System Market Power Mitigation

Draft Final Proposal

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1 Executive summary

This draft final proposal describes the CAISO's proposed approach for system-level market power mitigation in the real-time market which would be applied to energy offers for resources within the CAISO balancing authority area.

The CAISO has proposed in this initiative that it will implement system-level market power mitigation only in the real-time as an initial implementation so that it could be in-place by summer 2021. A second phase of this initiative and/or the extended day-ahead market enhancements initiative, will consider the day-ahead market.

The CAISO proposes an automated system-level market power mitigation process that tests based on the results of the real-time market's hour-ahead scheduling process. It will test for the potential for market power based on a residual supply index calculation using three pivotal suppliers (pivotal supplier test).

If the pivotal supplier test fails, indicating the potential for system-level market power, the CAISO proposes to only mitigate offers for resources located within the CAISO balancing authority area. The CAISO's intent in developing this proposal has been to address system-level market power within the CAISO balancing authority area.

The CAISO's intent has been to develop a methodology that will effectively mitigate system-level market power while avoiding adverse unintended effects that may occur if mitigation is triggered when the potential for market power does not actually exist. Consequently, in this draft final proposal the CAISO proposes criteria for triggering the pivotal suppler test that are in addition to the criteria the CAISO previously proposed that the CAISO balancing authority area be in the highest priced region in the energy imbalance market (EIM).

These additional criteria will require that the pivotal supplier test will only be trigged when CAISO energy prices are at least $100/MWh and are also greater than published bilateral electrical price indices. These prices must also be at least as high as the CAISO's proxy cost calculation of a hypothetical gas peaker, based on current gas prices.

Incorporating these elements into the system-level market power mitigation trigger will help limit its application to only when transmission and/or supply limitations exist that may keep CAISO balancing authority area load from having access to supply from the broader western interconnection's competitive bilateral market.

In addition, the CAISO proposes to incorporate these elements into the competitive locational marginal price (LMP) that factors into mitigated offer prices. This will help ensure mitigation does not result in inappropriately low prices.

Finally, the CAISO proposes that the pivotal supplier test used for system-level market power mitigation account for load-serving obligations in calculating suppliers potentially pivotal supply quantities.

2 Stakeholder comments and changes to this proposal

In its previous proposal, the revised straw proposal, the CAISO proposed that the system-level market power mitigation process test for market power in market intervals in which EIM energy transfers into the CAISO balancing authority area are transmission constrained. This would be indicated by the CAISO balancing authority area being in the highest-priced EIM region. Along with this trigger, the CAISO proposed that the system-level market power test would consider the full quantity of import offers submitted in calculating whether there was the potential for market power. The CAISO maintained that this would result in triggering system-level mitigation only when the CAISO balancing authority area did not have access to additional competitively priced energy from the broader western interconnection's bilateral market.

A principle of this initiative is to limit potential system-level market power mitigation to market intervals in which there is a clear potential for market power, recognizing that too frequent an intervention in the market could have adverse side effects by inefficiently reducing prices to administratively determined levels when there is no potential to exercise market power.

The CAISO developed its previous proposal based on stakeholder comments on a prior proposal to trigger the system-level market power test only in intervals in which the CAISO's three major interties are transmission constrained. Some stakeholders maintained that approach might not capture all instances when there could be the potential for system-level market power because there could be instances when there is not enough import energy available for the interties to reach their transmission limits. They also maintained that there also may be instances when there is not enough transmission available outside the CAISO balancing authority area to get enough import energy to the CAISO interties for them to reach their transmission limits.

In response to the previous proposal's approach to test for system-level market power mitigation when EIM energy transfers into the CAISO balancing authority area are transmission constrained, several stakeholders commented that constrained EIM transfers do not necessarily indicate that the CAISO balancing authority area is import constrained. They pointed out that the transmission available for EIM transfers is only a portion of the CAISO's total import capability. They also maintained that the amount of import offers in the CAISO market in a given hour do not necessarily represent all of the import supply that is ultimately available.

Some stakeholders maintained that the CAISO should instead pursue a conduct and impact test so that system-level market power mitigation is only triggered when there is a clear impact to market prices.

In response to these comments, the CAISO continues to propose in this draft final proposal to only test for system-level market power in market intervals in which EIM transfers into the CAISO are transmission constrained, but to also add a minimum price

threshold to trigger the test. This trigger will be based on CAISO prices being greater than prevailing bilateral energy prices outside the CAISO and also being greater than $100/MWh. The CAISO proposes to calculate prevailing bilateral energy prices to use for the trigger based on published electrical price indices for day-ahead transactions at electrical trading hubs outside the CAISO. It also proposes to adjust this price upward if the CAISO's proxy calculation of the costs of a hypothetical gas peaker are higher, based on gas prices in the morning of the real-time market.

Several stakeholders commented that the EIM prices that the CAISO proposed to use in part to calculate the competitive LMP, which it would use as a mitigated price floor, do not necessarily reflect prevailing prices in the broader western interconnection's bilateral market. To address this concern, the CAISO has revised its proposed competitive LMP calculation. In this draft final proposal, the CAISO proposes to calculate the competitive LMP as the greater of (1) the minimum price threshold to trigger the system-level market power test described above, or (2) the next highest balancing authority area marginal energy cost in the EIM. This will prevent system-level market power mitigation from reducing CAISO prices below prevailing bilateral prices outside the CAISO and will prevent "flow reversal" in the EIM resulting from mitigation.

The CAISO believes this approach will appropriately limit potential system-level mitigation to market intervals in which the CAISO balancing authority area no longer has access to competitively priced energy from the broader western interconnection because it is effectively import constrained. The import constraints could be either transmission constraints or limited import supply.

Some stakeholders contend that the pivotal supplier test should incorporate additional supply offer quantities in calculating the supply controlled by potentially pivotal suppliers. They believe that the pivotal supplier test should also incorporate both their quantity of import offers and the amount of supply they control in any adjoining balancing authority areas that are grouped in a constrained region with the CAISO.

The CAISO continues to believe that the pivotal supplier test should not consider these additional supply offer quantities as potentially pivotal supply. As explained later in this paper, import suppliers must compete for limited intertie transmission capacity which provides an incentive to not inflate import offers. EIM participating resources are likely contracted to serve demand in the balancing authority area outside the CAISO and the CAISO has no means to identify the amount of their supply contracted. In addition, including either of these amounts could incent suppliers to limit their offer quantities to avoid being considered a pivotal supplier and being subject to offer mitigation.

Some stakeholders were concerned about calculating the competitive using the next highest balancing authority area's marginal energy cost in the EIM. They observe that there is the possibility that this price might reflect market power because balancing authority areas other than the CAISO in the EIM are only subject to market power mitigation at the balancing authority area level if their marginal energy cost is greater

than the CAISO's.[1]The CAISO understands that this may be a valid concern when the addition of net supply offers from the second-highest priced group of balancing authority areas does not provide enough additional non-pivotal supply to meet demand. However, the CAISO believes it is reasonable to assume that the additional non-pivotal supply is sufficient until it can resolve this concern with holistic EIM market power mitigation design changes to be considered in the extended day-ahead market initiative.

Some stakeholders reiterated their concern that the system-level market power mitigation process would not mitigate resource adequacy import offers. The CAISO continues to propose to treat resource adequacy imports sourced from outside the CAISO balancing authority area the same as any other import sourced from outside the CAISO balancing authority area. Imports are sourced from a presumably competitive bilateral market in the western interconnection and must compete to clear on limited intertie capacity into the CAISO markets.

Finally, in this draft final proposal the CAISO modifies the proposed approach to determine the quantity of import offers the pivotal supplier test considers. It limits these quantities based on intertie scheduling limits.

Stakeholders requested additional information on the frequency that the proposed system-level market power test would be triggered and the frequency with which it would result in mitigation. The CAISO is developing a methodology to estimate this, and if an estimate is feasible, plans to provide this information prior to publishing its final proposal as part of this initiative, which it will publish prior to seeking approval for tariff changes from the CAISO Board of Governors.

[1] The CAISO balancing authority area was assumed to be competitive at a system level when this design was developed.

3 Issue

The CAISO's current approach to measures to address system-level market power in the CAISO balancing authority area is based on past assumptions that the CAISO market is competitive at the balancing authority area (*i.e.*, "system") level. Because of this, the only mitigation for system-level market power in the CAISO balancing authority area are its energy bid caps. The CAISO market does not dynamically test for or otherwise mitigate for system-level market power in the CAISO balancing authority area. Also because of this assumption, the market power processes used for both the CAISO balancing authority area as well as the other balancing authority areas in the EIM use a "competitive LMP" calculated based on the prices within the CAISO balancing authority area.

In recent analyses, the CAISO and the Department of Market Monitoring found that conditions in the CAISO balancing authority area were potentially uncompetitive during certain times, and the Department of Market Monitoring believes that these conditions have been worsening over the past three years. The CAISO found that there were 201 hours (just over 2 percent of the hours) in 2018 in which its supply mix was potentially uncompetitive.[2] The Department of Market Monitoring completed a similar analysis, finding the supply mix was potentially uncompetitive in 272 hours in 2018.[3] This metric prepared by the Department of Market Monitoring shows that competitive conditions have worsened over the past three years, with only a recent uptick in competitiveness in 2019.[4]

Both the CAISO's and the Department of Market Monitoring's metrics are broad structural indicators that do not directly measure if suppliers actually possess substantial system-level market power in the CAISO's energy markets. In its recent opinion on system market power, the Market Surveillance Committee noted from their review of these analyses that pivotal supplier tests indicate that there might have been some limited potential for market power at the system level. However, according to analyses of prices and costs that have been carried out to date, this market power has not been exploited very frequently or aggressively.[5]

Nonetheless, the CAISO is concerned that market conditions in the coming years may change in ways that will exacerbate the potential for system-level market power. Changes and trends that may increase the potential for system-level market power in the coming years include:

- Retirement and mothballing of gas capacity in the CAISO balancing authority area.

[2] "Analysis of Structural System-Level Competitiveness in the CAISO Balancing Authority Area, Revised Version," September 3, 2019, http://www.caiso.com/Documents/RevisedWhitePaper-SystemMarketPowerAnalysis.pdf
[3] The Department of Market Monitoring summarized its findings in a June 7, 2019 presentation to the Market Surveillance Committee. http://www.caiso.com/Documents/Presentation-AnalysisOfSystemLevelMarketPowerDMM-June7_2019.pdf
[4] See Department of Market Monitoring, "2019 Third Quarter Report on Market Issues and Performance," Section 3.5.2, published on December 5, 2019.
[5] Market Surveillance Committee, "Opinion on System Market Power Mitigation," Section II, November 5, 2019. http://www.caiso.com/Documents/MSC-DraftOpinionSystemMarketPowerMitigation-Nov5_2019.pdf

- Fewer energy tolling contracts between gas units within the CAISO and load serving entities without an incentive to exercise market power.

- Tightening west-wide supply conditions.

In this initiative, the CAISO intends to design a system-level market power mitigation process that aligns with its principles discussed in ***Section 4***. Following these principles, the CAISO can develop a market power mitigation process that will capture instances where suppliers may exercise material market power at a system-level regardless of if the conditions above materialize.

4 Principles

Effective market power mitigation should result in energy prices that approximate the prices that would occur in a competitive market (*i.e.*, prices should reflect the marginal cost of the highest cost unit dispatched). Any approach should consider whether suppliers have the opportunity to exercise market power (*i.e.*, when conditions are uncompetitive) because mitigation during actual competitive conditions may discourage supply and demand participation in the market. For example, suppliers may seek competitive sales elsewhere in the western interconnection rather than risk under-compensation through the CAISO's market. As for the demand side, potential mitigation of suppliers during actual competitive conditions may discourage demand from participating in the market and engaging in forward contracting.

The CAISO continues to believe that system market power is best addressed through long-term contracting, which includes the long-term procurement framework and resource adequacy requirements developed by the CPUC and other local regulatory authorities. These are an essential component of the protections against market power in the overall market design.[6] The CAISO's "damage control" bid caps also continue to be a component of the CAISO's system market power mitigation and take into consideration the overall competitiveness of energy markets.[7] FERC agreed the CAISO's overall market design was just and reasonable and noted that "if the CAISO believes the mitigation package along with strong market behavior rules and the must-offer obligation for resource adequacy generation is insufficient to prevent the exercise of market power, the CAISO can immediately request a change of one or more of the market power mitigation measures."[8]

Consequently, in this initiative the CAISO has proposed to use the following measures to address system market power:

- Energy prices should reflect the marginal cost of the highest cost resource used to meet demand. Energy prices should be competitive across the region when energy transactions are not limited by transmission capability.

- A supplier should not be forced to sell power below its offer price if it cannot exert market power. Supply offers should be mitigated to marginal costs to the extent supply has market power.

[6] MRT Transmittal Letter, FERC Docket No. ER06-615, at p. 40, http://www.caiso.com/Documents/MRTUTransmittalLetter.pdf (February 9, 2006).
[7] Although the FERC increased the "damage control" caps in Order No. 831, the increase is subject to cost verified incremental bids for internal resources, which provides a reasonable measure for ensuring system prices do not exceed the marginal cost of the highest cost unit dispatched. These protections are not present with regards to the CAISO market at the interties, where participants will be able to submit economic bids that exceed $1000/MWh up to $2000/MWh without cost verification. Therefore, the CAISO is considering cost verification procedures for intertie bids in a separate initiative.
[8] MRTU September 21, 2006 Order, Docket ER06-615, at P 1020 (116 FERC ¶ 61,274) (available at: http://www.caiso.com/Documents/September21_2006FERCOrderAcceptingCaliforniaISOComplianceFilinginDocketNo_ER02-1656-024_Amendment44-MRTU_.pdf)

- The mitigation design should not deter robust market participation and long-term forward contracting. The design should maintain strong incentives for suppliers and consumers to economically participate in the CAISO's market and to enter into long-term forward energy contracts.

- Mitigation should be effective at mitigating the exercise of market power. A supplier should not be able to easily circumvent the effects of the mitigation.

5 Scope

The CAISO plans to implement system-level market power mitigation in two phases. The CAISO plans to implement a first phase expeditiously so system-level market power mitigation measures are in place by summer 2021. A second phase will allow time to address more complex and/or contentious policy issues and more extensive system development.

The CAISO outlines below the scope of the phase 1 implementation. The approach for each scope item is based on the principles described in ***Section 4***.

5.1 Implement in real-time market

The phase 1 scope addresses system-level mitigation in the real-time market. There are structural limitations that make the real-time market particularly susceptible to suppliers potentially exercising market power and, as such, any design the CAISO would pursue would at a minimum apply to its real-time market. The CAISO also believes there are many different requirements to consider regarding implementing system-level market power in the day-ahead market that may take longer to resolve than the phase 1 policy development timeline.

The Market Surveillance Committee highlighted some concerns that may arise if the CAISO were to only apply system-level market power mitigation to the real-time market. The CAISO believes that real-time market power mitigation will add a significant level of protection against the exercise of market power in the day-ahead market until it can develop day-ahead market system-level market power mitigation in phase 2 of this initiative.

5.2 Pivotal supplier test trigger

The phase 1 scope includes determining the circumstances in which the market power mitigation process will consider the CAISO balancing authority area to be import constrained or whether import constraints must be binding to apply mitigation. Within the phase 1 scope, the CAISO has also considered the view of some stakeholders that the CAISO balancing authority area does not need to be import constrained to apply system-level market power mitigation.

5.3 Pivotal supplier test application

The phase 1 scope considers the appropriate quantities of supply included in calculating the residual supply index used for system-level market power mitigation measures. In general, supply offers have certain limitations (such as whether import offers are limited by intertie transmission constraints) that must be considered in mitigation design. The phase 1 scope also includes considering whether a supplier's load serving obligations should be subtracted from its supply quantity in calculating its supply quantity used in the residual supply index calculation. This may be appropriate to more accurately

identify suppliers that have an incentive to economically withhold supply from the market.

5.4 Energy offer mitigation

The phase 1 scope also includes considering whether system-level market power mitigation applies to energy offers for resources within the CAISO balancing authority area. The phase 1 scope also includes examining if there may be circumstances in which mitigation applies to other resource offers within the EIM footprint.

6 Background

6.1 Competitiveness, market power, and market power mitigation

The CAISO operates a competitive energy market where energy is priced based on marginal cost. Market power is the ability of a supplier to artificially raise market clearing prices above marginal cost by physically or economically withholding supply from the market. Suppliers that exercise market power undermine efficient market operations and efficient energy price formation. The CAISO market includes features to automatically detect structurally uncompetitive conditions and mitigate submitted energy offers to estimated cost-based levels.

Suppliers have the potential to exercise market power when overall market conditions are uncompetitive. The CAISO measures competitiveness in its energy market by assessing whether supply that is not controlled by the largest three suppliers can serve demand.

In LMP-based markets, it is imperative that market operators have the ability to mitigate the potential exercise of market power in transmission-constrained areas when that area is found to be uncompetitive. Otherwise, suppliers located in such areas could be in a position to artificially raise prices above marginal costs due to the lack of competitive alternatives.

The CAISO markets employ a dynamic local market power mitigation process that identifies local areas, identifies when the local area is not competitive, and mitigates local suppliers' offers to the greater of a pre-established estimate of marginal costs or the broader system competitive energy price.

The dynamic local market power mitigation process tests transmission constraints for competitiveness by comparing the demand for counter-flow to a constraint to the available supply of counter-flow. The test employs a "residual supply index," which is the ratio of the supply of counter-flow to the demand for counter-flow. The test assumes some portion of the supply for counter-flow from potentially pivotal suppliers is withheld. A transmission constraint is deemed competitive if the ratio of non-pivotal supply to demand is greater than or equal to one and uncompetitive if less than one. Currently, the test treats the three highest ranked suppliers, in terms of capacity that can be withheld, as potentially pivotal.

The same dynamic local market power mitigation process also assesses individual transmission constraints within balancing authority areas participating in the Western EIM.

In addition to the dynamic local market power mitigation process, each balancing authority area participating in the EIM is also subject to a system-level market power mitigation process.[9] This mitigation process tests whether demand within the balancing authority area has access to competitive external supply by first finding whether the balancing authority area is import constrained. If the balancing authority area is import constrained, the mitigation process tests whether the internal supply mix is competitive using the residual supply index. If the area is found uncompetitive, the market uses mitigated supply offers inside that area. The CAISO uses mitigated supply offers because suppliers in the constrained area could potentially exercise market power on demand within the constrained area.

Generally, the CAISO mitigates supply offers to the greater of what it calls "default energy bids" or the competitive LMP. Default energy bids are the CAISO's estimate of resource marginal costs. The competitive LMP is the energy price outside of the constrained area.

6.2 The broader western bilateral market

The CAISO operates the only LMP-based energy market in the western interconnection. Suppliers in the western interconnection that are not participating in the Western EIM may offer their power to the CAISO at its intertie locations or to other buyers through the bilateral market.

One way buyers and sellers engage in bilateral transactions is by bidding for and offering power at various western energy trading hubs. Trading hubs are pricing locations where buyers and seller transact energy. ***Figure 1*** shows the relationship between various western energy trading hubs and the CAISO.

[9] The balancing area-wide mitigation process is applied to all balancing areas other than the CAISO.

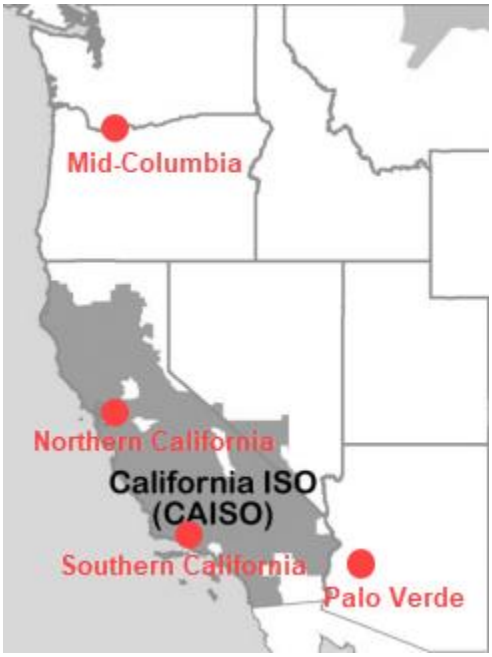

Figure 1: The relationship between various western energy trading hubs and the CAISO

Suppliers that offer their power to the CAISO at its intertie locations must procure external transmission rights in order to deliver power to the CAISO.[10] Transmission rights are generally available to all market participants and the quantity of these rights generally exceed the CAISO's locational import capability.[11] Under open access requirements, all market participants have access to external transmission rights because, even if participants have not procured long-term rights, transmission owners must release unused transmission capacity by the time the CAISO executes its real-time market.

While the CAISO operates an energy market with varying hourly prices, the broader western energy market generally transacts energy blocks of peak and off-peak power. There is one energy price for all hours within the block. Suppliers that offer their power in the broader western interconnected system presumably compare the CAISO's expected average LMP during the peak or off-peak period to the expected peak or off-peak western trading hub energy prices.

[10] *See e.g.*, Section 30.5.7 of the CAISO tariff and its subsections, specifying transmission profile E-tagging requirements for different types of intertie bids.
[11] Public data show that there are numerous holders of firm transmission rights to the major interties with California. For instance, nineteen different entities hold transmission rights on the Pacific AC and Pacific DC transmission facilities that connect the Pacific Northwest with California, with thirteen different entities holding more than 100 MW of rights and five different entities holding more than 500 MW of rights. The total firm capacity to deliver external supply to these two locations alone is 7,900 MW – in excess of the approximate 4,800 MW that these locations are generally limited to in the CAISO's markets.

When examining 29 high-priced hours[12] in 2018, the Market Surveillance Committee found that the day-ahead prices at the external trading hubs were generally in line with or above day-ahead market prices at the corresponding CAISO interties, Malin and Palo Verde.[13] ***Table 1*** shows the CAISO LMPs for PG&E, SCE, and SDG&E averaged over the on-peak period compared to the bilateral trading hub on-peak prices on those same days.

Table 1: CAISO and Bilateral On-Peak 16-Hour Prices

	Average	Number	LAP Prices			CAISO Intertie Prices			Platts MW Daily		
	Markup	RSI Fail	PG&E	SCE	SDGE	Malin	NOB	Palo Verde	MID C	Palo Verde	COB
21-Feb	4.62	0	48.77	151.78	201.43	47.91	44.83	66.05	38.11	49	48.33
23-Jul	11.94	9	135.09	168.57	176.79	126.31	160.37	155.40	196.23	261.50	222.50
24-Jul	14.32	10	278.65	392.97	396.95	264.85	355.01	357.93	219.37	348.75	294.50
25-Jul	8.12	10	243.06	315.98	379.96	191.75	292.53	291.17	216.54	260.00	251.00
26-Jul	12.22	9	140.99	176.48	188.07	127.50	161.94	161.13	195.57	225.25	228.00
27-Jul	3.90	7	108.65	131.87	143.82	90.21	118.71	117.82	87.24	99.25	95.00
28-Jul	3.09	3	66.56	72.78	74.76	61.97	70.63	67.70	87.24	99.25	95.00
7-Aug	0.37	5	139.33	291.90	292.39	142.58	254.86	266.70	300.00	377.50	310.22
8-Aug	4.19	5	112.64	173.47	176.81	111.45	146.41	156.76	147.66	175.00	148.50
10-Aug	4.16	0	94.79	135.77	149.78	84.53	77.60	61.22	53.41	94.66	65.00

Source: http://www.caiso.com/Documents/MSC-DraftOpinionon SystemMarketPowerMitigation-Nov5_2019.pdf

6.3 General market power mitigation design elements

The objective of market power mitigation is to provide effective measures against the exercise of market power. Historically, the CAISO has relied on long-term contracting between supply and demand to address system-wide market power and the existing "damage control" bid caps work to limit the pricing exposure should any market participant exercise such market power. Also, the CAISO has not applied a system-level market power mitigation process to its market because it generally has access to large amounts of presumably competitive west-wide power through economic offers at its interties.

To this end, the CAISO carefully considers the question of whether or not suppliers have the opportunity to exercise market power (*i.e.,* when conditions are uncompetitive) because mitigation during actual competitive conditions may discourage supply and demand participation in the market. The CAISO understands that potential mitigation of suppliers during actual competitive conditions may discourage suppliers from participating in the CAISO's markets altogether as they seek competitive sales elsewhere in the western interconnection rather than risk under-compensation through the CAISO's market. As for the demand side, potential mitigation of bids during actual

[12] The 29 hours over 10 days in 2018 are representative of: (1) the hours in which one or more of the SCE, SDG&E or PG&E load aggregation point (LAP) prices exceeded $500/MWh and (2) the hours during 2018 in which the California ISO Department of Market Monitoring found a difference of $20/MWh or more between (i) a simulated integrated forward market (IFM) clearing price calculated using the actual offer prices used to clear the IFM and (ii) a simulated IFM clearing price calculated using the lower of the actual offer price or the default energy bid for each gas-fired resource that was committed in the actual IFM solution.
[13] See Market Surveillance Committee, "Opinion on System Market Power Mitigation," Appendix A, Table 4, published on November 5, 2019. http://www.caiso.com/Documents/MSC-DraftOpinionon SystemMarketPowerMitigation-Nov5_2019.pdf

competitive conditions may discourage demand from participating in the market through price-sensitive bids and engaging in forward energy contracting.

Effective market power mitigation should result in energy prices that approximate the prices that would result in a competitive market (*i.e.*, prices should reflect the marginal cost of the highest cost unit dispatched). Without a market power mitigation process in place, suppliers within constrained areas could exercise market power on demand within constrained areas when conditions within the constrained areas are uncompetitive. This condition would lead to energy prices that are above the prices that would result from a competitive market. To achieve an effective market power mitigation design that does not discourage supply and demand participation, the CAISO's market power mitigation measures include an evaluation of the competitiveness of the supply within the constrained area before mitigating supply offers within the constrained area.

The CAISO's current market power mitigation design reflects these principles by following a three-step process where the CAISO market:

(1) Identifies a constrained area (or constraint)

(2) Tests the supplier concentration in the constrained area

(3) Mitigates offers within the constrained area when the supplier concentration test fails

For example, consider an afternoon in southern California when system conditions are stressed. Transmission lines into southern California from the North and the East are limiting the ability of demand within southern California to access additional competitive supply outside of southern California. In ***Figure 2***, the box represents the constrained southern California area. The black circles represent supply within southern California (circle A) as well as supply outside of southern California (circles B and C).[14] Energy prices within southern California are $300 while prices outside southern California are $50 due to the binding constraints into southern California (represented by the red arrows).

[14] This example is a simplification of the actual local market power mitigation process, which identifies specific constraints and evaluates the ability of resources to provide relief on the specific constraints. Under the actual local market power mitigation process, constrained areas are implicitly defined by the ability of a subset of generators to provide relief on specific constraints. Nonetheless, it remains that a constrained area is identified, competitiveness is tested, and resources within the constrained area may be mitigated.

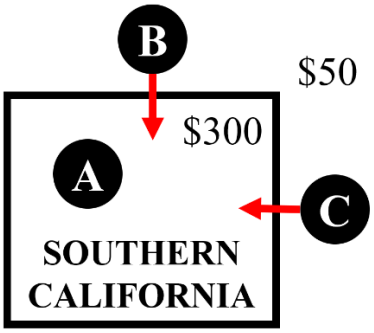

Figure 2: A constrained southern California on a stressed afternoon

The CAISO does not mitigate offers in southern California unless it first finds that the constrained area is potentially uncompetitive. Supplier A may be able to exercise market power in southern California if the supply mix inside southern California is found to be uncompetitive. The CAISO tests competitiveness using a residual supply index that tests whether demand within the constrained southern California can be served without the largest three suppliers in the constrained southern California. The CAISO mitigates supplier offers within southern California only when this test fails.

The CAISO does not mitigate offers from suppliers B and C because neither supplier B nor supplier C could exercise market power on demand within southern California. Both supplier B and supplier C are located in an unconstrained competitive area. If supplier B or supplier C would try to exercise market power by raising their offer prices above their marginal costs, they would risk losing the sale to another supplier in the unconstrained competitive area. Supplier A, on the other hand, may be able to exercise market power by raising its offer prices above its marginal costs, because demand in southern California cannot access cheaper sources of power due to the transmission constraints.

The CAISO applies the same design pattern to EIM balancing authority areas at a local level (*i.e.*, on specific transmission constraints within the balancing authority area) as well as at an EIM balancing authority area system-level.[15] The CAISO balancing authority area is the only participating EIM balancing authority area to which the CAISO does not apply a system-level market power mitigation process.

[15] *See California Indep. Sys. Operator Corp.*, 148 FERC ¶ 61,222 (2014) (available at: http://www.caiso.com/Documents/Sep22_2014_Order_EIMEnhancements_ER14-2484.pdf)

7 Proposal

This section outlines the CAISO's proposed approach to implement an automated system-level market power mitigation process in the real-time market. The CAISO proposes that the system-level market power mitigation process only mitigates offers for resources located within the CAISO balancing authority area. This initiatives intent is to address system-level market power within the CAISO's balancing authority area.

The CAISO proposes to only trigger the system-level market power mitigation process when there are clear indications market power potentially exists. Consequently the CAISO proposes that the system-level market power test will only be triggered when the CAISO balancing authority area is in the highest priced EIM region and additional criteria are met. These additional criteria will require that CAISO energy prices must be at least $100/MWh and are also greater than published bilateral electrical price indices. These prices must also be at least as high as a CAISO proxy cost calculation to approximate the costs of a gas peaker based on current gas prices.

In addition, the CAISO proposes to incorporate these elements into the competitive LMP that factors into mitigated offer prices.

The CAISO proposes that the system-level market power test will be based on a system-level residual supply index calculation using three pivotal suppliers, also termed a "pivotal supplier test." The pivotal supplier test will assess whether energy supply offers from non-pivotal suppliers[16] in the constrained region the CAISO is in are sufficient to meet the region's demand without three pivotal suppliers (*i.e.*, suppliers whose energy is required to meet demand) that potentially could exert market power.

The CAISO does not propose any changes to the market power mitigation processes for EIM balancing authority areas. The EIM already effectively applies a system-level market power mitigation process for balancing authority areas outside the CAISO because for them it mitigates energy offers for potential market power at the balancing authority area level.[17] It does not currently do this for the CAISO balancing authority area.

The CAISO proposes to enhance the pivotal supplier test used for system-level market power mitigation relative to that used for existing local market power and EIM mitigation processes. This enhancement will increase the pivotal supplier test's accuracy by reducing net-seller potentially pivotal supply quantities to account for load-serving obligations, rather than relying on a static net-seller designation that assumes all of the net-seller's supply is potentially pivotal.

[16] In its determination of whether or not a constraint is competitive, the CAISO considers suppliers to be "non-pivotal" as those suppliers internal to the constraint that is not controlled by the identified potentially pivotal suppliers that provide counter-flow to the transmission constraint. *See* existing section 39.7.2.2 (B)(b). The CAISO proposes to apply the same principles in identifying the whether a resource is fringe as it does today.
[17] *See California Indep. Sys. Operator Corp.*, 148 FERC ¶ 61,222 (2014) (available at: http://www.caiso.com/Documents/Sep22_2014_Order_EIMEnhancements_ER14-2484.pdf)

Relative to the CAISO's existing mitigation processes, this proposal improves the precision of offer mitigation by only mitigating resource offers from suppliers whose supply is pivotal to meeting demand. The CAISO is proposing this because non-pivotal suppliers do not have an incentive to economically withhold supply from the market. This improvement is important for a system-level market power mitigation process because otherwise the process would mitigate offers from a larger segment of suppliers with no ability to exercise market power.

Finally, the proposed approach counts economic import offers at the CAISO's import scheduling locations as non-pivotal supply using a quantity that considers that the various import scheduling limits may prevent all import offers from clearing the market, rather than assuming all un-cleared import supply in the market power mitigation pass is not available.

The CAISO discusses each element of this proposal in the following sections:

- ***Section 7.1*** discusses the CAISO's proposal to only apply system-level market power mitigation to the real-time market in this initial phase of developing an automated system-level market power mitigation process in the CAISO market.

- ***Section 7.2*** discusses the CAISO's proposal to only perform a three pivotal supplier test when certain price impact screens are met and the CAISO balancing authority area price separates from other balancing authority areas into the highest priced region in the EIM.

- ***Section 7.3*** discusses the CAISO's proposal to use a three pivotal supplier test to determine if pivotal suppliers in the CAISO balancing authority area could potentially exercise market power in the constrained region.

- ***Section 7.4*** discusses the CAISO's proposal to calculate the competitive LMP when the CAISO balancing authority area fails the system-level market power mitigation test.

- ***Section 7.5*** discusses the CAISO's proposal to only mitigate energy bids for supply resources with pivotal supply offers within the CAISO balancing authority area when the pivotal supplier test fails.

Appendix A: System-Level Market Power Mitigation High-Level Business Requirements (Preliminary) provides a preliminary draft of the high-level business requirements that summarizes this proposal and a summary of the steps of the system-level market power mitigation process.

The mathematical formulation for implementing system-level market power mitigation is included in Appendix B: Draft Technical Description.

7.1 Implement system market power mitigation in the real-time market only

The CAISO proposes to apply the system-level market power mitigation process to only its real-time market in this initial phase of developing and implementing system-level market power mitigation.

In developing this proposal, the CAISO ultimately decided not to, at least initially, implement system-level market power mitigation processes in its day-ahead market in addition to the real-time market. The CAISO currently plans to work with stakeholders to consider whether it would be appropriate to extend system-level market power mitigation to the day-ahead market in subsequent stakeholder initiatives. The CAISO is pursuing a phased approach, aiming to mitigate the potential to exercise system-level market power while avoiding unnecessary offer mitigation that would discourage supply and demand participation in the CAISO markets. If the interaction between the day-ahead and real-time markets is efficient, it should reduce the need to apply a system-wide market power mitigation to the day-ahead market.

By concentrating on system-level market power mitigation in the real-time market in this initiative, the CAISO and stakeholders will have more time and experience to consider system-level market power mitigation in the day-ahead market. Also, by implementing system-level market power mitigation in the real-time market first, the CAISO will be able to monitor system-level mitigation performance for adverse effects. Finally, applying system-level market power mitigation in the real-time market only, will allow the CAISO to implement system-level mitigation in-place sooner than could be accomplished if it were also implemented in the day-ahead market.

The real-time market is the priority because it is likely more susceptible to market power than the day-ahead market for two reasons. First, the real-time market clears supply against the CAISO's demand forecast, rather than clearing against demand bids like the day-ahead market does. Because load serving entities do not bid the price they are willing to pay for energy in the real-time market, a supplier in an uncompetitive area may exercise market power and increase prices irrespective of the price load serving entities are willing to pay. Second, the real-time market lacks a mechanism for virtual supply to apply competitive pricing pressure on physical suppliers. Without competitive pressures from virtual supply, suppliers may increase the market prices above marginal costs without risking losing the sale of its energy because they submitted a bid price above marginal costs.

Although the real-time market is more vulnerable to the exercise of market power, the CAISO recognizes that there could be drawbacks to its initial real-time-only approach. In a recent opinion, the CAISO's Market Surveillance Committee highlighted some risks to a real-time-only approach. The application of system-level market power mitigation in the real-time market only, may allow some level of market power to be exercised in the day-ahead market when real-time supply elasticities diverge from day-ahead supply elasticity. However, the Market Surveillance Committee supported the approach to

implement system-level market power mitigation initially in the real-time market only because it would address market power in the real-time market while somewhat constraining (although not completely precluding) the market power in the day-ahead market and the CAISO could implement it quickly without delaying other projects.[18]

[18] See Market Surveillance Committee, "Opinion on System Market Power Mitigation," Appendix B, published November 5, 2019. http://www.caiso.com/Documents/MSC-DraftOpinionon SystemMarketPowerMitigation-Nov5_2019.pdf

7.2 Pivotal supplier test trigger

The CAISO proposes that the hour-ahead scheduling process will execute a system-level pivotal supplier test in each fifteen-minute interval when the CAISO balancing authority area marginal energy cost is greater than other EIM energy prices and greater than prevailing bilateral prices, as indicated by published bilateral electrical price indices. This helps ensure that the system-level market power mitigation process only intervenes in the market when broader conditions indicate that the CAISO balancing authority area could be uncompetitive. CAISO balancing authority area prices that are high and above bilateral prices outside of the CAISO likely mean the CAISO balancing authority area is effectively import constrained and cannot access competitively priced supply from the broader western interconnection's bilateral market. There is the potential for system-level market power in the CAISO balancing authority area under this condition.

The CAISO proposes that, additionally, prices must be greater than $100/MWh and greater than the CAISO's proxy price calculation of a hypothetical gas peaker based on current gas prices. This adds additional assurance that potential market power exists before triggering the system-level market power mitigation process. It also updates the threshold price for triggering the process if gas costs, and consequently electrical prices, increase between the time day-ahead priced indices are published and the day of the real-time market.

Perform the system-level three pivotal supplier test in the hour-ahead scheduling process

In developing this proposal, the CAISO considered whether it should perform system-level three-pivotal supplier test in the fifteen-minute and five-minute markets in addition to the hour-ahead scheduling process. The CAISO proposes to only perform the pivotal supplier test in the hour-ahead scheduling process because this process fully accounts for the competitive pressure that hourly block import supply places on internal suppliers. Suppliers cannot change their offering behavior in response to the hour-ahead scheduling results, and aggregate system conditions are not anticipated to dramatically change between the hour-ahead scheduling process and the fifteen-minute and five-minute markets. Consequently, the pivotal supplier test should consider all of the supply offers submitted for an hour, which are the offers used by the hour-ahead scheduling process.

At a system-level, the hour-ahead scheduling process fully accounts for the competitive pressure that hourly block import supply places on internal suppliers, while subsequent markets would undervalue this competitive pressure. The hour-ahead scheduling process compares hourly block import offers to the internal supply offers to clear the most economic supply to meet demand. When the supply available in the hour-ahead scheduling process passes the system market power mitigation test, it shows that there was a structurally competitive supply mix offered into the market in that hour. After the

hour-ahead scheduling process is complete, the market then converts the cleared hourly block imports to self-scheduled supply in the fifteen-minute and five-minute market and the market does not make the remaining hourly block import offers available to subsequent sub-hourly markets. Similarly, the market does not make un-cleared fifteen-minute dispatchable offers available to the five-minute market. Subsequent sub-hourly markets see a much lower quantity of available non-pivotal supply that actually competed with internal supply. If the mitigation test were to only evaluate the cleared import supply in the fifteen-minute market, it would undervalue the competitive pressure that hourly block import supply places on internal suppliers.

Suppliers cannot change their offers in the real-time market after they submit their offers to the hour-ahead scheduling process. This means that suppliers cannot strategically use offers to exercise market power in subsequent sub-hourly markets. If the pivotal supplier test fails in the hour-ahead scheduling process for a fifteen-minute interval, considering competitive pressure from hourly block import supply, then a failure of a pivotal supplier test in the fifteen- and five-minute markets is likely due to either an undercount of non-pivotal import supply or a dramatically different system condition than anticipated, both of which cannot be attributed to strategic bidding within the hour.

Finally, system conditions will not typically change significantly between the hour-ahead scheduling process and the fifteen-minute market to warrant an assumption in the fifteen-minute market that there was not previously enough competitive pressure from hourly block import supply in the hour-ahead scheduling process to overcome these differences. This is in contrast to the significant changes that can occur between the day-ahead and real-time markets.

Although the CAISO proposes to only trigger the pivotal supplier test in the hour-ahead scheduling process, the system market power mitigation process will use the mitigated energy offers in each fifteen-minute market interval that failed the pivotal supplier test. The five-minute real-time dispatch will also use the mitigated offers in the corresponding five-minute market intervals. The CAISO trigger will be based on the binding fifteen-minute intervals of the hour-ahead scheduling process (i.e. the intervals for which the hour-ahead scheduling process produces import and export schedules.)

Price criteria to trigger system-level pivotal supplier test

The CAISO proposes that the system-level market power mitigation process only triggers the pivotal supplier test in the hour ahead scheduling process fifteen-minute intervals that meet all of the following criteria:

- The CAISO balancing authority area’s marginal energy cost is greater than $100/MWh.

- The CAISO balancing authority area's marginal energy cost is greater than the highest day-ahead bilateral electrical trading hub index price for the applicable operating day plus 10 percent. This price will be shaped hourly to convert the multi-hour index prices to hourly prices.

- The CAISO balancing authority area's marginal energy cost is greater than an energy price calculated based on current natural gas prices. This will be based on a CAISO proxy cost calculation of the costs of a hypothetical gas-fired peaker based on current gas costs plus 10 percent.

- The CAISO balancing authority area's marginal energy cost is the highest marginal energy cost in the EIM and is higher than other EIM balancing authority area marginal energy costs.

The first criteria listed above is that the mitigation process will only execute the system-level pivotal supplier test when the CAISO balancing authority area marginal energy cost is greater than $100/MWh. One benefit of the CAISO market is that it reveals the marginal cost of operations by efficiently optimizing resource dispatch over a large and complex system. Too frequent an intervention in the real-time market, by mitigating offers to potentially inaccurate administrative estimates of resource costs, could undermine this benefit.[19] By requiring market prices to be greater than $100/MWh before potentially intervening with system-level market power mitigation, the CAISO will limit its potential market intervention to periods when there is a reasonable risk of suppliers exercising market power. This proposal balances concerns from stakeholders about the major harm that would be caused by suppliers exercising system-level market power with the CAISO's concerns that too frequent an intervention could deter robust market participation and may, at times, inappropriately force suppliers to sell power below offer prices when they cannot actually exercise market power.

The CAISO chose a $100/MWh price for the initial implementation of this screen because $100/MWh seems to be a dividing line between somewhat typical day-to-day market prices and atypically much higher market prices. The CAISO understands that some stakeholders may view the specific $100/MWh energy price as somewhat arbitrary, so the CAISO proposes to periodically review it once implemented to examine if it appropriately triggers the pivotal supplier test.

The second criteria listed above to trigger the pivotal supplier test is that the mitigation process will only execute the system-level pivotal supplier test when prices in the CAISO balancing authority area are higher than prices in the bilateral market outside the CAISO. This condition indicates the CAISO balancing authority area is likely effectively import constrained relative to the presumably competitive bilateral market

[19] The CAISO Market Surveillance Committee's noted in its "Opinion on System Market Power Mitigation" dated November 5, 2019 that one great advantage of competitive markets is their ability to reveal, through the behavior of their participants, the true underlying costs of various resources under various conditions. If administrative estimates of costs are not sufficient to cover a resource's actual marginal costs, the resulting market dispatch can create inefficiencies and potentially reliability concerns. Over the longer-run, persistent and chronic mitigation of resources could distort the incentives of resource owners with respect to investment and operational efficiencies of their plants. http://www.caiso.com/Documents/MSC-DraftOpinionon SystemMarketPowerMitigation-Nov5_2019.pdf

outside the CAISO. The CAISO prices would not be higher than prices outside the CAISO if load in the CAISO balancing authority area could use additional energy from the bilateral market outside the CAISO.

The CAISO balancing authority area has two sources of energy from outside its balancing authority area: EIM transfers resulting from the EIM's resource-specific dispatch and imports from import bids at the CAISO's interties. When EIM transfers between balancing authority areas are binding, the higher priced balancing authority areas cannot access additional 15-minute supply through the EIM. In addition to these transfers, the CAISO has access to import supply offered directly at its intertie scheduling locations. The supply offered at CAISO's interties may be limited directly by CAISO's intertie scheduling limits or by broader transmission and supply limitations.

The CAISO proposes to compare its energy prices to external bilateral trading hub index prices to determine when the CAISO balancing authority area is effectively import constrained. When prices between the CAISO balancing authority area and competitive external bilateral indices are relatively close, it indicates that there is sufficient energy and transmission available to serve load in the CAISO balancing authority area from outside the balancing authority area. However, when prices in the CAISO balancing authority area raise above external bilateral price indices, demand in the CAISO balancing authority area is likely constrained from accessing additional external supply. These constraints could be binding transmission scheduling limits on CAISO interties, reaching EIM transfer limits, scarce external transmission to get energy to the CAISO interties, exhausting import bids at the CAISO interties, or dispatching all available offers in the EIM.

The CAISO proposes to base the pivotal supplier test trigger on the highest-priced bilateral trading hub outside the CAISO balancing authority area. The CAISO balancing authority area should only be considered to not have access to energy being sold in the bilateral market outside the CAISO when CAISO prices rise above this price. The CAISO would use representative bilateral electrical trading hubs in the northwest and southwest regions, which it currently envisions to be Mid-C and Palo Verde.

Similar to the approach the CAISO is proposing to calculate a maximum import bid price in the *FERC Order 831 – Import Bidding and Market Parameters* initiative, the CAISO proposes to shape the published bilateral electrical trading hub prices, which represent multi-hour block sales, to hourly prices. It will adjust the index price to hourly prices by calculating a shaping factor for each hour. Using a representative recent day, the CAISO will calculate the shaping factor as the ratio of the daily average system marginal energy cost to the hourly system marginal energy cost. It will calculate this separately for peak and off-peak periods.

Similar to default energy bids, the CAISO proposes to add 10 percent to the bilateral trading hub index prices. This will account for differences in prices between published price indices and individual transactions. The published electrical price indices are based on the weighted average price of all electric transactions so individual transaction

prices can be greater than the average. This adder will also account for other costs, such as greenhouse gas emission costs to import energy into the CAISO.

The third criteria listed above to trigger the pivotal supplier test is that the mitigation process will only execute the pivotal supplier test when the CAISO balancing authority area's marginal energy cost is greater than a CAISO proxy cost calculation of the costs of a hypothetical gas-fired peaker based on current gas costs plus 10 percent. This component of the pivotal supplier test trigger ensures that the mitigation process will not incorrectly apply market power mitigation if there is a sudden gas price increase after the time that electrical price indices are published. This component also ensures that mitigation is applied when gas peaker resources are the marginal resource. This is representative of when the system is experiencing high loads and there is potential for system-level market power during peak price periods.

This calculated hypothetical gas-fired peaker price would not be shaped hourly as the CAISO proposes for the electrical index prices. It approximates the cost of a peaker, which typically only sets prices in the few highest load peak hours.

Similar to the bilateral electrical price indices, the CAISO proposes to use the highest gas price index for a gas price region defined in the EIM to calculate this price. This is representative of the highest price supply that would be available to be imported into the CAISO. This gas price index will be multiplied by the average heat rate of a typical gas peaker. Similar to the bilateral electrical price indices, the CAISO proposes to add 10 percent to account for differences between individual transactions and the index price to account for other costs.

The CAISO proposes to update this peaker proxy cost calculation each morning for use in that day's real-time market based on current same-day natural gas prices occurring on the Intercontinental Exchange (ICE), using the same process it is currently proposing in its *Commitment Costs and Default Energy Bid Enhancements* initiative. Prior to this morning update, this calculated hypothetical gas-fired peaker price would be calculated using next-day gas index prices published the prior evening.

The final criteria listed above to trigger the pivotal supplier test is that the mitigation process will only execute the pivotal supplier test when the CAISO balancing authority area is in the highest priced region of the EIM. This means this region is transfer constrained from other balancing authority areas in the EIM. Ensuring the CAISO balancing authority area is in the highest-priced EIM region extends the existing EIM market power mitigation principles to the CAISO balancing authority area, allows the mitigation process to consider the full geographic scope of the area which CAISO suppliers may exercise market power, and allows the CAISO to design a competitive LMP that will not interfere with pricing in other balancing authority areas.

In the EIM, the CAISO only executes a pivotal supplier test in balancing authority areas that have system prices that elevate above the CAISO system price. Similarly, this screen for CAISO's system-level market power mitigation ensures that the CAISO

prices are elevated above other EIM balancing authority area prices. The CAISO will also use the balancing authority area marginal energy costs to define the geographic scope of the region to test whether suppliers in the CAISO balancing authority area could potentially exercise system-level market power. By ensuring that the CAISO balancing authority area is in the most expensive region in the EIM, this screen also allows the CAISO to base its competitive LMP calculation in part on broader EIM conditions. Finally, this screen limits the application of the system market power mitigation process to only situations where CAISO balancing authority area demand has limited access to additional EIM transfers.

Energy prices become different on opposite sides of transfer constraints when the market has access to less supply on one side of the constraint because the constraint is limiting energy flow from the lower-priced region to the higher-priced region. In the real-time market, both imports and EIM energy transfers compete for the same transmission capacity into the CAISO balancing authority area. Energy prices in the EIM converge with the same power balance constraint shadow price when transfer constraints between the areas do not limit supply transactions.

The CAISO calculates a marginal energy cost for each balancing authority area in the EIM. The balancing authority area marginal energy cost is the cost to serve the next increment of load in the balancing authority area given the various transfer constraints between balancing authority areas. When import transfer constraints are binding into a balancing authority area, that balancing authority area has a higher marginal energy cost reflecting the import-constrained condition. When transfer constraints are not binding between balancing authority areas, they all have the same balancing authority area marginal energy cost.[20]

Balancing authority areas, or groups thereof, can become import constrained when import or EIM transfer constraints limit the flow of energy between them. For example, the figure below shows six balancing authority areas in the EIM. The figure shows that the CAISO balancing authority area is included in the highest priced region with balancing authority area 1 and balancing authority area 2. The CAISO balancing authority area resides within the import constrained region shown with the dashed red line. Demand within the import constrained region cannot access the lower cost energy in the neighboring balancing authority areas due to transfer limitations. When one group of balancing authority areas have a marginal energy cost higher than other balancing authority areas, the group can no longer transfer more 15-minute energy from other balancing authority areas through the EIM.

[20] Localized transmission constraints can still result in varying LMPs within balancing areas.

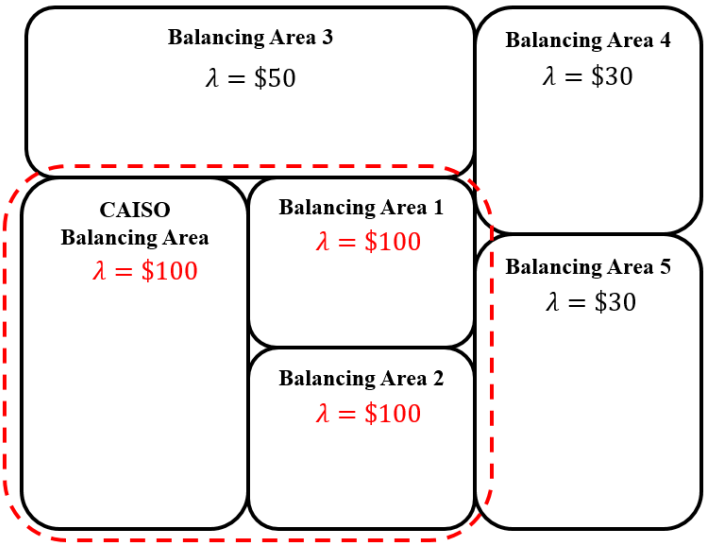

Figure 3: The CAISO's import constrained region in the EIM

When the CAISO balancing authority area is in the highest priced region in the EIM and its prices are higher than bilateral trading hub prices, demand in the CAISO balancing authority area is in a constrained region without access to lower cost supply from outside the region. In this situation, with restricted access to external supply, resources in the CAISO balancing authority area may be able to exercise market power.

7.3 Pivotal supplier test application

The CAISO proposes that the hour-ahead scheduling process of the real-time market will execute a system-level pivotal supplier test by calculating a residual supply index using three pivotal suppliers in component fifteen-minute market intervals in which the pivotal supplier test is triggered (based on the criteria described above in ***Section 7.2***).

This pivotal supplier test is modeled after the CAISO market's existing local market power mitigation process that determines when the market within a transmission constrained region is uncompetitive. The existing test calculates whether the market can meet demand in a constrained region without the resources controlled by the three suppliers that control the three largest amounts of supply submitted to the market, termed the "potentially pivotal suppliers." Suppliers are considered "pivotal" when the supply they control is needed to meet demand.

The pivotal supplier test fails based on if its "residual supply index" metric is less than one, calculated as non-pivotal supply offers divided by demand. The market power mitigation process assumes the market is uncompetitive in a constrained region and pivotal suppliers have the potential to exercise market power in market intervals when the pivotal supplier test fails. The market power mitigation process assumes that non-pivotal suppliers cannot exert market power.

For example, if there are 15,000 MW of supply offers, but the potentially-pivotal suppliers control 5,000 MW, the 10,000 MW of supply offers for resources not controlled by the potentially-pivotal is the non-pivotal supply. The pivotal supplier test would compare the 10,000 MW of non-pivotal supply to the demand in the constrained region to determine if the constrained region is competitive. If demand is greater than 10,000 MW, the test considers the area uncompetitive because pivotal suppliers are needed to meet demand. If demand is less than or equal to 10,000 MW, the test considers the region competitive.

The CAISO proposes that the system-level pivotal test will calculate pivotal supply offers, non-pivotal supply offers, and demand based on a constrained region consisting of the CAISO balancing authority area and any other balancing authority areas that are in the constrained region along with the CAISO. The geographic scope of the constrained region will be defined based on EIM balancing authority area marginal energy costs.

The system-level pivotal supplier test will only consider supply offers for resources within the CAISO balancing authority area in calculating potentially-pivotal suppliers. The test will consider all other supply as non-pivotal, which includes:

- Import offers submitted for the CAISO intertie scheduling points (these quantities will be limited by the various CAISO market intertie constraints).

- Supply offers for EIM participating resources in other balancing authority areas that are in a constrained region along with the CAISO.

- Net EIM transfers into the constrained region in the EIM.

This proposed system-level pivotal supplier test for the CAISO that tests supply and demand based on a constrained region consisting of more than one balancing authority area is different than the existing pivotal supplier test the market performs for the other balancing authority areas in the EIM. This existing test for the other balancing authority areas in the EIM considers only the supply and demand in each balancing authority area, irrespective of whether it is in a constrained region along with other balancing authority areas. Ideally the test would do this and the CAISO plans to consider modifications to do so in a future market initiative. The CAISO ruled out pursuing these modifications in this initiative because without more extensive modifications this approach would expose EIM participants to additional market power mitigation. For example, more extensive modifications would be needed to accurately calculate each EIM participant's supply net of its load serving obligations.

As described above, the system-level pivotal supplier test will consider all import offers submitted for the CAISO intertie scheduling points as non-pivotal supply. This will include import offers submitted by suppliers that also control resources within the CAISO balancing authority area. This is because import offers must compete for limited intertie capacity.

An import supplier that also controls resources within the CAISO balancing authority area could only successfully exert market power if its resources within the CAISO are required to meet demand. Otherwise, the market will dispatch resources controlled by other suppliers. Such a supplier increases its benefit of exerting market power the more imports it schedules. The supplier would have the incentive to offer the imports at cost because it must compete for limited intertie capacity and is competing with other suppliers also offering imports sourced from the broader western interconnection, which is presumably competitive.

An additional consideration is that if the system-level pivotal supplier test were to consider import supply as potentially pivotal, it could potentially incent importers also controlling resources in the CAISO balancing authority area to limit their import offer quantities to avoid the test considering them to be a pivotal supplier.

As also described above, the system-level pivotal supplier test will consider offers for EIM participating resources in other balancing authority areas that are in a constrained region along with the CAISO as non-pivotal supply. This will include offers for resources that are controlled by a supplier that also controls resources within the CAISO balancing authority area. This is because these EIM participating resources are likely contracted to serve demand in the adjoined EIM balancing authority area. All of the balancing authority areas adjacent to the CAISO are controlled by vertically-integrated utilities. The supplier would not have the incentive to exert market power for

this supply under contract and the CAISO has no ability to determine this amount. In addition, as with imports at the CAISO interties, potentially considering this EIM participating resource supply as pivotal supply could potentially incent these suppliers to limit their offer quantities to avoid being considered a pivotal supplier.

In this draft final proposal, the CAISO proposes several additional features of the system-level pivotal supplier test that are different than the existing pivotal supplier test that is used for local market power mitigation and EIM balancing authority area-level mitigation[21]:

Accounting for load-serving obligations

The CAISO proposes to adjust each suppliers pivotal supply quantities to account for their load-serving obligations. Suppliers that also have load-serving obligations do not have an incentive to exercise market power for the amount of supply needed to serve their load because any increased supply revenue would be offset by increased costs to serve their corresponding load. For example, a supplier that controls 5,000 MW of supply and must serve 4,900 MW of load does not have the incentive to exercise market power for any more than 100 MW of supply. Any additional amount would result in an offsetting price increase for its load.

The market power mitigation will calculate an estimated load-serving obligation for each supplier that is also a load-serving entity based on their recent load. The load-serving obligation will be calculated for each hour using the three-month average of their load in the corresponding hourly final settlement quality load meter data. The mitigation process will then calculate a ratio of this value compared to all other load-serving entity obligations to scale it to the CAISO real-time market demand forecast. This method will allow the mitigation process to recognize that individual load-serving entities have different daily load patterns.

Accounting for intertie scheduling limits

As described earlier, the CAISO proposes that the system-level pivotal supply test consider net import offers for the CAISO's intertie scheduling points as non-pivotal supply. However, it will limit this quantity to the amount that the market could potentially schedule on each intertie based on the various intertie scheduling limits. For example, if there are 1,200 MW of energy offers submitted at an intertie with capacity to schedule 1,000 MW of imports, the pivotal supplier test will only consider 1,000 MW as non-pivotal supply. This calculation will consider exports as netting against imports on each intertie.

[21] The CAISO is not proposing to modify the pivotal supplier test that will continue to be used by the local market power mitigation process (including EIM balancing area level mitigation.)

7.4 Energy offer mitigation

In the event the pivotal supplier test triggers system-level market power mitigation, the CAISO proposes that the market power mitigation process will mitigate energy offers for jointly-pivotal supplier resources within the CAISO balancing authority area to the greater of the resource's default energy bid or a system-level competitive LMP.[22]

The CAISO does not propose to mitigate import offers. Also, although supply offers for participating resources in balancing authority areas other than the CAISO in the EIM will continue to be subject to the current EIM mitigation process, they will not be mitigated as a result of the system-level market power mitigation process this document describes.

Only mitigate offers from jointly-pivotal suppliers

The CAISO proposes the system-level market power mitigation process mitigate only the resource offers from suppliers controlling enough supply to be pivotal for serving demand in a constrained area that includes the CAISO. This means that the system-level market power mitigation process will only mitigate resource offers from the two suppliers controlling the largest amounts of supply plus the offers of each of the other suppliers whose supply that in conjunction the two largest suppliers is required to meet the demand.

In other words, any supplier controlling enough supply to be the third pivotal supplier causing the residual supply index test to fail, will have its resources' offers mitigated. Because of this, when triggered, the system-level market power mitigation process will mitigate the offers of at least three suppliers, and potentially more than three suppliers.

At a system-level, this process should only mitigate offers from pivotal suppliers with an incentive to raise offer prices. At the broader system-level, with the potential for a large amount of non-pivotal suppliers and the consequential potential of broad mitigation of many suppliers, it is beneficial for the system-level market power mitigation process to first identify which suppliers could actually be pivotal at a system-level before mitigating resource offers.

The CAISO's current local and EIM balancing authority area-level market power mitigation processes mitigate all suppliers that are in the constrained area, even though non-pivotal suppliers do not have an economic incentive to raise their offer prices to try to economically withhold from the market. The existing simplification of mitigating all resource offers in the constrained area in the much more complicated *local* market power mitigation process is a reasonably cautious approach because local constraints often have very limited supply of counter-flow, which would lead to most suppliers in the constrained area being pivotal anyway. However, this simplification may not be

[22] The mitigation process will not mitigate resource offers to values greater than the resource's offer price. This should be interpreted as: $\min[\text{Resource Bid}, \max(Resource\ DEB, Competitive\ LMP)]$.

reasonable at a system-level, where there is the potential for a large amount of non-pivotal suppliers within the constrained area.

Only mitigate offers from resources inside the CAISO balancing authority area

Because the purpose of the test is to determine if suppliers within the CAISO balancing authority area have the opportunity to exercise market power, the CAISO proposes that the system-level market power mitigation process will only mitigate offers for resources inside the CAISO balancing authority area.

This initiative is focused on extending similar system-level market power mitigation checks already performed in the EIM to suppliers in the CAISO balancing authority area. The CAISO does not propose to mitigate import offers because an import supplier could simply not offer import supply to the market if it were trying to withhold supply, rather than economically withholding the supply. The CAISO should not mitigate offers from resources in balancing authority areas in the EIM that are included with the CAISO balancing authority area in the highest priced region because they likely represent non-pivotal supply.

The CAISO does not propose to mitigate import offers because external supply sourced from a presumably competitive bilateral market in the western interconnection must compete with other importers for limited import capacity in order to clear into the CAISO market. If importers try to raise energy offers at the CAISO's intertie scheduling locations, other lower priced offers sourced from the same competitive bilateral market in the western interconnection will clear on CAISO's limited import transmission instead. In this way, the imports should already be competitively offered to the CAISO. For this same reason, the mitigation process also will not mitigate import supply offers affiliated with internal CAISO suppliers.

Do not mitigate offers for participating resources in adjoined EIM balancing authority areas

Supply offers for resources participating in the EIM that are in balancing authority areas included with the CAISO in the highest priced region should also not be mitigated because they are likely non-pivotal supply. EIM suppliers that control generation outside California generally also have load-serving obligations.[23] These entities have a limited ability to withhold supply from the market in order to sell power at inflated prices because withholding supply from the market could raise the costs of meeting their own obligations or very slightly raise prices with large proportionate reductions in small net sales. The overall result would be that the supplier could make an extremely small profit at best and the supplier would increase its own costs at worst. Furthermore, the CAISO's estimate of an EIM supplier's load serving obligation would likely be unreasonably inaccurate.

[23] The Market Surveillance Committee discussed shortcomings of the pivotal supplier test in Section IV.A of its opinion on system market power mitigation published on November 5, 2019. http://www.caiso.com/Documents/MSC-DraftOpinionon SystemMarketPowerMitigation-Nov5_2019.pdf

The mitigation process also will not mitigate supply offers from participating resources in an adjoined EIM balancing authority area controlled by suppliers that also control resources within the CAISO balancing authority area. As discussed in the proposed pivotal supplier test design, these resources are likely contracted to serve demand in the adjoined EIM balancing authority area and these suppliers could simply not voluntarily offer its resource's energy into the EIM if it were attempting to exercise market power. In addition, mitigating offers for these resources could provide an incentive for suppliers controlling these resources to limit their offer quantities to avoid being classified as a pivotal supplier.

Do not mitigate resource adequacy import offers

Some stakeholders have suggested that the CAISO should consider mitigating import bids for imports that have been shown as resource adequacy capacity. While there may be merits to the view that these imports are needed to meet CAISO balancing authority area load and should be treated like internal supply, the CAISO is not proposing to subject resource adequacy imports to system-level market power mitigation. Imports are sourced from a presumably competitive bilateral market in the western interconnection and must compete to clear on limited intertie capacity into the CAISO markets.

Stakeholders have been concerned that some resource adequacy importers are economically withholding from the energy market by bidding at or near the $1,000/MWh energy bid cap. These stakeholders recommend the CAISO mitigate resource adequacy import bids to remedy this apparent economic withholding. However, this behavior is most likely attributable to resource adequacy suppliers selling resource adequacy capacity to load-serving entities with no physical resource dedicated to backing it up at the time of the capacity sale (i.e. "paper capacity"). If this is the case, then the submission of import resource adequacy supply offers at or near the $1,000/MWh cannot be economic withholding because the seller has no underlying supply to withhold. The CAISO and the California Public Utilities Commission are currently considering rule changes in other stakeholder initiatives that will address the "paper capacity" issue and the associated submission of high-priced import bids to avoid delivering energy.

7.5 Competitive locational marginal price (LMP)

The CAISO proposes that the system-level market power mitigation process will calculate a system-level specific competitive LMP to use as part of system-level mitigation. Consistent with the CAISO's existing local market power mitigation process, the CAISO proposes that the system market power mitigation process mitigate energy offers to the higher of the competitive LMP or the resource's default energy bid.

The CAISO proposes to calculate the system-level competitive LMP to be at least as high as prevailing bilateral electrical prices in the broader western interconnection. This will help ensure that system-level mitigation will not reduce CAISO prices below prevailing prices which would dissuade imports and would introduce other inefficiencies by administratively suppressing CAISO market prices. This is particularly important to avoid when system-level market power mitigation is applied because of its broad application.

The CAISO proposes that the system-level market power mitigation process use similar components to those it uses for the system-level pivotal supplier test trigger discussed in ***Section 7.2***. The CAISO proposes that the system-level competitive LMP be calculated as the greater of the following:

- $100/MWh
- The highest day-ahead bilateral electrical trading hub index price for the applicable operating day plus 10 percent. This price will be shaped hourly to convert the multi-hour index prices to hourly prices based on a recent representative day's system marginal energy cost.
- The CAISO balancing authority area's marginal energy cost is greater than an energy price calculated based on current natural gas prices. This will be based on a CAISO proxy cost calculation of the costs of a hypothetical gas-fired peaker based on current gas costs plus 10 percent.
- The next highest marginal energy cost in the same market interval of a balancing authority area in the EIM (the CAISO has the highest cost when mitigation is triggered).

The first component the CAISO proposes to use to calculate the system-level competitive LMP, $100/MWh, will help ensure the system-level market power mitigation process does not mitigate energy offers to prices below those expected to result from the exercise of market power.

The second and third components the CAISO proposes to use to calculate the system-level competitive LMP, the day-ahead bilateral electrical trading hub index price and the price based on the cost of a peaker unit, will help ensure the system-level market power mitigation process does not mitigate energy offers to prices below prevailing bilateral

electrical prices in the broader western interconnection. They will also ensure the system-level market power mitigation process does not mitigate energy offers to prices below those of a peaker unit, which are presumably the marginal resources on the tight supply days that pose the potential for system-level market power.

The last component the CAISO proposes to use to calculate the system-level competitive LMP, the next highest marginal energy cost of a balancing authority area in the EIM, will ensure offers are not mitigated beyond the amount needed to address potential market power. As with the CAISO's existing market power mitigation processes, this ensures the market power mitigation process does not mitigate offers to a price that results in the CAISO market dispatching resources for more energy than is needed to serve load in a constrained hour. Without the competitive LMP, at the extreme a constrained area can switch from importing energy to exporting energy. This has been termed "flow reversal."

The CAISO's existing market power mitigation processes use competitive LMP as a price floor on mitigated offer prices of mitigated resources to ensure offers are not mitigated beyond the amount needed to address potential market power. It represents the competitive price for energy outside of the constrained area. For the local market power mitigation process, it is calculated by removing the non-competitive congestion components from the LMP. As part of the balancing authority area level market power mitigation in the EIM performed for balancing authority areas other than the CAISO, it is calculated as the CAISO's system marginal energy price. Using this offer floor, the output of a resource subjected to offer price mitigation will likely not be increased relative to its output in the unmitigated market process beyond the output needed to relieve binding and potentially non-competitive constraints.

This system-level competitive LMP should only have a small impact on EIM entities other than the CAISO. The market will continue to use the CAISO's system marginal energy price as the competitive LMP when other balancing authority areas fail their existing balancing authority area system-level market power mitigation tests. When the CAISO balancing authority area does fail its system-level market power mitigation test, the calculated competitive LMP may still impact other entities in the EIM to the extent that individual local constraints in their balancing authority areas are simultaneously binding and uncompetitive. The local market power mitigation processes will continue to calculate resource-specific competitive LMPs that include all congestion from competitive constraints. However, the resource-specific competitive LMP calculation will use this new system-level competitive LMP in place of the CAISO system marginal energy cost because the CAISO system marginal energy cost was determined to be uncompetitive.

8 Energy Imbalance Market Governing Body Role

This initiative proposes to implement a system-level market power mitigation for the CAISO balancing authority area. The rules that govern decisional classification indicate 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 the rules to implement the proposed changes would not be EIM-specific. Rather, the new rules would apply only to the CAISO balancing authority area. The logic for price mitigation in EIM balancing authority areas would remain unchanged: they would use the greater of the competitive LMP from the CAISO balancing authority area when the CAISO's LMP is found to be competitive or the default energy bid. Moreover, the primary driver for pursuing this initiative is not an issue that is specific to the EIM balancing authority areas.

This EIM classification reflects the current state of this initiative and may change as the stakeholder process is completed. If any stakeholder disagrees with this proposed classification, please include in your written comments a justification of which classification is more appropriate.

9 Stakeholder engagement

The schedule for stakeholder engagement is provided below. The CAISO will present its proposal to the Energy Imbalance Market Governing Body at its September 2020 meeting and to the Board of Governors' at its September 2020 meeting.

Date	Event
November 13, 2019	Board of Governors meeting (briefing)
December 4, 2019	Energy Imbalance Market Governing Body (briefing)
December 11, 2019	Publish straw proposal
December 16, 2019	Stakeholder meeting
January 10, 2019	Comments on straw proposal due
April 7, 2020	Publish revised straw proposal
April 13, 2020	Stakeholder conference call
May 4, 2020	Comments on revised straw proposal due
June 15, 2020	Publish draft final proposal
June 24, 2020	Stakeholder conference call
July, 14 2020	Comments on draft final proposal due
June/July 2020	Tariff and BRS development
August 2020	Publish final proposal
August 2020	Comments on final proposal due
September 15-16, 2020	Energy Imbalance Market Governing Body meeting
September 30 - October 1, 2020	Board of Governors meeting
Prior to Summer 2021	Implementation

Stakeholders should attend the stakeholder conference call on June 24, 2020 and provide written comments to initiativecomments@caiso.com by July 14, 2020.

10 Appendix A: System-Level Market Power Mitigation High-Level Business Requirements (Preliminary)

Timing

- The real-time market system market power mitigation process will execute the pivotal supplier test only in the hour ahead scheduling process and will execute it for each fifteen-minute interval in the hour ahead scheduling process.
- Based on the results of the pivotal supplier test executed in the hour ahead scheduling process, the system market power mitigation process will mitigate energy bids used in the hour ahead scheduling process for the fifteen-minute intervals that fail the pivotal supplier test. The real-time market will also use these mitigated bids in the corresponding fifteen-minute market interval and the corresponding real-time dispatch intervals.

Pivotal supplier test trigger

- The system market power mitigation process will identify balancing authority area price tiers within the EIM by comparing each balancing authority area's power balance constraint shadow price.
- The system market power mitigation process will perform a pivotal supplier test in the hour ahead scheduling process during the following conditions:
    - The CAISO balancing authority area power balance constraint shadow price is greater than $100/MWh.
    - The CAISO balancing authority area power balance constraint shadow price is greater than the day-ahead MIDC bilateral index price, the day-ahead PV bilateral index price, and the maximum morning gas price multiplied by peaker heat-rate.
    - The CAISO balancing authority area has the highest power balance constraint shadow price in the EIM and the CAISO's price is elevated above other balancing authority areas in the EIM.

Pivotal supplier test

- The market will perform the pivotal supplier test in each interval in which it is triggered.
- The pivotal supplier test will evaluate whether demand in the highest priced tier that includes the CAISO balancing authority area can be served without the largest three suppliers in the highest priced tier.
    - The test will consider the following suppliers potentially pivotal:
        - ***Supplier affiliate groups that control resources within the CAISO balancing authority area*** that the test determines to be net sellers taking into account their load-serving obligations
        - The test will not consider ***EIM entity scheduling coordinator affiliate groups*** as potentially pivotal.

- For supplier affiliate groups controlling resources within the CAISO balancing authority area, the calculation of the potentially pivotal supply will take account of resource ramping constraints, resource commitment constraints, ancillary service obligations, self-scheduled quantities, and load-serving obligations.
    - Each resource's potentially pivotal supply will be the difference between the maximum achievable output within its economic bid range and the minimum achievable output within its economic bid range from the interval prior to the test interval. Resource ramp rate, startup, and shutdown times will determine the maximum and minimum achievable output from the interval prior to the test interval.
    - The supplier's total potentially pivotal supply will be limited by the supplier's load-serving obligation. If the sum of the minimum achievable output for resources affiliated with the supplier is lower than the supplier's load-serving obligation, the amount of supply lower than the supplier's load-serving obligation and higher than the sum of the minimum achievable output for resources affiliated with the supplier will not be considered potentially pivotal supply.
    - The supplier affiliate group's load-serving obligations will be the entity's hourly rolling three month average demand as a ratio of all other load-serving entity hourly rolling three month average demand multiplied by the CAISO demand forecast for the tested interval.
- The test will not consider EIM entity scheduling coordinator affiliate groups potentially pivotal.
- The test will assume all supply in adjoined EIM balancing authority areas is non-pivotal.
- The test will assume that net EIM transfers into the highest priced tier in the EIM are non-pivotal supply.
- The test will assume that net import supply offered at the CAISO's intertie scheduling locations, limited by the various inter-related intertie scheduling limits are non-pivotal supply.
    - The test will not consider import supply offered by a supplier that controls supply within the CAISO as potentially pivotal supply.

Resources to mitigate

- The system market power mitigation process will only mitigate resource offers if the pivotal supplier test fails.
- The system market power mitigation process will only mitigate offers for resources within the CAISO balancing authority area.
- ***Mitigate offers from jointly pivotal suppliers.*** The system market power mitigation process will only mitigate resource offers from the two largest internal CAISO suppliers and any other internal CAISO supplier when in combination with the two largest suppliers is required to meet demand.

- The process will not mitigate participating resource offers from resources in an adjoined EIM balancing authority area that are affiliated with an internal CAISO supplier.
- The process will not mitigate import supply offers at the CAISO intertie scheduling locations.

Competitive locational marginal price (LMP)

- The competitive LMP to use in system market power mitigation will be the power balance constraint shadow price of the next lower-priced tier in the EIM.
- This competitive LMP will be used as the system marginal energy price in the calculation of competitive LMPs for local market power mitigation.

System-level pivotal supplier test detailed calculation steps

A formulation of the system-level market power mitigation process including its pivotal supplier test is presented in the technical appendix to this proposal (Appendix B: Draft Technical Description). The following steps summarize the system-level pivotal supplier test:

1. ***Calculate the amount of supply every resource would provide to the market in the test interval if it were controlled by a non-pivotal supplier.*** This is an upper limit for the supply schedule for every resource (using previous interval dispatch, capacity limits, ramp rates, and interval length). It is the amount of supply the resource can ramp up to from the previous interval, limited by its supply offer and the resource maximum output constraint. This approach follows the methodology the CAISO currently employs in its real-time market local market power mitigation pivotal supplier test.

2. ***Calculate the amount of supply every resource would provide to the market in the test interval if it were controlled by a pivotal supplier economically withholding.*** This is a lower limit for the supply schedule for every resource (using previous interval dispatch, capacity limits, ramp rates and interval length). It is the amount of supply the resource can ramp down to from the previous interval, accounting for its self-schedule and the resource maximum output constraint. This approach follows the methodology the CAISO currently employs in its real-time market local market power mitigation pivotal supplier test.

3. ***Account for a supplier's load-serving obligation in the amount of supply it would provide to the market if it is controlled by a pivotal supplier trying to economically withhold supply.*** Apply a load-serving obligation limitation to the lower supply schedule (from step 2) after summing up the lower supply schedules per supplier affiliate group. If the sum of the lower supply schedules (from step 2) over all resources the supplier controls is less than the supplier's

load-serving obligation, set the lower supply schedule equal to the load-serving obligation.

4. ***Determine the three largest potentially pivotal suppliers.*** Calculate the maximum supply a supplier can withhold from the market as the difference between upper supply schedules for each resource calculated in step 1 summed over all resources the supplier controls and the lower supply schedules for the affiliate group calculated in step 3. The suppliers controlling the three largest amounts of supply are to be considered potentially pivotal suppliers for purposes of this pivotal supplier test. The resources of all other supplier affiliate groups will be considered non-pivotal.

5. **Calculate the total non-pivotal supply as the sum of the following values.**

    - Calculate the ***non-pivotal supplier supply*** as sum of the maximum supply schedules from step 1 on non-pivotal supplier resources determined in step 4.

    - Calculate the ***potentially pivotal supplier non-pivotal supply*** as the sum of the minimum supply schedules from step 2 on pivotal supplier resources determined in step 4.

    - Calculate the ***non-pivotal supply from EIM transfers into the high priced region*** as the net EIM transfers into the high priced region.

    - Calculate the ***import non-pivotal supply*** as the net import offers to the CAISO balancing authority area as limited by the intertie transfer constraints.

6. **Calculate the residual supply index using three potentially pivotal suppliers.** Divide the total non-pivotal supply from Step 6 by the demand in the high-priced region. If the residual supply index is less than 1, then there is the potential for system-level market power in the test interval and the mitigation process will mitigate resource offers as described in ***Section 7.4***.