System Market Power Mitigation

Straw Proposal

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1 Executive Summary

In this document, the CAISO discusses its proposal to apply a system-level market power mitigation in the CAISO market for the CAISO balancing authority area. It outlines the principles and scope for designing and implementing system-level market power mitigation. The CAISO plans to present a final proposal to its Board of Governors at its May 2020 meeting so that the CAISO may implement the proposed changes before summer of 2021.

In a recent analysis, 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.[1] The potential for system-level market power in the CAISO balancing authority area[2] is a significant issue because the CAISO's current market power mitigation provisions currently are based on the assumption that the CAISO market is competitive at the balancing area (*i.e.*, "system") level. Because of this assumption, the only mitigation for system-level market power in the CAISO balancing 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 area. Also because of this assumption, the market power processes used for both the CAISO balancing area as well as the other balancing areas in the Western Energy Imbalance Market ("energy imbalance market") use a "competitive locational marginal price" calculated based on the prices within the CAISO balancing area.

A number of stakeholders advocate that it is imperative that the CAISO implement system-level market power mitigation for its balancing area to address the potential for the CAISO balancing area not being competitive at a system level. In contrast, a number of other stakeholders and the Market Surveillance Committee point out that the CAISO should consider and design system-level market power mitigation carefully to ensure it increases market efficiency while avoiding potential adverse outcomes such as discouraging robust supply and demand participation during tight system conditions. The CAISO recently published a whitepaper[3] presenting a conceptual market power mitigation design to address system-level market power in the CAISO's market. The CAISO intended the conceptual design to serve as the basis of discussion regarding the benefits and drawbacks of adding system-level market power mitigation to the CAISO market. The CAISO also recently published a scoping document[4] presenting the principles and scope it would follow throughout the policy development process. The Market Surveillance Committee recently published an opinion related to the CAISO's conceptual design proposal and its scoping document.[5] In this opinion, the Market Surveillance Committee generally agreed with the design, but outlined a number of considerations that the CAISO should confront throughout the design process.

[1] "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
[2] The remainder of this document refers to the NERC-defined Balancing Authority Area as "balancing area."
[3] "System-Level Market Power Mitigation Conceptual Design Proposal," September 19, 2019, http://www.caiso.com/Documents/WhitePaper-SystemMarketPowerMitigation-Sep20-2019.pdf
[4] "System-Level Market Power Mitigation Initiative Scoping Document," October 28, 2019, http://www.caiso.com/Documents/ScopingDocument-SystemMarketPowerMitigation.pdf
[5] See Market Surveillance Committee, "Opinion on System Market Power Mitigation," published November 5, 2019. http://www.caiso.com/Documents/MSC-DraftOpinionon SystemMarketPowerMitigation-Nov5_2019.pdf

In the **Issue** section of this document, the CAISO describes why the potential for system-level market power in the CAISO balancing area is a significant issue and its concerns that market conditions in the coming years may change in ways that will exacerbate the potential for system-level market power.

In the **Principles** section of this document, the CAISO outlines its market power mitigation design principles. Generally, the CAISO seeks an effective design that does not to deter supply and demand participation in its markets and does not deter long-term forward contracting.

In the **Scope** section of this document, the CAISO explains that it plans to implement system-level market power mitigation in two phases. It plans to implement a first phase sooner than it could implement more comprehensive enhancements. A second phase would allow time to address more complex and/or contentious policy issues and more extensive system development.

In the **Background** section of this document, the CAISO discusses its current local market power mitigation process applied within the CAISO's balancing area and balancing areas within the energy imbalance market, system-level market power mitigation applied to energy imbalance market balancing areas, the CAISO's relationship to the broader western interconnected system, and the CAISO's general market power mitigation design framework.

In the **Proposal** section, the CAISO discusses various design elements involved in creating a system-level market power mitigation process to apply to the CAISO balancing area. It proposes to apply system-level market power mitigation to the real-time market only at this time. It proposes to first determine if the CAISO balancing area is import constrained before applying a pivotal supplier test. It proposes to test the competitiveness of the supply mix in its balancing area using a three pivotal supplier test. It proposes to mitigate resource offers provided by scheduling coordinators for resources inside the CAISO's balancing area. Finally, it proposes to mitigate energy imbalance market resource offers in a balancing area to the default energy bid when that balancing area fails its current market power mitigation test and the CAISO balancing area also fails its market power mitigation test.

2 Issue

The potential for system-level market power in the CAISO balancing authority area [6] is a significant issue because the CAISO's market power mitigation provisions currently are based on the assumption that the CAISO market is competitive at the balancing area (*i.e.*, "system") level. Because of this assumption, the only mitigation for system-level market power in the CAISO balancing 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 area. Also because of this assumption, the market power processes used for both the CAISO balancing area as well as the other balancing areas in the Western Energy Imbalance Market ("energy imbalance market") use a "competitive locational marginal price" 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 area were potentially uncompetitive, and the Department of Market Monitoring found 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.[7] The Department of Market Monitoring completed a similar analysis, finding the supply mix was potentially uncompetitive in 272 hours in 2018.[8] 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.[9]

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, but, 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.[10]

Nonetheless, the CAISO continues to be 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 area.

[6] The remainder of this document refers to the NERC-defined Balancing Authority Area as "balancing area."
[7] "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
[8] 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
[9] See Department of Market Monitoring, "2019 Third Quarter Report on Market Issues and Performance," Section 3.5.2, published on December 5, 2019.
[10] Market Surveillance Committee, "Opinion on System Market Power Mitigation," Section II, November 5, 2019.

- 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 fundamentally sound system-level market power mitigation process that aligns with its principles discussed in ***Section 3***. 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.

3 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.[11] 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.[12] 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."[13]

Consequently, the CAISO proposes to use the following market power mitigation design principles when considering whether the current provisions are sufficiently adequate to address any degradation of the competitiveness of energy markets and whether the CAISO must adopt additional market power mitigation process 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

[11] MRT Transmittal Letter, FERC Docket No. ER06-615, at p. 40, http://www.caiso.com/Documents/MRTUTransmittalLetter.pdf (February 9, 2006).
[12] 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.
[13] 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)

supply has market power.

- 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.

4 Scope

The CAISO plans to implement system-level market power mitigation in two phases. The CAISO plans to implement a first phase sooner than it could implement more comprehensive enhancements. A second phase would allow time to address more complex and/or contentious policy issues and more extensive system development.

The CAISO outlines below its proposed scope for the phase 1 implementation. The proposed preliminary approach for each scope item is based on the principles described in ***Section 3***. This reflects the CAISO's preliminary thinking and is subject to modification and refinement in the stakeholder process.

4.1 Applying system market power mitigation to the real-time market only at this time

The CAISO proposes that the phase 1 scope would address system-level mitigation in the real-time market only. 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 aspects 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 recently 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 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.

4.2 Determining when the CAISO will consider its balancing area import constrained

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

4.3 Determining when the supply mix is potentially uncompetitive

The CAISO proposes that 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 the CAISO and stakeholders will need to consider. Within the phase 1 scope, the CAISO may also consider 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.

4.4 Determining which resource offers to mitigate

The CAISO proposes that the phase 1 scope considers that system-level market power mitigation would only apply to energy offers for resources within the CAISO balancing area. Within the phase 1 scope, the CAISO also intends to examine if there may be circumstances in which it must apply offer mitigation to other resource offers within the energy imbalance market footprint.

5 Background

5.1 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 locational marginal priced-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 areas participating in the Western Energy Imbalance Market.

In addition to the dynamic local market power mitigation process, each balancing area participating in the energy imbalance market is also subject to a system-level market power mitigation process.[14] This mitigation process tests whether demand within the balancing area has access to competitive external supply by first finding whether the balancing area is import constrained. If the balancing 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 locational marginal price. Default energy bids are the CAISO's estimate of resource marginal costs. The competitive locational marginal price is the energy price outside of the constrained area.

5.2 The broader western interconnected system

The CAISO operates the only locational marginal price-based energy market in the western interconnection. Suppliers in the western interconnection that are not participating in the Western Energy Imbalance Market 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.

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

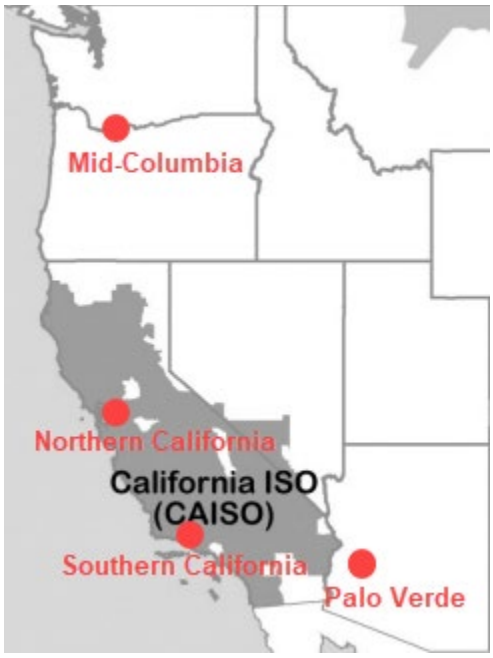

Figure 1: The relationship between various western energy trading hubs and the CAISO

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.[15] Transmission rights are generally available to all market participants and the quantity of these rights generally exceed the CAISO's locational import capability.[16] 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 locational marginal price during the peak or off-peak period to the expected peak or off-peak western trading hub energy prices.

[15] *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.
[16] 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[17] 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.[18] ***Table 1*** shows the CAISO locational marginal prices for PG&E, SCE, and SDG&E averaged over the on-peak period compared to the bi-lateral trading hub on-peak prices on those same days.

Table 1: CAISO and Bi-Lateral 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

5.3 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 suppliers during

[17] 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 LAP prices exceeded $500 and (2) the hours during 2018 in which the California ISO Department of Market Monitoring found a difference of $20 or more between (i) a simulated 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.
[18] See Market Surveillance Committee, "Opinion on System Market Power Mitigation," Appendix A, Table 4, published on November 5, 2019.

actual competitive conditions may discourage demand from participating in the market and engaging in additional long-term 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 a stressed afternoon in southern California. 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).[19] 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).

[19] 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.

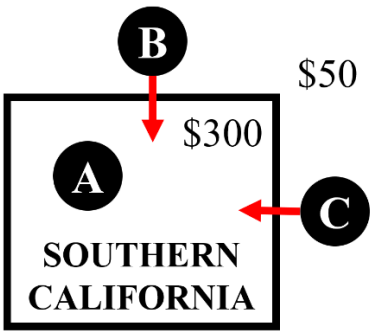

Figure 2: A constrained southern California on a stressed afternoon

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 energy imbalance market balancing areas at a local level (*i.e.*, on specific transmission constraints within the balancing area) as well as at an energy imbalance market balancing area system-level.[20] The CAISO balancing area is the only participating energy imbalance market balancing area to which the CAISO does not apply a system-level market power mitigation process.

[20] *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)

6 Proposal

In this section, the CAISO discusses various design elements involved in creating a system-level market power mitigation process to apply to the CAISO balancing area.

- In ***Section 6.1***, the CAISO discusses its proposal to apply system-level market power mitigation to the real-time market only at this time.

- In ***Section 6.2***, the CAISO discusses its proposal to first determine if the CAISO balancing area is import constrained and how it proposes to make this determination.

- In ***Section 6.3***, the CAISO discusses its proposal to test the competitiveness of the supply mix within the CAISO balancing area using a three pivotal supplier test.

- In ***Section 6.4***, the CAISO discusses its proposal to mitigate resource offers provided by scheduling coordinators for resources inside the CAISO balancing area to its estimate of resource costs.

- In ***Section 6.5***, the CAISO discusses its proposal to mitigate energy imbalance market resource offers in a balancing area to the default energy bid when that balancing area fails its current market power mitigation test and the CAISO balancing area also fails its market power mitigation test. Under these circumstances, supply offers in energy imbalance market balancing areas will be mitigated to default energy bids if the participating balancing area fails its existing market power mitigation test rather than to the maximum of the default energy bid and the competitive locational marginal price.

6.1 Apply the mitigation process to the real-time market only

CAISO proposes to apply the system-level market power mitigation process to its short-term unit commitment ("STUC"), hour-ahead scheduling process ("HASP"), real-time pre-dispatch ("RTPD") including the fifteen-minute market ("FMM"), and five-minute real-time dispatch ("RTD") processes.

6.1.1 Discussion

The CAISO proposes a phased approach to applying system-level market power mitigation measures that mitigate the potential to exercise system-level market power but avoids instances of unnecessary or inappropriate mitigation that may otherwise discourage supply and demand participation in its markets. The CAISO's understanding is that if the economics of the interaction between the day-ahead and real-time markets work as presumed, it should not be entirely necessary to apply a system-wide market power mitigation to the day-ahead market. The CAISO also understands that the market may not behave as presumed. The CAISO believes it is appropriate to first implement the proposed design in the real-time market (i.e. STUC, RTPD, FMM, and RTD).

By concentrating only on the real-time market design in this first phase of this initiative, the CAISO will have more time to develop day-ahead market system-level market power mitigation processes. The CAISO will also be able to coordinate any changes to the day-ahead market with its on-going *Day-Ahead Market Enhancements* initiative and its on-going *Extended Day-Ahead Market* initiative. By implementing system-level market power mitigation in its real-time market first, the CAISO will also be able to monitor the mitigation performance in instances where supply conditions trigger system-level market power mitigation in the real-time. Finally, as discussed further below, applying the system-level market power mitigation in the real-time market provides a just and reasonable degree of protection against the potential exercise of system market power that need not be delayed given that the CAISO can extend the market power mitigation process it applies to other energy imbalance market balancing areas to the CAISO balancing area with some minor modifications.

The CAISO real-time market has characteristics that make it more susceptible to market power than the day-ahead market. 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. Since load serving entities do not bid the price they are willing to pay in the real-time market, a supplier in an uncompetitive area may exercise market power and increase prices irrespective of the price load or energy marketers are willing to pay. Second, the real-time market lacks a mechanism for virtual supply to apply competitive pricing pressure on suppliers. Without competitive pressures from virtual supply, suppliers with resources in uncompetitive areas 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.

The day-ahead market does not have these same structural limitations. The day-ahead market clears offered supply against bid-in demand. Load serving entities can submit demand bids to purchase power only at prices they are willing to pay. With load serving entities actively participating in the day-ahead market, suppliers in uncompetitive areas are not free to exercise market power and increase offer prices irrespective of the price load or energy marketers are willing to pay. The day-ahead market allows any entity to offer virtual supply bids, which apply competitive pricing pressure on suppliers. With competitive pressures from virtual supply, suppliers with resources in uncompetitive areas are not free to increase market prices above marginal costs because they risk losing the sale of their energy.

Consequently, demand's ability to submit bids that limit how much it is willing to pay for power and the role of virtual suppliers in converging prices to real-time market levels, the day-ahead market will have a level of protection against system-level market power even if system-level market power mitigation is only applied in the real-time market at this time.

In a recent opinion, the 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, it supported the real-time-only approach because this approach would somewhat constrain (although not completely preclude) the exercise of market power in the day-ahead market and the CAISO could implement it quickly without delaying many other projects.[21]

6.1.2 Proposal

The CAISO proposes to apply the system market power mitigation process to short-term unit commitment, hour-ahead scheduling process, real-time pre-dispatch including the fifteen-minute market, and real-time dispatch processes. The CAISO will consider in a later phase of this initiative the policy details involved in extending system-level market power mitigation to the day-ahead market.

[21] See Market Surveillance Committee, "Opinion on System Market Power Mitigation," Appendix B, published November 5, 2019.

6.2 Execute pivotal supplier test only if the CAISO balancing area is import constrained

The CAISO proposes to trigger the system-level market power mitigation pivotal supplier test in intervals when the CAISO balancing area is import constrained.

6.2.1 Discussion

Similar to the market power mitigation process for energy imbalance market balancing areas, the CAISO proposes to pre-condition its pivotal supplier test on a screen that indicates when internal demand has lost access to competitive west-wide supply.

The CAISO designed its current market power mitigation processes to protect load serving entities in constrained and uncompetitive areas. 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 a screen for constrained conditions as well as an evaluation of the competitiveness of the supply within the constrained area before mitigating supply offers within the constrained area.

A logical extension of the existing design would be for the CAISO to first determine if it is import constrained before executing a pivotal supplier test. In so doing, the CAISO presumes that the broader western interconnection is workably competitive and consumers in the CAISO balancing area could access this competitive supply unless the CAISO's intertie transmission capability limits their ability to import it.

The CAISO believes it's reasonable to pre-condition a system-level pivotal supplier test on a constrained import screen because it does not have evidence that the broader western interconnection is uncompetitive and it does not have evidence that suppliers within the CAISO possess western interconnection-wide market power.

It is fair to assume that the western interconnection is workably competitive. Indeed, the Federal Energy Regulatory Commission has granted market-based rate authority to numerous entities in the western interconnection that participate in the bi-lateral electricity markets. In general, the Federal Energy Regulatory Commission grants market-based rate authority when it believes those areas are competitive. External transmission rights are generally available to all market participants and the quantity of

these rights generally exceed the CAISO's locational import capability.[22] Furthermore, the CAISO does not have evidence suggesting the existence of western interconnection-wide market power, and the entities controlling large amounts of generation outside California also have large load-serving obligations. These entities have a limited ability to withhold supply from the market in order to sell power at prices inflated by the exercise of market power, as withholding supply from the market could result in them having to buy power at high prices in order meet their own obligations or very slightly raising prices with large proportionate reductions in small net sales.[23]

Some stakeholders have argued that the CAISO need not pre-condition its pivotal supplier test on a screen that indicates when internal demand has lost access to competitive west-wide supply. The CAISO understands that hypothetically, suppliers located within the CAISO balancing area may control enough supply to exercise western interconnection-wide market power by withholding their supply even if CAISO is not import constrained. In such cases, it may be appropriate to apply a test for system-level market power regardless of whether the CAISO is import constrained. However, if CAISO balancing area suppliers had such western interconnection-wide market power, then the CAISO should be able to observe substantial withholding of supply within the CAISO balancing area in real-time, and would expect that withheld supply (and associated exports from the CAISO) to be replaced by lower cost energy within the energy imbalance market.[24] The CAISO has not seen such market outcomes that would reflect western interconnection-wide market power. In the absence of such evidence, the CAISO does not see a need to consider mitigation to address the potential for the exercise of western interconnection-wide market power. The possibility that import supply might only be available at high prices during tight system conditions when high cost resources are used to meet demand does not reflect the exercise of market power.

By pre-conditioning the pivotal supplier test on a screen that indicates when internal demand has lost access to competitive west-wide supply, the CAISO's system-level market power mitigation process will follow the same design pattern as already applied to other balancing areas in the energy imbalance market. The CAISO balancing area currently operates under an arguably less stringent mitigation criterion than other balancing areas in the energy imbalance market with respect to the application of market power mitigation when the balancing area as a whole is transmission constrained. It is reasonable to start by extending the same mitigation protocols that are designed to address the same type of system-level market power in the other energy

[22] 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.

[23] This observation was first made by the Market Surveillance Committee in its opinion on system market power mitigation published on November 5, 2019.

[24] Real-time import supply not only includes hourly transactions that could be scheduled in the HASP but also includes the flexible capacity offered by each EIM entity and available for dispatch in real-time. The Western EIM's economic dispatch would in the course of its routine operation replace high cost energy offers within the CAISO with lower cost energy from resources that would have other otherwise provided flexible ramping capacity elsewhere in the western interconnection. The dispatch would then use the high cost supply within the CAISO to provide flexiramp. This shifting of output would be constrained by amount of 15-minute ramp rate limited capacity within the CAISO that had been offered at high prices

imbalance market balancing areas with respect to constraints on import supply to the CAISO balancing area.

Stakeholders hold the view that mitigation could be applied to supply offers in all instances when the pivotal supplier test fails, whether or not the CAISO balancing area is import constrained. They suggest that such a design may not have any downside, since mitigation would not be triggered unless suppliers failed the pivotal supplier test, indicating the possible existence of system-level market power. However, in its recent opinion, the Market Surveillance Committee pointed out that under the CAISO's prevailing pivotal supplier test framework this is almost certainly not the case.

Using the CAISO's prevailing pivotal supplier test framework, without a pre-condition for constrained imports, the CAISO would risk mitigating supply offers in an unreasonable number of intervals when there is in fact no potential for the exercise of system market power. The pivotal supplier test does not necessarily indicate that there is a potential for the exercise of material market power and it does not show that any market power was exercised.[25] At a system level, the pivotal supplier test would only consider *cleared* import supply, rather than all cost-effective import supply, in order to prevent the test from being circumvented by the submission of very high cost import supply. The omission of import supply that did not clear but is otherwise cost-effective, could potentially cause such a pivotal supplier test for system market power to trigger mitigation when there is in fact no potential for the exercise of system-level market power. Similarly, the pivotal supplier test treats price-taking supply offered by a potentially pivotal supplier as being withheld when testing for pivotality, which overstates the amount of supply that the CAISO assumes could be withheld by the pivotal supplier. Finally, the pivotal supplier test does not account for the magnitude of load-serving obligations when testing net sellers for pivotality. Net sellers with load-serving obligations have no incentive to withhold the amount of supply needed to meet their demand.[26] These drawbacks of the pivotal supplier test may lead to an unreasonable number of false positives if not also combined with a test for conditions in which the CAISO balancing area is import constrained.

As an alternative to screening for simultaneously binding import constraints, some stakeholders hold the view that the CAISO could consider itself import constrained if it has exhausted all of the offers at an intertie constraint rather than only when an intertie constraint is binding. Generally, the point is that if no more import offers are available then internal demand does not have access to competitive external supply. However, under these circumstances, the physical transmission system did not limit demand's ability to import more competitive supply and suppliers both inside and outside the CAISO balancing area do not know whether other external suppliers will be offering more or less supply on the same interties, which would make predicting the

[25] The Market Surveillance Committee discussed shortcomings of the pivotal supplier test in Section IV of its opinion on system market power mitigation published on November 5, 2019.
[26] This has not been an issue when applying the pivotal supplier test within the CAISO to date because the load-serving entities with large amounts of supply have all been excluded from the pivotal supplier test as net buyers. This situation may no longer be the case within the CAISO with shifts in load-serving obligations due to the rise of community choice aggregators, and will certainly be an issue if a pivotal supplier test were to be used to test for whether a supplier is pivotal at a system-level.

uncompetitive condition difficult. Even so, a design where the CAISO would mitigate suppliers under these circumstances may be easily circumvented by suppliers offering very high-cost import energy.

Furthermore, the CAISO is generally concerned about the impact to the market if its estimates of resource costs are materially deficient. There are circumstances where this can occur today, but the effects are less extreme because the existing market power mitigation screens are not triggered in a potentially unreasonable number of intervals when there is in fact no potential for the exercise of market power. Although the CAISO continuously strives to enhance its market rules to more accurately account for a resource's actual marginal costs to calculate the reference levels used when the resource's bid is mitigated, the CAISO is generally concerned with market power mitigation methodologies that falsely trigger when there is no actual ability for resources to exercise market power. The CAISO agrees with the Market Surveillance Committee 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.[27]

The Market Surveillance Committee warned that, fundamentally, the application of beneficial mitigation relies on the ability of the CAISO to reasonably approximate the marginal costs of the resources whose offers it mitigates. It then outlined various examples illustrating that this task has been becoming increasingly difficult across the energy imbalance market over the last several years because: (1) the market has expanded into areas with less liquid and transparent natural gas markets; (2) there has been an expansion in the need to dispatch use limited resources in a more flexible manner than in the past to balance unpredictable variations in net load; (3) the amount of hydro resources with opportunity costs that are difficult to accurately measure have increased; and (4) substantial natural gas storage in southern California was lost after the Aliso Canyon incident, which has made southern California gas prices more volatile and difficult to predict. Although the CAISO has taken significant measures to address these issues over time,[28] the CAISO understands that estimates of a resource's marginal costs are never perfect and agrees with the Market Surveillance Committee that the accurate development of cost-based offer prices will likely become even more challenging with increased reliance on electricity storage resources, and potentially a wide variety of storage resources become available with disparate trade-offs between their long run costs and use patterns, to balance net load.[29]

[27] Market Surveillance Committee, "Opinion on System Market Power Mitigation," Section III, November 5, 2019.
[28] *See* CAISO CCDEBE Pending Filing FERC Docket ER19-2727-000 available at: http://www.caiso.com/Documents/Aug30-2019-TariffAmendment-CommitmentCosts-DefaultEnergyBidEnhancements-ER19-2727.pdf; *see also* CAISO local market power mitigation enhancements available at: http://www.caiso.com/Documents/Sep30-2019-Order-TariffRevisions-Accepting-Part-Rejecting-Part-LMPME-ER19-2347.pdf.
[29] *Id.*

6.2.2 Proposal

At this time, the CAISO proposes to apply the pivotal supplier test only in intervals when Malin, NOB, and Palo Verde are simultaneously binding. However, the CAISO seeks stakeholder input on whether it should consider itself import constrained under different circumstances, such as when it exhausts import offers (rather than when import constraints are binding) or when another or multiple sets of import constraints are binding.

Suppliers within the CAISO balancing area may be able to exercise market power on demand in the CAISO balancing area when demand has lost access to competitive west-wide supply. Demand within the CAISO would be completely cut off from additional external supply when all of the CAISO's import limits are simultaneously binding. Admittedly, it is extremely unlikely that *all* CAISO import limits will simultaneously bind. However, losing access to competitive west-wide supply on the CAISO's major interties may negatively impact competitive conditions within the CAISO balancing area.

Figure 3 below shows that approximately 60% of all import offers were made on Malin (MALIN500), NOB, and Palo Verde (PVWest) interties throughout 2018.

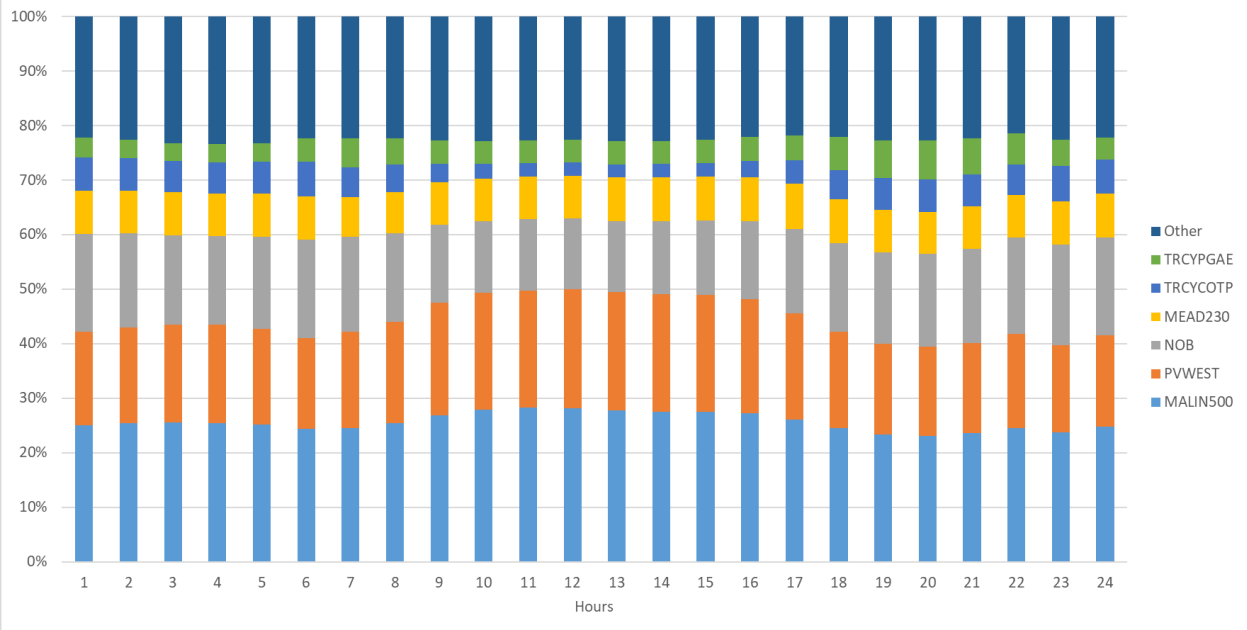

Figure 3: Percent of Total Hourly Import Offers per Intertie in 2018

Because a majority of competitive import supply is offered at only a few major interties, a reasonable approach would be for the CAISO to consider itself import constrained if its three major interties (Malin, NOB, Palo Verde) are constrained. This only occurred in one interval in the real-time market in 2018.[30] Regardless of how often this condition

[30] Based on a preliminary review of market data, Malin, Palo Verde, and NOB were simultaneously binding in one fifteen-minute interval in 2018.

happened in the past, the CAISO expects it to occur more frequently in the future as a result of tightening supply conditions in California.

Another way to evaluate for the CAISO's major competitive entryways is to compare import offer volumes at specific intertie locations to the intertie limits. If intertie offers rarely exceed certain intertie limits, perhaps there is something structurally deficient outside the CAISO that is limiting demand's ability to import competitive west-wide energy at certain locations. The CAISO has not yet completed this evaluation, but it may be another consideration in determining the when the CAISO should consider its balancing area import constrained.

The CAISO seeks stakeholder input on other ways to determine when it should consider itself import constrained.

6.3 Determine if the supply mix is competitive using a three pivotal supplier test

The CAISO proposes to calculate a system-level residual supply index by comparing the demand in its balancing area to the supply after removing the three largest suppliers to determine if the supply mix in the CAISO balancing area is competitive. If the CAISO is import constrained and this competitive test fails, the CAISO proposes to trigger system-level market power mitigation.

6.3.1 Discussion

The CAISO's current market power mitigation processes evaluate the structural competitiveness of the supply mix in constrained areas prior to mitigating resource offers. They measure a "residual supply index" after performing a "pivotal supplier test". The residual supply index and pivotal supplier test assess the sufficiency of supply available to meet demand after removing the capacity owned or controlled by one or more suppliers.

- **Residual supply index.** The residual supply index is the ratio of supply from non-pivotal suppliers to demand. A residual supply index less than 1.0 indicates an uncompetitive level of supply.

- **Pivotal supplier test.** If supply is insufficient to meet demand with the supply of any individual supplier removed, then this supplier is pivotal. This is referred to as a single pivotal supplier test. The two-pivotal supplier test is performed by removing supply owned or controlled by the two largest suppliers. For the three-pivotal test, supply of the three largest suppliers is removed.

The electric industry commonly tests a residual supply index by assuming two or three suppliers withhold supply in combination because of the potential for collusion between suppliers. The potential for such behavior is high in the electric industry because the demand for electricity is highly inelastic, and competition from new sources of supply is limited by long lead times and regulatory barriers to siting of new generation.

The pivotal supplier test has many advantages that make it a fairly effective screen at the local level. It combines aspects of supplier conduct and market structure. By measuring the amount of supply offered into the market at a given time, it measures the real-time conduct of suppliers. By testing if demand could be served if the three largest suppliers withheld their supply, it measures for structural conditions that are unlikely to change at a local level. Most importantly, the test can easily be applied pre-market so that any supplier that may try to exercise market power will not be able to negatively affect the market clearing prices that the CAISO pays and charges to market participants.

However, overall the pivotal supplier test is a fairly blunt and conservative test of competitiveness. It does not necessarily indicate that there is a potential for the exercise of material market power and it does not show that any market power was exercised.[31] A better indicator to identify if suppliers possessed material market power measures the ability of suppliers to successfully raise market clearing prices above market clearing prices that would result from cost-based offers. This is known as the "price-cost markup" which can be calculated after-the-fact. The Market Surveillance Committee recently compared pivotal supplier test results to after-the-fact price-cost markup test results to evaluate how well the pivotal supplier test at a system-level would indicate the potential for suppliers to exercise material market power. It found that while pivotal supplier tests indicate that there might have been some limited potential for market power at the system level, 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.[32] It also noted that there were many more hours during 2018 that failed the pivotal supplier test but did not produce significant mark-ups according the DMM benchmark analysis.[33]

The Market Surveillance Committee also identified many of the drawbacks of the pivotal supplier test that may be exacerbated if applied at the system-level. These drawbacks include the treatment of supply in generation pockets, the treatment of high cost supply, the treatment of price-taking supply, and accounting for net sellers' load-serving obligations.[34] These drawbacks may cause more problems if the CAISO were to apply the test at a system-level. For instance, since the pivotal supplier test framework currently does not take account of a net sellers' load-serving obligations, the test may consider a net seller as a pivotal supplier when that net seller may only actually be offering small amounts of supply beyond their load-serving obligation into the market. The pivotal supplier test would consider a much larger amount of supply as potentially withheld from the market when such a supplier actually has no incentive to withhold that much larger amount of supply from the market. At a system-level, a pivotal supplier test failure would result in the CAISO mitigating all suppliers in the CAISO footprint, while at a local level, only those suppliers in much smaller constrained areas may be impacted.

The Market Surveillance Committee commented in their opinion that a "conduct-and-impact" market power test would not have these same shortcomings. A conduct-and-impact test accounts for offer prices in calculating schedules and resulting impacts on prices while also accounting for the interaction of offers with transmission constraints. However, the Market Surveillance Committee did not recommend consideration and implementation of a conduct-and-impact test at this time.

[31] The Market Surveillance Committee discussed shortcomings of the pivotal supplier test in Section IV of its opinion on system market power mitigation published on November 5, 2019.
[32] The Market Surveillance Committee discussed their findings in Section II of its opinion on system market power mitigation published on November 5, 2019.
[33] The Market Surveillance Committee discussed their findings in Section III of its opinion on system market power mitigation published on November 5, 2019.
[34] 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.

The CAISO acknowledges the various drawbacks with the existing pivotal supplier test framework, but believes it can be reasonably workable at a system-level if combined with a constrained import pre-condition as described in ***Section 6.2***. The same drawbacks impact the CAISO's current local market power mitigation processes to a certain degree. As such, any major pivotal supplier test design enhancements should likely also be applied to the CAISO's existing processes. The CAISO can consider wholesale changes to the pivotal supplier test to apply to all of its market power mitigation processes in a later phase of this initiative.

6.3.2 Proposal

The CAISO proposes to calculate a residual supply index to detect uncompetitive system-level conditions by comparing the demand in its balancing area to the supply in each market interval. It will do this after removing the amount of supply provided by the three suppliers that submitted bids for the greatest amounts of supply for each market interval. The residual supply mix shows if the supply offered in the CAISO market for the CAISO balancing area is competitive. The CAISO proposes to mitigate supply bids if the CAISO balancing area is import constrained and the residual supply index shows demand in the CAISO balancing area cannot be met without the supply offered by the three suppliers offering the greatest amount of supply.

The CAISO proposes to calculate the residual supply index defined below in every interval that imports into the CAISO are constrained. The equation below is the ratio of non-pivotal supply compared to the amount of demand left to be served without competitive import supply. The numerator calculates the fringe supply (*i.e.*, non-pivotal supply) in the CAISO balancing area by subtracting the amount of supply provided by the three suppliers that submitted bids for the greatest amounts of supply from the supply offered from all resources inside the CAISO balancing area. The numerator does not include import offers because imports are not within the CAISO balancing area and import supply is accounted for in the denominator. The denominator calculates the amount of demand to be served by internal supply by subtracting the amount of import supply and energy imbalance market transfers from the CAISO balancing area's demand forecast. When the numerator is smaller than the denominator, this shows that there is not enough fringe supply inside the CAISO balancing area to serve internal demand not being served by imports and energy imbalance market transfers.

$$RSI3 = \frac{\sum \max(Internal\ Supply\ Offers) - \sum \min(Internal\ Pivotal\ Supply\ Offers)}{CAISO\ Balancing\ Area\ Demand - \sum Cleared\ Net\ Imports \mp Cleared\ Net\ EIM\ Transfers}$$

The internal supply offers that this calculation considers will be ramp constrained. This means that if a supplier has offers above the amount of supply it could feasibly ramp to in a given interval, the calculation will only consider the amount of supply it could feasibly ramp to. This calculation is consistent with the existing local market power mitigation pivotal supplier test and the energy imbalance market pivotal supplier test.

The calculation uses imports cleared in market power mitigation pass. The CAISO market executes two passes, the first pass (*i.e.*, the market power mitigation pass) calculates market prices based on submitted bids and the second pass uses mitigated bids where appropriate. If the CAISO were to use all import supply offers, import suppliers could submit higher-cost import supply to inflate the total supply, which may make the calculation show a more competitive situation than actually exists. The CAISO proposes to use cleared imports so that the test cannot be easily circumvented.

The Market Surveillance Committee suggested that the CAISO consider using imports cleared in the day-ahead market to perform the pivotal supplier test in the short-term unit commitment process, rather than import offers cleared using real-time supply bids. It was concerned that because the results from the short-term unit commitment process are not financially binding, import suppliers may use real-time bids within the short-term unit commitment horizon to cause the CAISO to not commit longer starting resources. The CAISO would then observe tighter supply conditions in the financially binding real-time market. The CAISO acknowledges this concern, but nonetheless proposes to align the system-level pivotal supplier test with its current local market power mitigation by using the real-time offers available as of the short-term unit commitment time.

6.4 Mitigate supply offers within the CAISO balancing area

6.4.1 Discussion

Supply offers in constrained and uncompetitive areas should be mitigated

In general, the CAISO's market power mitigation processes are designed to identify circumstances when suppliers could realistically exercise market power. They are designed this way because the CAISO does not believe that a supplier should be forced to sell power below its offer price if it cannot exercise market power. At the local level in the entire energy imbalance market footprint and at a system-level for non-CAISO balancing areas participating in the energy imbalance market, the CAISO market's market power mitigation processes identifies transmission constrained areas before mitigating bids for resources in the constrained areas. The CAISO applies this first check for whether an area is transmission constrained because demand in the constrained area is captive to the suppliers in that area. Those suppliers can arbitrarily raise energy prices in the area with impunity. Suppliers in constrained areas can successfully arbitrarily raise market prices because constrained areas lack the capability to bring in more economic external supply. Mitigating submitted bids should be dependent on demand in constrained areas having access to competitive supply.

The CAISO's balancing area can also be constrained in a way that limits the ability of demand to access competitive external supply. When the CAISO balancing area is import constrained and its supply mix is potentially uncompetitive, suppliers inside the CAISO balancing area could exercise market power on demand inside the CAISO balancing area. Under these circumstances, it would be appropriate for the CAISO market to mitigate offers from those suppliers whom can arbitrarily raise prices on captive demand (i.e. its internal resource offers).

Mitigating import supply offers could be potentially inappropriate and ineffective

Some stakeholders have advocated that the CAISO should mitigate import bids in addition to internal supply bids (*i.e.*, bids from non-import resources within the CAISO balancing area). Such a design would deviate from the common market power mitigation design and such offer mitigation may be inappropriate or ineffective. It would be inappropriate because the offers originate from an unconstrained and presumably competitive western interconnection. It would likely be ineffective because once the CAISO market's market power mitigation processes find that demand in its balancing area does not have access to additional competitive west-wide supply, mitigating offers from outside the constrained area cannot improve competitiveness within the constrained area. When import constraints are binding, the CAISO market has already cleared as many competitive import offers as it could feasibly clear.

There may be circumstances in which mitigating import supply offers could be appropriate, but it would be extremely difficult to confirm if it would be appropriate and it would likely be ineffective to mitigate import supply offers. Stakeholders that suggest

the CAISO should mitigate import offers also suggest that the CAISO should not pre-condition mitigation on the CAISO being import constrained. The CAISO acknowledges that the suggestion to mitigate import supply offers may be appropriate when the CAISO is not import constrained if two assumptions hold true: (1) if the broader western interconnection is uncompetitive and (2) if the suppliers offering imports at the CAISO's interties are pivotal to the entire western interconnection, rather than fringe suppliers. Under these assumptions, the CAISO may be able to reasonably conclude that the suppliers could potentially exercise market power across the western interconnection, which would then impact market clearing prices in the CAISO balancing area.

It may be unreasonable to simply assume that the western interconnection is uncompetitive. There is no information currently available to the CAISO and stakeholders to confirm that the western interconnection is uncompetitive and that import suppliers are pivotal in setting prices in the entire western interconnection. To do this, the CAISO would need to be able to fully define a constrained area that includes a portion of the western interconnection for which it does not operate the grid. Next, the CAISO would require information about the supply ownership in a portion of the western interconnection for which it does not operate the grid. The CAISO also would require information about the demand bids and supply bids outside its market. Finally, the CAISO would need resource-specific information on all resources in the constrained area so that it could estimate resource costs and appropriately mitigate bids from those resources, or develop another reasonable method to estimate external resource costs that would not be susceptible to the same potential exercise of market power (*i.e.*, a method that does not use west-wide electricity price information).

It may be unreasonable to simply assume that all entities offering to sell power at its interties are pivotal to the entire western interconnection. The Market Surveillance Committee recently noted in its opinion on system market power mitigation that entities that control large amounts of generation outside California also have large load-serving obligations.[35] 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.

If the CAISO were to mitigate import offers, the results would be ineffective. Consider if the CAISO chose to mitigate internal suppliers and import suppliers. During the net demand peak hours in which the CAISO is generally concerned about its market competitiveness, demand in California relies heavily on imported energy to supplement its internal capability. If external conditions actually are uncompetitive (as presumed), then one must also presume that import suppliers anticipating offer mitigation in CAISO's market will either withhold supply from the CAISO's market entirely or choose

[35] 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.

to offer it into parallel western markets rather than risk offer mitigation in the CAISO's market. The result could be detrimental because those imports that California demand relies on would offer their power in the bilateral markets in the west rather than risk offer mitigation in the CAISO's market. If the CAISO were to mitigate its internal and import suppliers, one can expect an overall lack of supply and likely higher CAISO clearing prices.

The only workable solution, presuming an uncompetitive western interconnection, would be for all supply offers from pivotal suppliers within the constrained area that includes a portion of the non-CAISO western interconnection to be mitigated, which goes beyond the purview of the CAISO. Under these circumstances, it would be the purview of the Federal Energy Regulatory Commission to address the uncompetitive western interconnection-wide conditions.

Potential basis for mitigating only resource adequacy import offers

Stakeholders have also suggested that the CAISO should consider mitigating resource adequacy import offers. For purposes of market power mitigation, the CAISO currently sees no reason to distinguish between import offers associated with *capacity* purchased under a state regulated capacity contract and all other import offers. The threshold question remains the same: can the supplier exercise market power on demand in a constrained and uncompetitive area? Regardless of if it is under a resource adequacy contract or not, if it can exercise market power, then it should be mitigated to ensure that the resulting prices are just and reasonable. As discussed above, the CAISO does not believe it is appropriate to mitigate import supply offers because they originate from outside of the constrained area.

Stakeholders have been concerned that some resource adequacy importers are economically withholding from the energy market by placing $1,000/MWh offers. These stakeholders recommend the CAISO to mitigate resource adequacy import offers 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 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 $1,000/MWh cannot be economic withholding from the western interconnection because the seller has no underlying supply to withhold. The submission of $1,000/MWh offers by import resource adequacy suppliers is an issue relating to the CAISO/California Public Utilities Commission resource adequacy design and should be addressed as such.

Mitigate all internal supply offers, rather than just pivotal suppliers

The CAISO's current market power mitigation processes mitigate all suppliers that are in the constrained area, even though fringe suppliers do not have an economic incentive raise their offer prices to try to economically withhold from the market. The CAISO acknowledges this drawback with the existing mitigation design, but does not propose to

deviate from this general design in its system-level market power mitigation process. The CAISO believes the current design to mitigate all suppliers is a reasonably cautious approach because there may be inaccuracies in determining pivotal suppliers. Updating the design to only mitigate pivotal suppliers would be a major mitigation design change and arguably should also be applied to the CAISO's existing processes. The CAISO can consider wholesale changes to the mitigation design to apply to all of its market power mitigation processes in a later phase of this initiative.

6.4.2 Proposal

The CAISO proposes to mitigate resource offers for resources inside the CAISO balancing area to each resource's default energy bid. The CAISO does not propose to mitigate import offers.

The CAISO's proposal only mitigates suppliers' offers when they are in potentially uncompetitive constrained areas. By first finding whether the CAISO balancing area is import constrained, the market power mitigation design considers whether demand in the balancing area has access to presumably competitive western interconnection-wide supply.

6.5 Determining the competitive LMP when the CAISO mitigates its balancing area

The CAISO proposes to mitigate energy imbalance market resource offers in a balancing area to the default energy bid when that balancing area fails its market power mitigation test and the CAISO balancing area also fails its market power mitigation test.

The potential for system-level market power in the CAISO balancing area is a significant issue because the CAISO's market power mitigation provisions currently are based on the assumption that the CAISO market is competitive at the balancing area (i.e., "system") level. Because of this assumption, the CAISO market's only mitigation for system-level market power in the CAISO balancing 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 area. Also because of this assumption, the market power processes used for both the CAISO balancing area as well as the other balancing areas in the energy imbalance market use a "competitive locational marginal price" calculated based on the prices within the CAISO balancing authority area.

In intervals when the CAISO balancing area is found uncompetitive, the CAISO's market power mitigation processes applied to energy imbalance market balancing areas cannot compare default energy bids to a competitive locational marginal price because a competitive locational marginal price does not exist.

If mitigation is triggered in an energy imbalance market balancing area using the existing market power mitigation processes and the CAISO is also found uncompetitive in the same interval, supply offers in energy imbalance market balancing areas will be mitigated to default energy bids, rather than to the maximum of the default energy bid and the competitive locational marginal price.

The Market Surveillance Committee noted that a design calling for the application of market power mitigation to resources located outside the CAISO but within the energy imbalance market could be applied but risks having the effect of reducing the supply offered by energy imbalance market entities to the minimum required to meet the energy imbalance market resource sufficiency test, thereby raising rather than lowering prices in the CAISO.[36] However, the CAISO believes that in the specific instances described in this section, an uncompetitive energy imbalance market balancing area and no true competitive locational marginal price, it is reasonable for the CAISO to mitigate resource offers to its default energy bid.

[36] Market Surveillance Committee "Opinion on System Market Power Mitigation," Section IV.B, published November 5, 2019.

7 Energy Imbalance Market Governing Body to have an advisory role

This initiative proposes to implement a system-level market power mitigation for the CAISO balancing authority area. Staff believes the EIM Governing Body should have an advisory role in the approval of the proposed changes.

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

At this stage of the initiative, it does not appear it would satisfy the first test, because 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, 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 moves ahead. If any stakeholder disagrees with this proposed classification, please include in your written comments a justification of which classification is more appropriate.

8 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 May 6, 2020 meeting and to the Board of Governors' at its May 20, 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
February 2020	Publish draft final proposal
February 2020	Stakeholder meeting
March 2020	Comments on draft final proposal due

February-March 2020	Tariff and BRS development
April 2020	Publish final proposal
April 2020	Comments on final proposal due
May 6, 2020	Energy Imbalance Market Governing Body meeting
May 20, 2020	Board of Governors meeting
Prior to Summer 2021	Implementation

Stakeholders should attend the stakeholder meeting on December 16, 2019 and provide written comments to initiativecomments@caiso.com by January 10, 2020.