option 1 described below is the same methodology the CAISO proposed in its FERC Order No. 831 compliance filing, which sets all of the constraint relaxation penalty prices relative to the \$2,000/MWh bid cap.

Option 2 described below sets the constraint relaxation penalty prices relative to \$2,000/MWh only when there are cost-justified energy bids greater than \$1,000/MWh in the CAISO market. This option includes a potential variation that sets energy prices at the highest economic bid in the event energy bids are greater than \$1,000/MWh and the market must relax constraints.

The CAISO seeks stakeholder feedback on these two options and the two variations of Option 2.

Option 1 – Penalty parameters set to the hard bid cap.

Option 1 sets the power balance constraint relaxation penalty price equal to the hard energy bid cap, as it is today. Under this option, the power balance constraint relaxation penalty price would be set to \$2,000/MWh, which is the hard bid cap once the CAISO tariff changes to comply with FERC Order No. 831 become effective. All of the other penalty prices the CAISO market uses would be proportionally scaled to \$2,000/MWh.

This option makes the assumption that the price of the hard bid cap is the appropriate scarcity price signal the market should send when there are not enough supply bids to meet demand. When this situation occurs today, the power balance constraint relaxation penalty price is set to the \$1,000/MWh hard energy bid cap. This option considers the bid cap to be \$2,000/MWh and assumes the power balance constraint relaxation penalty price should be the price of the bid cap. It assumes \$1,000/MWh does not represent the bid cap and instead is merely the price above which bids must be cost-verified as a market safeguard to ensure bids that high represent actual costs because of the high price.

Some stakeholders have the differing view that the bid cap effectively remains at \$1,000/MWh under the FERC Order No. 831 changes because the CAISO will only accept energy bids greater than \$1,000/MWh in the unlikely event that actual costs are that high.

Under Option 1, the CAISO market would send strong scarcity price signals. Some stakeholders believe this would be an excessively high price signal if the market constraint penalty prices were scaled relative to a \$2,000/MWh power balance constraint relaxation penalty price. This is of particular concern when market infeasibilities are small or intermittent, not representing actual or meaningful scarcity.

However, a stronger price signal sent by a higher power balance constraint relaxation penalty price has advantages. It would tend to compensate flexible resources that can best respond to dispatch instructions to meet ramping needs. It also increases suppliers' incentive to bid actual costs and increases incentives to deliver supply in real-time.

The scarcity price signals sent by the market, when the market has to relax the power balance constraint because there is not enough supply to meet demand, give suppliers an incentive to bid actual costs because they receive the relaxation penalty price. Even if a supplier thinks its bid might be the marginal bid, it still has incentive to bid its actual costs because, if there is scarcity, the supplier receives the higher relaxation penalty

price. If the supplier did not think its bid would be the marginal bid, the supplier could have incentive to increase its bid price to set a higher market clearing price.

A stronger scarcity price signal also could increase incentives to deliver on day-ahead market supply schedules. The Market Surveillance Committee's (MSC) recent opinion on the CAISO's system-level market power mitigation conceptual design, pointed out that higher scarcity prices would help ensure that importers have actual generation capacity to back day-ahead market import bids. This is of particular concern for resource adequacy import capacity. The MSC states that "some import supply offered to cover resource adequacy obligations is offered at or near the bid cap (\$1,000/MWh). Rather than reflecting an attempt to exercise market power, this import supply could be offered at the price cap to avoid being scheduled in the day ahead market because there might in fact be no supply backing the resource adequacy contract. In addition, because real-time shortage pricing in the CAISO is capped at \$1,000/MWh, an import supplier that bids supply in the day-ahead market at \$1,000/MWh is unlikely to incur material losses if its bid clears in the day-ahead market and the supplier is unable to deliver this power in real-time."¹⁸

Consequently, incentives to deliver day-ahead market supply schedules would be increased under a higher \$2,000/MWh power balance constraint penalty price.

Option 2 – Penalty parameter adjustment based on verified bids.

Option 2 continues to scale the market constraint relaxation penalty prices relative to a \$1,000/MWh power balance constraint relaxation penalty price when there are no bids in the market that have been cost-verified at a price greater than \$1,000/MWh. This option assumes that under the CAISO tariff changes to comply with FERC Order No. 831, the bid cap effectively remains at \$1,000/MWh and only increases in the unlikely event that there are cost-verified energy bids that exceed \$1,000/MWh. Consequently, this option assumes that the scarcity pricing signal sent by the power balance constraint relaxation price should be based on the \$1,000/MWh bid cap under normal market conditions.

Under this option, the CAISO market would utilize two sets of penalty parameters:

1. If there is no cost-verified bid that is greater than \$1,000/MWh, penalty parameters will be scaled relative to a \$1,000/MWh power balance constraint relaxation penalty price.

¹⁸ Market Surveillance Committee Opinion on System Market Power Mitigation
http://www.caiso.com/Documents/MSC-DraftOpiniononSystemMarketPowerMitigation-Nov5_2019.pdf

FERC Order 831 - Import Bidding and Market Parameters
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2. If there is a cost-verified bid greater than \$1,000/MWh, penalty parameters will be scaled relative to a \$2,000/MWh power balance constraint relaxation penalty price.

Under Option 2, the market would only accept virtual bids greater than \$1,000/MWh if the CAISO had cost-verified physical supply bids greater than \$1,000/MWh. Virtual bids are not subject to cost-verification measures under FERC Order 831. Therefore, if allowed to bid above \$1,000/MWh without there being a cost-verified physical supply bid above \$1,000/MWh, these virtual bids would have the potential to consistently set the market constraint penalty parameters at \$2,000/MWh.

There are two different ways Option 2 could be implemented. In the case that there are cost-verified cleared bids greater than \$1,000/MWh and the market must relax the power balance constraint, the market could set prices based on one of two options:

Option 2a – Under Option 2a, the market would set prices using the “price discovery mechanism.” The price discovery mechanism sets market prices using the highest-priced cleared economic bid. The price discovery mechanism is currently used in the CAISO market for the first 12 months following an EIM entity’s balancing authority area integration into the real time market. This mechanism was designed to accommodate temporary pricing anomalies that may arise with the startup and transition of EIM operations.¹⁹

Applying the price discovery mechanism to the CAISO balancing authority area when there are cost-verified bids greater than \$1,000/MWh will ensure that prices are not set at \$2,000/MWh when there are small or intermittent infeasibilities that do not represent actual scarcity conditions.

This option would set penalty prices based on a \$2,000/MWh power balance constraint relaxation penalty price within the market’s scheduling and pricing runs. In the market’s pricing run, the price discovery mechanism would be used to find the last economic bid to set CAISO energy prices rather than use the shadow price of the power balance constraint.

For example, assume the highest-priced cleared bid in the market was \$1,200/MWh and there was a power balance constraint infeasibility. In the scheduling and pricing runs, the penalty prices would be scaled relative to \$2,000/MWh to determine the dispatch. However, the pricing run would set energy prices based on the \$1,200/MWh highest-priced cleared economic bid.

Option 2b – Under Option 2b the market would set prices using penalty prices scaled relative to a \$2,000/MWh power balance constraint relaxation penalty

¹⁹ Energy Imbalance Market Transition Period Draft Final Proposal
http://www.caiso.com/Documents/DraftFinalProposal_EIMTransitionPeriod.pdf

FERC Order 831 - Import Bidding and Market Parameters
Revised Straw Proposal

price. This option assumes the market should send this higher-priced scarcity price signal only when there are cost-verified bids in the market greater than \$1,000/MWh. However, this option also assumes the strong \$2,000/MWh scarcity pricing signal is appropriate when there are verified costs that exceed \$1,000/MWh.

For instance, in the example described above, prices would be set based on the \$2,000/MWh power balance constraint relaxation penalty price.

5 Energy Imbalance Market Governing Body Advisory Role

As described above this initiative considers two topics:

1. Cost-verification of import bids greater than \$1,000/MWh.
2. Methodologies to establish the market constraint relaxation penalty prices.

These two topics would be severable for decisional purposes, because even if potential changes to address one of the topics was not approved, the CAISO would nevertheless file amendments to implement potential changes to address the other topic. The CASIO believes the EIM Governing Body should have an advisory role in the approval of the proposed changes.

The rules that govern decisional classification were amended in March 2019 when the Board adopted changes to the Charter for EIM Governance and the Guidance Document. An initiative proposing to change rules of the real-time market now falls within the primary authority of the EIM Governing Body either if the proposed new rule is EIM-specific in the sense that it applies uniquely or differently in the balancing authority areas of EIM Entities, as opposed to a generally applicable rule, or for proposed market rules that are generally applicable, if “an issue that is specific to the EIM balancing authority areas is the primary driver for the proposed change.”

At this stage of the initiative, it does not appear it would satisfy the first test, because any proposed rules to address the two topics described above would be generally applicable to the entire CAISO market footprint rather than EIM-specific. Moreover, primary driver for addressing these topics is not specific to the EIM balancing authority areas. Although EIM participants asked the CAISO to address the second topic, non-EIM market participants also requested it, and the effects of any change would be expected, at this stage, to be similar in the CAISO balancing authority area and EIM balancing authority areas. Accordingly, this initiative would fall entirely within the advisory role of the EIM Governing Body.

Stakeholders are encouraged to submit a response to the EIM classification of this initiative as described above in their written comments, particularly if they have concerns or questions.

6 Stakeholder engagement

The schedule for stakeholder engagement is provided below. The CAISO will present its proposal to the Energy Imbalance Market Governing Body at their May 6, 2020 meeting and to the Board of Governors' at their May 20-21, 2020 meeting.

| Date | Event |
|------------------|--|
| 11/26/2019 | Publish revised straw proposal |
| 12/5/2019 | Stakeholder conference call on revised straw proposal |
| 12/19/2019 | Stakeholder comments due |
| 2/12/2020 | Publish Draft Final Proposal |
| 2/19/2020 | Stakeholder conference call on draft final proposal |
| 3/4/2020 | Stakeholder comments due |
| Feb – April 2020 | Development of draft Business Rules Specifications and Tariff language |
| April – May 2020 | Publish final proposal |
| May 2020 | Stakeholder comments due |
| May 2020 | Energy Imbalance Market Governing Body & Board of Governors meetings |

Stakeholders should attend the stakeholder conference call on December 5, 2019 and provide written comments to initiativecomments@caiso.com by December 19, 2019.