California Independent
System Operator Corporation

March 26, 2021

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: California Independent System Operator Corporation
Docket No. ER21- ___-000

Tariff Amendment to Implement Summer 2021 Market Enhancements

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) submits this tariff amendment filing to prepare for summer 2021 in light of the performance of the CAISO's markets and supply shortages during last summer's heat wave events.[1] The proposed tariff revisions arise from root cause analyses of the controlled load shed events in August 2020 and CAISO discussions with stakeholders in the Market Enhancements for Summer 2021 Readiness stakeholder initiative. They reflect market rule and other enhancements feasible for the CAISO to implement by summer 2021. The CAISO proposes five categories of tariff revisions: (1) incentives for import schedules in the Hour Ahead Scheduling Process (HASP) during tight market conditions; (2) reliability demand response resource (RDRR) dispatch and real-time price impacts; (3) energy imbalance market (EIM) coordination and resource sufficiency test; (4) pricing enhancements during tight system conditions; and (5) generation interconnection process improvements.[2] The proposed tariff revisions, with other

[1] The CAISO submits this filing pursuant to section 205 of the Federal Power Act ("FPA"), 16 U.S.C. § 824d. Capitalized terms not otherwise defined herein have the meanings set forth in the CAISO tariff, and references to specific sections, articles, and appendices are references to sections, articles, and appendices in the current CAISO tariff and as revised or proposed in this filing, unless otherwise indicated.

[2] This is the first set of tariff revisions from the Market Enhancements for Summer 2021 Readiness initiative. In April 2021, the CAISO will file tariff revisions regarding the scheduling priorities for internal

actions the CAISO and state agencies are undertaking, will better position the CAISO to maintain reliable grid operations this summer and beyond.

To address the risks the CAISO faces in summer 2021, the proposed tariff revisions must become effective by the start of this summer. Therefore, the CAISO respectfully requests the Commission issue an order by May 25, 2021, accepting the proposed tariff revisions to be effective no later than June 15, 2021.[3] This will provide the CAISO and market participants sufficient time to prepare for implementing these changes. The CAISO requests authorization to notify market participants of the effective date of the tariff changes at least five days before implementation.[4]

From a substantive perspective, the five categories of tariff changes are separate and discrete from each other. They are separate elements of a multi-part filing severable from the tariff revisions in other categories. They are not interrelated, interdependent, or affected by Commission action on tariff revisions in any other category. Accordingly, the Commission should evaluate the justness and reasonableness of each of the proposed tariff revisions on its individual merits. Mere rejection of one proposed set of tariff revisions should not *per se* require rejection of any other set of tariff revisions.

It is critical the CAISO implement the proposed tariff provisions by the start of summer 2021 when high loads can occur. If the Commission believes it needs more information to assess one category of tariff changes, the Commission should either reject those tariff revisions or issue a deficiency letter only for that specific category of tariff revisions. The CAISO respectfully requests the Commission issue an order accepting the remainder of the tariff revisions.

I. EXECUTIVE SUMMARY

A heat wave affected the western United States for several consecutive days in mid-August 2020, causing energy supply shortages that led to two rotating power outages in the CAISO footprint on August 14 and 15. The CAISO, California Public Utilities Commission (CPUC), and California Energy Commission (CEC) subsequently undertook a root cause analysis of these events, and the CAISO Department of Market Monitoring (DMM) separately issued a report on the performance of the CAISO markets during these events. The CAISO also initiated an expedited Market Enhancements for

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load, exports, and wheeling through transactions in the day-ahead and real-time market optimizations.

[3] The CAISO tentatively plans on implementing the proposed enhancements on June 3, 2021, but desires flexibility regarding the implementation date if there is some delay.

[4] The CAISO has included an effective date of 12/31/9998 as part of the tariff records submitted in this filing. The CAISO will notify the Commission of the actual effective date of these tariff records within five business days of implementation in an eTariff submittal using Type of Filing code 150 – Report. *See Cal. Indep. Sys. Operator Corp.,* 172 FERC ¶ 61,263 (2020).

Summer 2021 Readiness stakeholder process to identify actions it could take to prepare for potential extreme weather events in the summer of 2021. The proposed tariff revisions arise from these efforts, and they will help ensure the CAISO has the appropriate operational tools and market rules to address tight supply conditions this summer and beyond. The measures will enhance the CAISO's market rules and processes to incentivize additional supply to be available during tight system conditions, better ensure each balancing authority area participates in the EIM with sufficient resources, improve the dispatch of RDRRs, and better ensure their CAISO market prices reflect their dispatch. Importantly, the proposed enhancements are implementable by summer 2021.

The CAISO proposes five categories of tariff revisions. First, the CAISO proposes to provide bid cost make whole payments for hourly intertie block schedules issued through HASP that provide energy during tight system conditions. The make whole payment provisions will apply only in those hours for which the CAISO has issued a notice of an anticipated or actual operating reserve shortage. The proposed tariff revisions seek to incentivize incremental imports during these narrowly defined operating conditions. The CAISO's current import settlement rules may not sufficiently incentivize suppliers to offer hourly block economic imports to the CAISO in the real-time market because, although the real-time market clears hourly block import bids based on HASP prices, it settles them at fifteen-minute market (FMM) prices. Thus, it is possible suppliers are paid a price that is less than their bid price.

Second, the CASO proposes tariff revisions to improve the bidding, dispatch, and pricing of RDRRs. The CAISO proposes to extend to RDRRs the hourly block and fifteen-minute bidding and dispatch options currently available to intertie resources and proxy demand resources. Currently, the CAISO dispatches RDRRs only in the CAISO's five-minute market, which can be problematic for RDRRs with operational constraints that require more notice and schedules that are more static. Extending the hourly block and fifteen-minute bidding options to RDRRs leverages existing market functionalities for resources that face similar constraints. These revisions will help RDRRs participate more effectively in the CAISO's real-time markets, thereby improving dispatch efficacy. Additionally, the CAISO is implementing several updates to its optimization software to implement currently effective tariff provisions. These software enhancements will ensure the CAISO can include RDRRs in the real-time market processes that precede real-time dispatch, thereby allowing the market optimization to effectively commit and dispatch RDRRs by accounting for their start-up and run times. As explained below, the CAISO expects these enhancements will better enable the market optimization to dispatch RDRRs, avoiding the need for the CAISO to rely on manual dispatch of RDRRs.

Third, the CAISO proposes two independent and severable elements to improve EIM operations and coordination. First, the CAISO proposes to add to the capacity test component of the EIM resource sufficiency evaluation an uncertainty requirement that captures a Balancing Authority Area's (BAA's) net load variability. This modification will

require participating EIM BAAs to submit sufficient schedules and bids to account for their net load forecast uncertainty, in addition to sufficient schedules to cover their forecasted load. The CAISO's proposal arises from its review of findings in the root cause analysis and discussions with stakeholders regarding the resource sufficiency evaluation's performance during last summer's tight conditions. By requiring BAAs provide sufficient capacity to meet their uncertainty needs in addition to forecasted load, the CAISO's proposal will better ensure each BAA brings sufficient resources into the real-time market.

The second EIM-related change mandates each EIM BAA use an automated market feature that updates the EIM BAA's "mirror resource" schedule when the market awards an import at a CAISO intertie scheduling point sourced from the EIM BAA. A mirror resource is one or more resources the EIM BAA has designated as the source of imports at CAISO scheduling points. These imports are separate from EIM transfers resulting from the EIM's resource-specific dispatch. Currently, it is optional for an EIM BAA to use the automated update functionality. This enhancement results from the CAISO's review of operational issues that occurred during last summer's heat event during which the CAISO's market systems and an EIM BAA used incorrect information in connection with updating a mirror resource's schedule. As a result, the market optimization relied on incorrect information about supply resources available to the EIM for dispatch. The CAISO's proposal addresses this modeling issue, and it will improve operational coordination between EIM BAAs.

The CAISO notes it has committed to commencing a stakeholder process later in 2021 to undertake a more comprehensive examination of potential changes to the resource sufficiency evaluation and consider changes to the consequences of failing the tests. Two stakeholders suggested the CAISO defer making any EIM–related changes pending the outcome of this comprehensive stakeholder process. However, there is no reason to defer these incremental, targeted enhancements that will provide clear benefits for summer 2021 and address discrete known issues revealed during the summer 2020 heat events.

Fourth, the CAISO proposes to revise the tariff to price all operating reserves at the energy bid cap when dispatched to provide energy in a system emergency. Currently, when the CAISO dispatches contingency reserves because of a contingency, the CAISO prices energy dispatched from the contingency reserves at the energy bid price submitted by market participant. Only when the CAISO is responding to a system emergency and has run out of economic bids, with no contingency, does the tariff allow the CAISO to price the energy dispatched from contingency reserves at the bid cap. However, the CAISO can only price "contingency only" reserves dispatched to provide at the energy under these circumstances bid cap. The current practice can cause real-time prices to decrease because the price of the energy bids can be below the current real-time market price, thereby suppressing prices even though the market needs to signal conditions are tight and more energy is needed. Under the CAISO's proposal, when the CAISO is arming its load to meet reserves, the CAISO will price the energy

released from the reserves at the applicable energy bid cap. This proposal not only will avoid deflating real-time prices during tight system conditions, it should help attract additional supply when most needed and encourage load-serving entities to schedule demand in the day-ahead market.

Some stakeholders believe the CAISO should consider this change with more comprehensive market design changes (*e.g.*, system market power mitigation). There is no legitimate reason to defer consideration of this enhancement. It is consistent with Commission shortage pricing principles, will improve price formation, and will enhance reliability. The CAISO's DMM and Market Surveillance Committee (MSC) support this pricing enhancement. System market power mitigation is not needed with this change because the resulting prices are unaffected by bid prices submitted by the supply resources.

Finally, the CAISO proposes two separate and severable improvements to the independent study interconnection process to address limitations on an independent study interconnection customers' ability to create capacity that load-serving entities can procure this summer. First, the CAISO proposes to eliminate the cap from the behind-the-meter expansion process that limits expansions to the lesser of 125 percent of the existing capacity or 100 MW. This will allow variable energy resources to hold excess energy when demand is low and then discharge that energy during the system peak. Second, the CAISO proposes to allow itself to award available interim deliverability on a temporary basis. The independent study process currently requires independent study interconnection customers to participate as "energy only" until they can participate in the next cluster deliverability assessment. Thus, even if deliverability is available and unused, the CAISO cannot allocate it to independent study interconnection customers on a temporary basis. The CAISO's proposal will maximize available deliverability capacity load serving entities can use to bolster their portfolios for summer 2021. It will allow independent study interconnection customers to use available deliverability if they come online quickly, while preventing queue jumping for deliverability.

II. BACKGROUND

A. Summer 2020 Heat Events

During August 14-19, 2020, California experienced statewide extreme heat with temperatures 10-20 degrees above normal. The rest of the west also experienced record or near record highs with forecasts ranging from five to 20 degrees above normal. This west-wide heat wave significantly affected demand for and supply of generation. On August 14 and 15, 2020, the CAISO was forced to institute rotating electricity outages. On August 14, the CAISO ordered two phases of controlled load shed of 500 MW each, based on a *pro-rata* share across the CAISO footprint for distribution utility companies. On August 15, the CAISO ordered distribution utility operators to execute about 500 MW of controlled load shed on their respective distribution systems.

From August 16 through 19, the forecast was for excessive heat in California. During this period, various portions of the western region began to cool off, and imports increased on those days. The most critical days were Monday, August 17, and Tuesday, August 18, and the CAISO declared Stage 2 Emergencies for both days. However, the CAISO avoided controlled load shed and rotating outages.

On August 16, Governor Newsom declared a State of Emergency[5] because of the extreme heat wave in California and surrounding western states. The proclamation gave the California Air Resources Board maximum discretion to permit the use of stationary and portable generators, as well as auxiliary ship engines, to reduce load and increase generation. On August 17, Governor Newsom issued Executive Order N-74-20,[6] which suspended restrictions on the amount of power facilities could generate, the fuel they could use, and the air quality requirements that prevented facilities from generating additional power during peak demand periods. Because of the conservation messaging and awareness created by the State of Emergency, the state significantly reduced peak demand by as much as 4,000 MW (compared to day-ahead forecasts) on August 17 through 19.

In addition to the extreme heat wave in mid-August, the CAISO footprint experienced another period of high temperatures and demand over the 2020 Labor Day weekend, specifically on Sunday, September 6, and Monday, September 7. Similar to August 17-19, there was considerable conservation from the public, and the CAISO did not need to shed load.

B. Root Cause Analysis

Following the summer 2020 heat wave events, the CAISO, CPUC, and CEC undertook a root cause analysis of the events leading to the outages. They published a Preliminary Root Cause Analysis on October 6, 2020[7] and a Final Root Cause Analysis on January 13, 2021.[8] The Final Root Cause Analysis identified three major causal factors contributing to the August outages—extreme weather conditions, resource

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5 https://www.gov.ca.gov/wp-content/uploads/2020/08/8.16.20-Extreme-Heat-Event-proclamation-text.pdf.

6 https://www.gov.ca.gov/wp-content/uploads/2020/08/8.17.20-EO-N-74-20.pdf.

7 CAISO, CPUC, and CEC, *Preliminary Root Cause Analysis Mid-August 2020 Heat Storm*, October 6, 2020. The Preliminary Root Cause Analysis is available at http://www.caiso.com/Documents/Preliminary-Root-Cause-Analysis-Rotating-Outages-August-2020.pdf.

8 CAISO, CPUC, and CEC, *Final Root Cause Analysis Mid-August 2020 Extreme Heat Wave*, January 13, 2021, available at http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf.

adequacy and planning processes, and market practices.[9] In summary, these factors were:

1. *The climate change-induced extreme heat wave across the western United States resulted in demand for electricity exceeding existing electricity resource adequacy (RA) and planning targets.* The extreme heat wave experienced in August 2020 was a 1-in-30 year weather event in California. In addition, because the extreme heat wave extended across the western United States, resources in neighboring areas were also strained.

2. *In transitioning to a reliable, clean, and affordable resource mix, resource-planning targets have not kept pace to ensure sufficient resources that can be relied upon to meet demand in the early evening hours. This made balancing demand and supply more challenging during the extreme heat wave.* The rotating outages both occurred after the gross peak demand period, during the "net demand peak," which is the peak of demand net of solar and wind generation resources. With today's new resource mix, behind-the-meter and front-of-meter (utility-scale) solar generation declines in the late afternoon at a faster rate than demand decreases. These changes in the resource mix and the timing of the net peak have increased the challenge of maintaining system reliability, and this amplifies the challenge during an extreme heat wave.

3. *Some practices in the day-ahead energy market exacerbated the supply challenges under highly stressed conditions*.[10] A subset of energy market practices contributed to the inability to obtain or prioritize energy to serve CAISO load in the day-ahead market that could have otherwise relieved the strained conditions on the CAISO grid on August 14 and 15. The practices that obscured the tight physical supply conditions included under-scheduling of demand in the day-ahead market by load serving entities or their scheduling coordinators and convergence bidding reflecting financial supply positions. In addition, the combination of existing real-time scheduling priorities and a previously implemented market enhancement inadvertently caused the CAISO's markets to fail to account for the obscuring effects of under-

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[9] *Id.* at 3-5.

[10] The CAISO's DMM also issued a Report on *System and Market Conditions, Issues and Performance: August and September 2020* (DMM Report). The DMM Report is available at: http://www.caiso.com/Documents/ReportonMarketConditionsIssuesandPerformanceAugustandSeptember2020-Nov242020.pdf. The DMM Report found "there was no single root cause of the load shedding events occurring on August 14-15." DMM Report at 1. Rather, the load outages "resulted from the combined effect of a series of factors." *Id.* The DMM Report offered several recommendations to address potential resource shortages in future years.

scheduling and convergence bidding during August's stressed operating conditions.

The Final Root Cause analysis noted the CAISO, CPUC, and CEC had taken several actions, and were continuing their efforts, to prepare California for extreme heat waves in summer 2021 without having to resort to rotating outages. The Final Root Cause Analysis stated the near-term actions to prepare for summer 2021 included, among other actions:[11]

1) The CPUC opened an Emergency Reliability Rulemaking proceeding (R.20-11-003) to procure additional resources to meet California's electricity demand in summer 2021. Through this proceeding, the CPUC has already directed the state's three large investor-owned utilities to seek contracts for additional supply-side capacity and has requested proposals for additional demand-side resources that can be available during the net demand peak period (*i.*e., the hours past the gross peak when solar production is very low or zero) for summer 2021 and summer 2022. The CPUC and parties to the proceeding, including the CAISO, will continue to evaluate proposals and procurement targets for both supply-side and demand-side resources.

2) The CAISO is continuing to perform analysis supporting an increase to the CPUC's RA program procurement targets. Based on the analysis to date, the CAISO recommends that the targets apply to both the gross peak and the critical hour of the net demand peak period during the months of June through October 2021.

3) The CAISO is expediting a stakeholder process to consider market rule and practice changes by June 2021 that will ensure the CAISO's market mechanisms accurately reflect the actual balance of supply and demand during stressed operating conditions. This initiative will consider changes that incentivize accurate scheduling in the day-ahead market, appropriate prioritization of export schedules, and evaluate performance incentives and penalties for the RA fleet. The CAISO is also working with stakeholders to ensure the efficient and reliable operation of battery storage resources given the significant amount of new storage that will be on the system next summer and beyond. Through a stakeholder process, the CAISO will pursue changes to its planned outage rules.

4) The CPUC is tracking progress on generation and battery storage projects that are currently under construction in California to ensure

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[11] Final Root Cause Analysis at 1-3.

there are no CPUC-related regulatory barriers that would prevent them from being completed by their targeted online dates. The CAISO will continue to work with developers to address interconnection issues as they arise.

5) The CAISO and CEC will coordinate with non-CPUC-jurisdictional entities to encourage additional necessary procurement by such entities.

6) The CEC is conducting probabilistic studies that evaluate the loss of load expectation on the California system to determine the amount of capacity that needs to be installed to meet the desired service reliability targets.

7) The CAISO, CPUC, and CEC are planning to enhance the efficacy of Flex Alerts to maximize consumer conservation and other demand side efforts during extreme heat events.

8) Preparations by the CAISO, CPUC, and CEC are underway to improve advance coordination for contingencies, including communication protocols and development of a contingency plan. The contingency plan will draw from actions taken statewide under the leadership of the Governor's Office to mitigate the anticipated shortfall from August 17 through 19, 2020.

The tariff amendments proposed herein arise from the stakeholder initiative referenced in item #3 above as a current action to prepare for summer 2021.[12] Also, as referenced in item #3 above, in the CAISO's Resource Adequacy Enhancements stakeholder initiative the CAISO and stakeholders have been considering changes to the planned outage rules and rules to ensure the availability of storage resources providing resource adequacy capacity during periods of extreme need. The CAISO will make a tariff amendment filing under Section 205 of the Federal Power Act to implement these and other RA-related enhancements by the end of March 2021, to be effective June 1, 2021.[13]

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[12] The Final Root Cause Analysis identifies other market rule enhancements the CAISO is considering in separate stakeholder processes, as well as CAISO, CPUC, and CEC efforts regarding resource planning and development, situational awareness, and contingency planning. Final Root Cause Analysis at 71-76. Several of these are mid-term and long-term efforts to explore changes that are not implementable by summer 2021. The Market Enhancements for Summer 2021 Readiness initiative focused on rule changes that were feasible and the CAISO could implement by summer 2021.

[13] The CAISO also has been an active participant in the CPUC's Emergency Reliability Rulemaking proceeding referenced in the Final Root Cause Analysis. *See Order Instituting Rulemaking to establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the Event of an*

C. Market Enhancements for Summer 2021 Readiness Stakeholder Initiative

On January 5, 2021, the CAISO formally commenced the Market Enhancements for Summer 2021 Readiness initiative by posting a presentation regarding the scope of the initiative.[14] The CAISO noted the focus of the initiative was on market rules and procedural changes necessary to prepare the CAISO to manage heat events in summer 2021. The CAISO indicated it would file any necessary tariff changes by April, for June 2021 implementation. The presentation identified the initial topics the CAISO identified for consideration in the initiative as:

1. Export and load priorities[15]
2. Reliability demand response resource dispatch and real-time price impacts
3. Requirements for storage resources during tight system conditions[16]

Extreme Weather Event in 2021, Rulemaking 20-11-003 (Filed Nov. 19, 2020). The CAISO recommended, *inter alia*, the CPUC take the following actions: (1) increase the planning reserve margin from 15 percent to 17.5 percent for the months of June through October 2021, (2) authorize incremental import procurement, (3) fund the Flex Alert paid advertising program, and (4) adopt an Emergency Load Reduction Program (ELRP) in addition to the resource adequacy program to provide insurance value during stressed system conditions. On February 11, 2021, the CPUC issued its first decision (Decision 21-02-028) in the proceeding authorizing the investor owned utilities (IOUs) to contract for (1) incremental capacity from existing power plants through efficiency upgrades, (2) generation at-risk of retirement, (3) incremental energy storage capacity, and (4) firm forward imports. All resources must be deliverable during both the peak and net peak demand periods. On March 25, 2021, the CPUC issued a second decision (1) retaining the existing 15 percent PRM but authorizing incremental procurement by the IOUs to be shown as resource adequacy capacity, which would result in an implied PRM of 17.5 percent for 2021 and 2022, (2) approving funding for a statewide Flex Alert paid media campaign, and (3) approving an ELRP pilot program.

[14] The record of the CAISO's Market Enhancements for Summer 2021 Readiness initiative, including all documents posted by the CAISO and submitted by stakeholders, are available at https://stakeholdercenter.caiso.com/StakeholderInitiatives/Market-enhancements-for-summer-2021-readiness.

[15] During the stakeholder process, the CAISO severed consideration of the load, export, and wheeling through issues from the changes that are part of this tariff amendment filing. As indicated above, the CAISO will file tariff revisions regarding load, export, and wheeling through priorities in a separate Section 205 tariff amendment filing in late April. The CAISO will separately present its proposals to the CAISO Board in April.

[16] Prior to commencing the Market Enhancements for Summer 2021 Readiness initiative, the CAISO was already considering measures to operationalize storage in the ongoing Resource Adequacy Enhancements initiative. Although the CAISO also discussed issues regarding the management of storage resources in tight conditions in the Market Enhancements for Summer 2021 Readiness initiative given its relevance, considering specific proposals regarding storage dispatch remained an essential element of the RA Enhancements initiative. As indicated *supra*, in late March 2021, the CAISO will file

4. Cost recovery provisions for hourly block imports during tight system conditions
5. Short term scarcity price enhancements
6. EIM coordination and resource sufficiency test review
7. Other items that can be vetted though stakeholder process and implemented by June 1

On January 6, 2021, the CAISO held a call with stakeholders to discuss the issues it had identified for consideration and the initiative schedule. The CAISO provided stakeholders an opportunity to submit written comments in response to the presentation.[17]

The CAISO posted a straw proposal on January 25, 2021 and held a call with stakeholders to discuss it on January 26, 2021. The CAISO also held a follow-up call on January 29, 2021. The CAISO provided stakeholders an opportunity to submit written comments on the straw proposal.

The CAISO discussed its proposals at a MSC meeting on February 11, 2021. The CAISO posted a draft final proposal and an initial draft of proposed tariff language on February 18, 2021. The CAISO held a stakeholder call to discuss the draft final proposal on February 22, 2021 and a separate call to discuss the draft tariff language and business requirements associated with the proposed changes on February 26, 2021. The CAISO provided stakeholders an opportunity to submit written comments on both the draft final proposal and the draft tariff language. The CAISO posted revised tariff language on March 10, 2021 and held a call with stakeholders on March 18, 2021.

On March 10, 2021, the EIM Governing Body, under its primary approval authority, unanimously approved the CAISO's proposals to (1) enhance the resource sufficiency evaluation to ensure each balancing authority area participates in the EIM with the necessary resources, and (2) require EIM BAAs use an automated market feature that updates the EIM BAA's "mirror resource" schedule when the market awards an import at a CAISO intertie scheduling point sourced from the EIM BAA. In addition, the EIM Governing Body, in its advisory capacity, supported the proposed market enhancement regarding contingency reserve pricing.[18]

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tariff revisions regarding how the market will dispatch storage as part of Phase I of the Resource Adequacy Enhancements initiative.

[17] The CAISO held a workshop on January 14, 2021 to discuss load and export priorities and a second workshop on January 15, 2021 to discuss EIM coordination and the resource sufficiency evaluation.

[18] The March 3, 2021 Memorandum and March 10, 2021 Presentation to the EIM Governing Body regarding the Decision on Market Enhancements for Summer 2021 Readiness are Documents are included in Attachment C to this filing.

On March 19, 2021, the CAISO posted a Final Proposal. At its March 24-25, 2021 meeting, the CAISO Board of Governors authorized the CAISO to file the tariff revisions reflected in this filing.[19]

D. Market Surveillance Committee Opinion

On March 8, 2021, the MSC issued an Opinion commenting on three of the topics considered in the Market Enhancements for Summer 2021 Readiness initiative: revision of short-term scarcity pricing capabilities; resource sufficiency evaluation tests applied to individual BAAs in the EIM; and bid cost recovery provisions for block imports participating in the HASP.[20]

First, the MSC finds the CAISO's proposal to price all operating reserves at the hard energy bid cap when dispatched to provide energy in a system emergency "will address a critical limitation of the current pricing rules in time to reduce the potential need for load shedding as a result of inadequate supply during the coming summer."[21]

Second, the MSC Opinion recognizes there is "fairly widespread stakeholder support" for the CAISO's proposal to include the full amount of the flexible ramping product uncertainty requirement in the bid range capacity requirement of the EIM. The MSC recommends the CAISO "carefully test the implementation in order to understand its impacts and avoid unintended consequences."[22] The MSC also suggests the CAISO may "also want to retain the ability to switch this feature off on short notice if it becomes apparent it is operating in a manner materially different than intended."[23] The MSC also agrees the CAISO should not implement any major substantive changes in the EIM resource sufficiency test before summer 2021.[24] In that regard, the MSC Opinion concludes there are complex interactions between participating in the EIM dispatch and potential tests that account for ramp and commitment decisions that could have serious unintended consequences if any changes to the test are not carefully developed and

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[19] The March 17, 2021 Memorandum and March 24, 2021 Presentation to the CAISO Board regarding the Decision on Market Enhancements for Summer 2021 Readiness are included in Attachment D hereto. Attachment D also includes a March 17, 2021 Update from the CAISO's Department of Market Monitoring to the CAISO Board of Governors supporting the proposed market enhancements for summer 2021 (DMM Update to CAISO Board).

[20] The CAISO includes the Market Surveillance Committee Opinion in Attachment E to this filing.

[21] *Id.* at 7.

[22] MSC Opinion at 11.

[23] *Id*.

[24] *Id.* at 7.

tested. The MSC Opinion identifies several issues the CAISO should address in considering changes to the resource sufficiency test.

Finally, the MSC Opinion recognizes the CAISO's HASP make whole payment proposal is implementable by summer 2021 and will establish a relatively circumscribed application of make whole payments for hourly block imports. The MSC believes the proposal will be effective in eliminating the potential for material reductions in import supply during highly stressed system conditions because of the risk HASP will schedule them, but they will be paid materially less than their as-bid costs.[25] The MSC Opinion concludes the risks of adverse market outcomes from strategic behavior, in offsetting schedules or inflated offers to increase make whole payments, are likely to be small, given the narrow set of circumstances in which the payments would apply. The MSC Opinion recommends the CAISO monitor market behavior for such strategic behavior. The MSC Opinion also encourages the CAISO to consider as a long-term remedy, implementing a HASP market with fifteen-minute prices that would settle all import, export, and internal resource deviations from day-ahead schedules.

III. PROPOSED TARIFF REVISIONS

Through the Market Enhancements for Summer 2021 Readiness stakeholder process, the CAISO developed market enhancements to prepare it for summer 2021. Below, the CAISO discusses the proposed tariff revisions implementing the market enhancements it developed through the stakeholder process.

A. Tariff Changes to Incentivize Supplies from Hourly Block Imports

The CAISO proposes to provide bid price make whole payments for hourly block economic imports dispatched by the real-time market during tight supply conditions. These changes will provide a stronger incentive for suppliers to offer import supply to the CAISO BAA during tight supply conditions when it can especially need these imports.

1. Background

As part of the CAISO's real-time market, scheduling coordinators may submit economic bids for the HASP, which starts approximately 71.5 minutes before the trading hour.[26] HASP is a special run of the CAISO's real-time unit commitment that clears

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[25] *Id.* at 19.

[26] Existing CAISO tariff section 34.2; s*ee also* Business Practice Manual for Market Operation at Section 7.1.1. For the sake of clarity, this transmittal letter distinguishes between existing tariff sections (*i.e*., sections in the current CAISO tariff), new tariff sections (*i.e.,* new sections the CAISO proposes to add to the tariff in this filing), and revised tariff sections (*i.e*., existing tariff sections the CAISO proposes to

intertie bids and self-schedules.[27] Approximately 45 minutes before the trading hour, HASP produces advisory schedules for internal resources and binding hourly block energy schedules for imports and exports, *i.e.*, HASP block intertie schedules.[28] Although HASP is operationally binding, the CAISO settles HASP block intertie schedules at prices generated by the CAISO's fifteen-minute market.[29]

The CAISO established this pricing rule when it introduced its fifteen-minute market to address real-time imbalance energy offset charges.[30] These imbalance charges arose in part because, under the CAISO's prior market design, intertie transactions were financially binding based on HASP locational marginal prices, but load and internal generation schedules were financially binding based on real-time dispatch locational marginal prices. The HASP and real-time dispatch market runs occur at different times and with different market interval durations. This resulted in market uplifts in the form of real-time imbalance energy offset charges because of differences between HASP and real-time dispatch prices.

Implementing a fifteen-minute market allowed the CAISO to align prices for intertie transactions, internal generation, and load, thereby reducing real-time imbalance energy offset charges. However, given hourly scheduling practices throughout the Western Interconnection, the CAISO has continued to utilize the HASP to clear hourly block intertie schedules based on advisory locational marginal prices. The CAISO now settles these schedules at the fifteen-minute market locational marginal prices.[31] In addition, the CAISO adopted a rule to make hourly block intertie schedules ineligible for bid cost recovery.[32] The CAISO designed this rule to encourage scheduling

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revise in this filing).

[27] The real-time unit commitment process (RTUC) establishes financially binding ancillary services awards and unit commitment for internal generation. The RTUC is a market optimization run that performs a security constrained unit commitment with fifteen-minute granularity based on a forecast for ISO demand. The RTUC function also performs a security constrained economic dispatch that establishes financially non-binding energy schedules for the interval in which it runs and subsequent intervals within its time horizon.

[28] HASP also produces advisory schedules for Economic Hourly Block Bids with an Intra-Hour Option that allows scheduling coordinators to change their schedules for economic reasons once in the Trading Hour. HASP also produces advisory schedules for fifteen-minute dispatchable imports and exports. Existing CAISO tariff section 34.2.1.

[29] Existing CAISO tariff section 11.5.

[30] *Cal. Indep. Sys. Operator Corp*., 146 FERC ¶ 61,204 (2014). *See also* CAISO tariff amendment to implement real-time market design enhancements related to Order No. 764 dated November 26, 2013 in Commission Docket ER14-480.

[31] Existing CAISO tariff section 11.5.

[32] *Cal. Indep. Sys. Operator Corp* .146 FERC ¶ 61,204 (2014) at P 59. In the CAISO's market, bid cost recovery provides a settlements process through which eligible resources can recover their bid costs

coordinators to submit economic intertie bids in the fifteen-minute market, which would provide the CAISO with greater dispatch flexibility in real-time. The rule also foreclosed the potential for anomalous scheduling practices in which a market participant might submit offsetting hourly and fifteen-minute market schedules that would generate net revenues when hourly prices were greater than fifteen-minute market prices.

During some conditions, fifteen-minute market prices may be lower than the bid price for hourly block intertie schedules. This may create a disincentive for suppliers to offer incremental imports into the real-time market. The MSC concurs with this observation and believes it is reasonable to remove the possible disincentive to schedule imports during times of system stress.[33]

During stressed grid conditions, the risk of receiving a payment less than bid price can increase, in part, because the CAISO may take out-of-market actions before the fifteen-minute market that result in fifteen-minute prices clearing at amounts below a HASP intertie block bid. For example, the CAISO may make upward adjustments to the load forecast in HASP or make out-of-market import purchases. These measures tend to cause prices in the FMM to be lower relative to HASP prices. For example, on August 16, 2020 for hour ending 19, the CAISO made out-of-market purchases of imported energy. The HASP price for hour ending 19 the CAISO used to clear hourly block import bids at the Nevada Oregon Border intertie was $262/MWh. However, the fifteen-minute market prices used to settle those imports averaged negative $149/MWh for that hour. These negative prices resulted from the out-of-market purchases, which created congestion in the fifteen-minute market. As a result, suppliers in HASP faced a charge as opposed to a payment to deliver needed imports.

In its Report on Market Issues and Performance for the third quarter of 2020, the CAISO's DMM analyzed the compensation of hourly block economic imports after the August 2020 events. DMM's analysis calculated hourly block economic imports' revenues compensation at fifteen-minute market prices compared to HASP prices. DMM determined, for the hours analyzed, overall fifteen-minute market revenues exceeded potential revenues at HASP prices, even though HASP prices were higher than fifteen-minute prices in some hours during this period. Nonetheless, DMM observed a bid cost recovery or pay-as-bid option may be appropriate during high demand hours.[34]

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not otherwise recovered through market revenues in the day ahead and real-time markets, respectively.

[33] MSC Opinion at 15.

[34] The Department of Market Monitoring *Q3 2020 Report on Market Issues and Performance, Special Issues*, at 114. http://www.caiso.com/Documents/2020ThirdQuarterReportonMarketIssuesandPerformance-Feb4-2021.pdf

2. Proposed Tariff Revisions to Incentivize Imports during Tight System Conditions

The CAISO proposes to add tariff provisions for an hourly bid cost make whole payment to scheduling coordinators for real-time market hourly block intertie schedules that provide energy during tight system conditions.[35] This proposal will ensure scheduling coordinators receive payment for their schedules at least equal to their bid price during these trading hours. These make whole payments will not affect locational marginal prices. The CAISO will continue to settle hourly block intertie schedules at fifteen-minute market prices, but will offer a make whole payment for these schedules in very limited instances. Unlike bid cost recovery payments, the CAISO will not net these bid costs against market revenues over the period of the operating day.[36] The CAISO proposes to allocate the costs of these payments to measured demand, *i.e.*, CAISO balancing authority area metered demand and exports, in the applicable trading hour(s).

a. The CAISO's proposed tariff revisions will apply only in limited circumstances and only to incremental imports

The proposed tariff provisions specify the conditions under which scheduling coordinators may be eligible for a make whole payment associated with an hourly block intertie schedule that provides energy during tight system conditions.[37] Eligibility for this make whole payment will only occur during hours in which the CAISO has issued a notice it anticipates or is experiencing an operating reserve shortage during those hours.[38] In all other hours, the CAISO will continue to settle hourly block intertie schedules at fifteen-minute market prices with no opportunity for a make whole payment. During hours when the CAISO anticipates or experiences an operating

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[35] *See* New tariff section 11.21.3. The CAISO has also proposed minor edits to the heading for CAISO tariff section 11.21.

[36] The CAISO elected not to propose that HASP block intertie schedules qualify for BCR in part because of implementation lead required for such a proposal. In addition, the CAISO does not desire to change the general market framework for intertie schedules at this time. In addition, the CAISO nets BCR payments in the real-time market against a resource's real-time market revenues over the operating day. In this filing, the CAISO merely wants to ensure an appropriate incentive exists within a specific operating hour for a scheduling coordinator to provide incremental imports.

[37] *See* New tariff section 11.21.3.

[38] *See* New tariff section 11.21.3.1. The CAISO uses its alert, warning, and notices to inform the market of potential or actual operating reserve shortages. For example, on August 13, 2020, the CAISO issued a notice regarding an anticipated operating reserve shortage on August 14, 2020 for hours 1700-2100. On August 14, 2020, the CAISO issued a similar notice for hours 1200-2359, as well as emergency notices reflecting an actual operating reserve shortage between hours 1520-2100 and 1836-2038, respectively. Under the proposed language in tariff section 11.21.3.1, the make whole payment proposal would have applied to trading hours 1200-2359 on August 14, 2020.

reserve shortage and needs more supply, scheduling coordinators should not face the risk they will receive less than their bid price for their cleared HASP block intertie schedules.

The make whole payment will apply to fifteen-minute market optimal energy provided by the HASP block intertie schedule that is either incremental to any day-ahead market energy schedule or decremental to a day-ahead market export schedule.[39] The make whole payment will provide an appropriate incentive for scheduling coordinators to submit real-time supply offers when they know or anticipate the CAISO's system will face stressed operating conditions.

The CAISO, however, will not apply the make whole payment to any intertie resources subject to the CAISO's HASP reversal rule or intertie scheduling deviation rules during the applicable operating hour.[40] Wheeling through schedules will also be ineligible for the make whole payment.

The intent of the CAISO's proposal is to obtain incremental import supply when system conditions reflect an operating reserve shortage. The CAISO's HASP reversal rule deters implicit virtual bidding, which is the practice of scheduling physical intertie transactions in the day-ahead market with no physical resource backing the schedule, to liquidate the schedule in the fifteen-minute market and arbitraging the positive difference between the day-ahead and fifteen-minute market energy price. The rule requires a scheduling coordinator to maintain E-Tags through the HASP. The CAISO will not extend a make whole payment to an intertie resource with day-ahead scheduled quantities subject to the HASP reversal rule.[41] This eligibility criterion will help ensure the CAISO obtains incremental supply through either an increased import or a decreased export in real-time based on tagged quantities in HASP.

The CAISO will also not apply the make whole payment to an intertie resource with scheduled quantities subject to the CAISO's intertie deviation settlement rules.[42] These rules seek to address non-delivered intertie transactions by assessing an under/over delivery charge to a scheduling coordinator with an intertie transaction if the intertie resource supporting that transaction has a positive under/over delivery quantity. For HASP block intertie schedules, the under/over delivery quantity is the absolute value of the difference between the HASP block intertie schedule and final quantity of the energy profile on the Intertie transaction's E-Tag (or zero if the scheduling

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[39] In the case of HASP block intertie schedules, the CAISO considers all energy associated with a HASP block intertie schedule that matches the bid quantity as fifteen-minute market optimal energy.

[40] New CAISO tariff section 11.21.3.1.

[41] New CAISO tariff section 11.21.3.1 referencing CAISO tariff section 11.32.

[42] New CAISO tariff section 11.21.3.1 referencing CAISO tariff section 11.31.

coordinator does not submit an E-tag).[43] By making intertie resources with these under/over delivery quantities ineligible to receive make whole payments, the CAISO will incentivize scheduling coordinators to deliver the HASP block intertie schedule awarded by the market to ensure adequate balance of supply and demand.

Wheeling-through schedules will be ineligible for the make whole payment because they do not provide incremental energy to the CAISO BAA. This is consistent with the objective of the make whole payment—to incentive incremental supply for the CAISO BAA during periods of tight system conditions.

Finally, the CAISO proposes tariff authority to suspend its proposed make whole payment rule if it concludes the payment is not resulting in incremental supply. For example, if the CAISO observes scheduling coordinators submitting high real-time market bids in HASP to reverse day-ahead energy import schedules, and submitting separate real-time HASP block import bids that seek to qualify for a make whole payment, the CAISO may need to suspend eligibility for the make whole payment. Scheduling coordinators might also submit offsetting trades (imports and exports) that could have different real-time settlements to earn positive revenue in the form of the make whole payment whenever HASP or the fifteen-minute market settle the transactions at different prices.[44] Under such circumstances, the CAISO would effectively not receive any incremental supply in the real-time market in response to its anticipated or actual operating reserve shortage. Given the limited trading hours in which the make whole payment will apply, the CAISO does not believe such bidding practices are likely, but the Commission should authorize the CAISO to prevent outcomes adverse to the market if it detects such behavior.[45] The Commission has granted the CAISO similar authority in the CAISO's convergence bidding tariff rules.[46] Regarding the CAISO's authority to suspend convergence bidding, the Commission required the CAISO to include tariff provisions explaining the instances in which the CAISO will exercise such authority. Here, determining the CAISO is not obtaining incremental supply from HASP block intertie schedules in hours when the CAISO anticipates or is experiencing an operating reserve shortage constitutes sufficient grounds to suspend the make whole tariff provisions. The CAISO emphasizes its proposed authority to suspend the make whole tariff payment is severable from the other elements of the make whole payment proposal and does not affect whether the remaining elements of the proposal are just and reasonable.

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43 Existing CAISO tariff section 11.31.1.1.

44 *See* MSC Opinion dated March 8, 2021 at 17-18.

45 The CAISO Market Surveillance Opinion supports the CAISO's proposed authority to suspend the make whole payment to prevent adverse market outcomes.

46 *Cal. Indep. Sys. Operator Corp.,* 130 FERC ¶ 61,122 (2010) ("February 18 Order") at P 88.

b. The CAISO's tariff revisions incentivize market participants to offer incremental supply during periods of anticipated or actual operating reserve shortages

Under this proposal, the CAISO would calculate bid cost make whole payments for HASP block intertie schedules during tight system conditions. The make whole payment would reflect the positive difference between a scheduling coordinator's bid price and the hourly average fifteen-minute market locational marginal price for each of the hours in which the CAISO identifies tight system conditions exist.[47] The CAISO would then multiply that price by the FMM Optimal Energy delivered by the HASP block intertie schedule during the trading hour. The CAISO does not expect these payments to result in significant uplift for two reasons: (1) the payments will only apply during the limited operating hours in which supply is very tight; and (2) fifteen-minute market prices would need to be less than a scheduling coordinator's bid for the hourly block intertie schedule.

The following import and export examples reflect the mechanics of this calculation during hours when the CAISO issues a notice stating it anticipates or is experiencing an operating reserve shortage.

Example 1 – Import Bid
A scheduling coordinator submits an import bid in HASP priced at $100/MWh for 0-50 MW, and $150/MWh for 50-100 MW.

- HASP prices on the applicable intertie are greater than the import bid price and HASP schedules a 100 MW import based on the scheduling coordinator's bid.
- Fifteen-minute market prices decrease relative to HASP prices and average $90/MWh for the four fifteen-minute market intervals in the trading hour.
- The scheduling coordinator delivers 100 MW for the trading hour.
- The CAISO would calculate the make whole payment for both bid segments as follows:

50 MW * ($100-$90/MWh) =	$500
50 MW * ($150-$90/MWh) =	$3000
Total make whole payment:	**$3,500, or $35/MWh**

Example 2 – Export Bid
A scheduling coordinator with 100 MW export scheduled in the day-ahead market rebids the export in the real-time market at $100/MWh.

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[47] New tariff section 11.21.3.2.

- HASP prices on the applicable intertie are greater than the export bid price and HASP reduces the export schedule to 0 MW, making it effectively a 100 MW real-time market import.
- Fifteen-minute market prices decrease to an average of $90/MWh for the four fifteen-minute market intervals in the hour.
- The CAISO would calculate the make whole payment as follows:

100 MW * ($100-$90/MWh) =	$1,000
Total make whole payment:	**$1,000, or $10/MWh**

The CAISO recognizes the proposed make whole payment may raise concerns with the potential for overlapping import and export bids from the same scheduling coordinator. Settlement of an overlapping import and export schedule could net to zero and compensate the scheduling coordinator with a make whole payment for the import while delivering no incremental energy to the CAISO.[48] However, the risk of this scenario occurring is minimal because of the limited periods of time the make whole provisions will apply. In addition, economic export bids are less likely to clear in the real-time market during tight system conditions when CAISO issues notices signaling anticipated or actual operating reserve shortages and will not clear if there is insufficient supply to meet CAISO load. Additionally, as discussed in section III.A.2.a *supra*, the CAISO will monitor bidding activity associated with the periods in which the make whole payment rule is in effect and suspend the make whole payment provisions if the CAISO observes these payments do not result in incremental supply. The MSC agrees (1) the risks of any adverse market outcomes from strategic behavior is likely small given the narrow set of circumstances in which the payments would apply and (2) the CAISO should monitor the situation as it proposes to do.[49]

c. The CAISO will allocate the cost of make whole payments to scheduling coordinators for measured demand

The CAISO proposes to allocate uplift costs from the make whole payments to scheduling coordinators for measured demand, *i.e.,* CAISO balancing authority area metered demand and exports within the applicable trading hour(s).[50] The CAISO's cost

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48 *See also* CAISO tariff amendment to implement real-time market design enhancements related to Order No. 764 dated November 26, 2013 in Commission Docket ER14-480 at 30-32.

49 MSC Opinion at 23.

50 New CAISO tariff section 11.21.3.3. Some EIM Entities questioned the CAISO's initial proposal to allocate the make whole payment costs to EIM transfers out of CAISO because these costs arise from an anticipated or actual operating reserve shortage with the CAISO balancing authority area. The CAISO

allocation methodology is similar to how the CAISO allocates the costs for real-time market bid cost recovery uplift payments to CAISO measured demand,[51] except the CAISO will not allocate the cost of make whole payment to EIM transfers out of the CAISO balancing authority area. HASP block interties schedules clear as binding schedules to serve internal CAISO demand and exports, with hourly block exports based on the HASP price. HASP schedules for EIM transfers are only advisory with the final schedule based on fifteen-minute market prices, not HASP prices.[52] Stated differently, HASP block intertie schedules do not clear to serve EIM transfers out of the CAISO balancing authority area. Even though HASP intertie block schedules in part may support EIM transfers out of the CAISO balancing authority, these transfers are not the cause of the make whole payment. As discussed above, the make whole payment provisions will "trigger" only when the CAISO balancing authority area faces an anticipated or actual operating reserve shortage and needs to incentivize additional imports. In other words, the CAISO is providing the make whole payments to meet the operating reserve and expected energy needs of internal load and exports. The CAISO would not trigger the make whole payment to secure additional imports to support EIM transfers out of its balancing authority area. For this reason, excluding EIM transfers out of the CAISO balancing authority area is appropriate.

The CAISO's proposed cost allocation methodology is consistent with basic cost causation principles. The CAISO's proposed allocation is also consistent with how the CAISO allocates the costs of operating reserves themselves, *i.e.*, to scheduling coordinators for measured demand.[53] The CAISO does not allocate the costs of operating reserves to EIM transfers out of its balancing authority area.

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modified its proposal to allocate the cost of the make whole payment only to CAISO measured demand.

[51] Existing CAISO tariff section 11.8.6.6.

[52] Fifteen-minute dispatchable exports also reflect fifteen-minute-market prices. However, the quantity of these transactions in the CAISO's market is minimal and are appropriately part of Measured Demand for other cost allocations. Additionally, fifteen-minute export quantities, if any, contribute to a scheduling coordinator's ancillary services obligation whereas EIM transfers do not. In light of the trigger for the make whole payment, it remains appropriate to allocate the costs of these payments to all Measured Demand.

[53] Existing CAISO tariff sections 11.10.3.3.and 11.10.4.3: "The Scheduling Coordinator's total Operating Reserve Obligation for the hour is the sum of six (6) percent of its CAISO Demand and three (3) percent of its Energy for exports from the CAISO Balancing Authority Area (excluding export Dynamic Schedules); less three (3) percent of Energy from imports into the CAISO Balancing Authority Area (excluding import Dynamic Schedules)."

3. Stakeholders Generally Expressed Support for the Proposed Make Whole Payments

Many stakeholders expressed support for the proposed make whole payment because it would provide additional price certainty to HASP block intertie schedules during tight system conditions when fifteen-minute market prices may be lower relative to HASP prices. In comments during the CAISO's stakeholder process, DMM stated this enhanced compensation should effectively address market participant concerns that real-time hourly block imports will not offer power to CAISO during tight system conditions because of the risk market revenues will not meet their offer price.

Stakeholders also expressed concern with allowing HASP block intertie schedules to be eligible for bid cost recovery in general. The CAISO is not proposing to make HASP block intertie schedules eligible for bid cost recovery, which nets bid costs and market revenues across the entire day. Instead, the CAISO only proposes a make whole payment in limited operational circumstances and limited hours where it has determined a need for additional supply.

Some stakeholders suggested the CAISO consider alternative settlement options for hourly block imports during system emergencies, including using prices from the HASP. However, the CAISO determined any option using HASP prices was infeasible to implement by summer 2021 because it would require extensive market design, system, and process changes.

B. Tariff Changes to Make the Dispatch of Reliability Demand Response Resources More Efficient

1. Background

Load, storage, and generation resources frequently participate in the CAISO markets via demand response models. These resources can be transmission-connected, distribution-connected, or behind a retail meter. These resources participate in the CAISO markets by providing load curtailment through one of the CAISO's two demand response models: proxy demand resources or reliability demand response resources. A proxy demand resource is an economically dispatched demand response resource, and a RDRR is dispatched only when the CAISO's system is near or in a system emergency.[54]

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[54] *See Cal. Indep. Sys. Operator Corp.*, 144 FERC ¶ 61,047 at PP 8 *et seq.* (2013) (explaining a reliability demand response resource); *see also* Section 4.13.5 of the CAISO tariff (outlining the characteristics of proxy demand resources and reliability demand response resources).

During the registration process, RDRRs elect to use either the marginal real-time dispatch option or the discrete real-time dispatch option.[55] Under the discrete real-time dispatch option, there is only one bid segment, and the CAISO must dispatch the RDRR's entire cleared quantity. Under the marginal real-time dispatch option, the CAISO dispatches the RDRR according to the cleared bid quantity similar to other resources.[56] In either case, RDRRs receive dispatch schedules when the market optimization determines their bids are marginal or below the marginal price of energy. Currently, however, the CAISO's market optimization will not select RDRRs choosing the discrete real-time dispatch option to be the marginal resource in the pricing run because the market cannot incrementally move them above their minimum load.

All scheduling coordinators for RDRRs must submit energy bids at or above 95 percent of the soft energy bid cap.[57] The market optimization treats RDRRs registered as continuous similar to a conventional resource regarding start-up and ramping. RDRRs registered as discrete effectively have the same maximum and minimum load and thus should be capable of reaching their maximum load curtailment within 40 minutes after dispatch and providing services for at least four consecutive hours per event.[58] RDRRs also must have a minimum run time of an hour or less.[59] Once the CAISO enables RDRRs due to an imminent emergency, the market software includes RDRR bids in the optimization and dispatches them based on their price in the five-minute real-time market.[60] Market operators also can dispatch RDRRs manually relying on exceptional dispatch tariff authority.[61]

Dispatching RDRRs at prices at or above 95 percent of the soft energy bid cap should produce locational marginal prices of at least $950/MWh, thus signaling tight conditions and providing important market incentives (*e.g.*, ensuring scheduled supply remains available and attracting additional supply). However, during the August heat event, the CAISO observed RDRR dispatch likely contributed to suppressing real-time

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55 This protects certain emergency-triggered demand resources that may be incapable of a more granular dispatch and that operate under a firm service level agreement. *See Cal. Indep. Sys. Operator Corp.*, 144 FERC ¶ 61,047 (2013).

56 For example, if a resource under the discrete real-time dispatch option bids 10 MW, the CAISO must dispatch the full 10 MW even if only seven MW is needed; whereas a resource under the marginal real-time dispatch option could have a multi-segment bid curve and in this example the CAISO could dispatch that resource for only seven MW. *Id*.

57 Existing CAISO tariff section 30.6.2.1.

58 Existing CAISO tariff section 4.13.5.3.

59 *Id*.

60 Section 34.7 of the CAISO tariff ("The CAISO may make Reliability Demand Response Resources eligible for Dispatch in accordance with applicable Operating Procedures either: (a) after issuance of a warning; (b) during stage 1, stage 2, or stage 3 of a System Emergency; or (c) for a transmission-related System Emergency").

61 Existing CAISO tariff section 34.11.1.

prices. This occurred for several reasons. First, the CAISO's real-time market optimization failed to capture the resource-specific characteristics of RDRR because it currently only considers RDRRs in the CAISO's five-minute real-time dispatch (RTD). RTD's advisory horizon is approximately 65 minutes. When considered in RTD, RDRRs' start-up and run times often extend beyond the optimization horizon, leading to non-optimal schedules.

Second, because of this, the CAISO frequently resorts to dispatching RDRRs manually relying on its exceptional dispatch tariff authority. These manual dispatches then result in the market optimization seeing the resulting drop in demand, which can suppress prices. Thus, dispatching RDRRs out of market not only prevents RDRRs from setting real-time market prices based on their bid price, it can lower market prices. Third, because RDRRs typically have a maximum run time of four hours, the CAISO will dispatch RDRRs when their four-hour run time can allow a second dispatch without inadvertently adding demand during system conditions similar to or worse than the conditions existing when the CAISO first dispatched the RDRR. For example, the CAISO may seek to avoid the market dispatching RDRRs at 3 p.m. because such a dispatch could return the RDRR to normal load levels at 7 p.m., which is near the net demand peak. The CAISO will instead manually dispatch RDRRs to ensure they only run when they can return to normal load levels without threatening reliability. Finally, the CAISO's current RDRR rules fail to recognize RDRRs are large load resources, many of which may be incapable of responding to five-minute dispatches without more notice, or which may be incapable of moving dynamically within an hour. Like proxy demand resources and intertie resources before them,[62] RDRRs need more optionality to reflect accurately their operational constraints so they can participate effectively in the real-time market.

Another measure the CAISO is undertaking is to allow all the CAISO's real-time market applications,[63] most notably, the Real-Time Unit Commitment (RTUC) process, to consider RDRRs while recognizing their specific characteristics. RTUC will consider the startup and minimum run time of each RDRR's specific characteristics. This will increase the likelihood the market dispatches RDRRs, reducing the need to rely on the CAISO exceptionally dispatching RDRRs. The CAISO notes implementing this functionality requires no tariff change.

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62 *Calif. Indep. Sys. Operator. Corp.*, 146 FERC ¶ 61,204 (2014) (intertie resources); *Calif. Indep. Sys. Operator. Corp.*, Letter Order accepting tariff revisions, Docket No. ER19-2733 (Nov. 6, 2019) (proxy demand resources).

63 *I.e.*, STUC, HASP, RTUC, and RTD.

2. Proposed Tariff Revisions

a. Extending Hourly and Fifteen-minute Block Bidding

The CAISO proposes to extend its hourly block and fifteen-minute bidding options to RDRRs. The CAISO initially designed these options for intertie resources that frequently require additional time to secure transmission tights across BAAs, and subsequently extended them to proxy demand resources due to their constraints.[64] Specifically, the CAISO proposes to allow scheduling coordinators to specify in the Master File whether the RDRR can be dispatched in the real-time market in (i) hourly intervals, (ii) fifteen-minute intervals, or (iii) five-minute intervals.[65] The scheduling coordinator must make this election based on real operational and technical constraints, consistent with the CAISO's requirements for all Master File parameters.[66] If RDRRs do not submit an election, the CAISO will use five-minute intervals as the default.[67] Scheduling coordinators for both new and existing resources can request to modify their Master File parameters at any time, and the CAISO will incorporate their modifications between five and eleven business days.[68]

Scheduling coordinators electing to submit hourly block bids for RDRRs will receive binding schedules with the same MWh award for each of the four fifteen-minute intervals within the trading hour.[69] This will notify scheduling coordinators further in advance of dispatch. Scheduling coordinators will receive these schedules through the HASP between 45 and 60 minutes before the hour.[70] Resources cannot be dispatched up and down (and back up) repetitively within an hour. Consistent with the CAISO's established rules for intertie resources and proxy demand resources electing to use hourly block bids, RDRRs that elect to use hourly block bids will not be eligible for bid cost recovery.[71]

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64 *Id*.

65 Revised CAISO tariff section 4.13.3.

66 *See* Existing CAISO tariff section 4.6.4.

67 *Id*.

68 Section B.1 of the Business Practice Manual for Market Instruments.

69 Revised CAISO tariff section 30.6.2.1.

70 Existing CAISO tariff section 34.2.4.

71 Revised CAISO tariff section 11.6.4. *See Cal. Indep. Sys. Operator Corp.*, 146 FERC ¶ 61,204 at P 59 (2014) ("We accept CAISO's proposal to provide bid cost recovery only for intertie bids that offer bids into the 15-minute market or use dynamic transfers as just and reasonable. An important goal of the revised market design, and one of the objectives of Order No. 764, is to encourage flexible scheduling on 15-minute intervals. We find that providing bid cost recovery for hourly bids would detract from this objective and effectively reinstate the prior 'bid or better' rule, which created gaming opportunities and resulted in substantial uplift costs. We find that CAISO has provided hourly schedulers with adequate opportunities to address any risks by, for example, participating in the day-ahead market or by reflecting

Scheduling coordinators electing to submit fifteen-minute block bids for RDRRs will receive binding schedules in the CAISO's fifteen-minute market (FMM),[72] and the HASP run in RTUC will provide advisory dispatch schedules. These resources could have their schedules adjusted within a single hour, but only resources capable of doing so should elect to bid and be scheduled in the FMM. The CAISO will settle these schedules at the fifteen-minute market Locational Marginal Price.[73] Fifteen-minute bids will be eligible for bid cost recovery, consistent with current practice. Providing RDRRs with bidding options helps ensure RDRRs can better reflect the characteristics of their resources. More flexible but constrained resources can elect to be dispatched on a fifteen-minute basis. The most flexible resources can continue to use the five-minute market.

The Commission should approve these enhancements as just and reasonable. They leverage existing market functionalities for resources that face similar constraints. These revisions will help demand response resources participate more effectively in the CAISO's real-time markets, thereby improving dispatch efficacy.[74]

b. Stakeholder Comments

Stakeholders generally supported the CAISO's proposed tariff revisions and the CAISO software enhancements that are consistent with the existing CAISO tariff and RDRR policy.[75]

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the impact of their ineligibility for bid cost recovery in their hourly intertie bids"). Likewise, settlement charges that account for ramping and imbalances within an hour do not apply to hourly resources.

[72] Existing CAISO tariff section 34.4.

[73] Existing CAISO tariff section 11.5.

[74] As discussed in the CAISO's stakeholder initiative, the CAISO also plans to make several software updates to ensure the market optimization complies with the *existing* CAISO tariff and RDRR policy. This includes clarifying that the CAISO will treat RDRRs electing the discrete dispatch option similar to constrained output generators, which are generators with a very small range between PMin and PMax that generally are dispatched only at PMax for their specific run-time. For transparency and consistency, the CAISO has included a tariff clarification that matches the similar provision applicable to constrained output generators. *Compare* Revised section 30.6.2.1.2 of the CAISO tariff with Section 27.7.5. For a discussion why the CAISO and other ISO/RTOs model constrained output generators (and similarly situated RDRRs) this way to ensure they can set the market clearing price, *see Calif. Indep. Sys. Op. Corp.*, 105 FERC ¶ 61,140 at PP 85-89 (2003) (rejecting proposal); 107 FERC ¶ 61, 274 at PP 110-122 (2004) (accepting proposal).

[75] The CAISO DMM supported them "as another way of helping to ensure that prices are relatively high when system conditions are extremely tight, such that emergency demand response resources are needed to meet system loads." CAISO DMM Comments on Draft Final Proposal, *available at* http://www.caiso.com/Documents/DMMComments-on-Market-Enhancements-for-Summer-2021-

One stakeholder questioned why RDRRs electing to be hourly resources and submit hourly block bids cannot set the price in FMM and RTD intervals. Although the CAISO may evaluate new dispatch options for RDRRs, allowing resources that elect to be hourly to set the price in subsequent, more granular intervals is contrary to fundamental market principles and Order No. 764.[76] The CAISO does not require any RDRR to submit hourly block bids. Moreover, by their nature, hourly block bids do not account for variations in load and supply that take place in FMM and RTD. Allowing RDRRs to set the price in these later market runs would contravene established pricing rules for hourly block resources.[77] In making these options available to RDRRs, the CAISO proposes to apply the same rules to RDRRs it applies to the other resources with these options.

One stakeholder also questioned whether the CAISO could implement these enhancements with sufficient testing, and whether the CAISO's enhancements follow established RDRR policy. The CAISO reiterates it is not proposing to change the fundamental bidding rules for RDRRs; rather, the proposed enhancements provide RDRRs more options that may better fit their unique resource specific characteristics. Although the CAISO is proposing this change on an expedited timeline, hourly and fifteen-minute block bidding are established functionalities. The CAISO successfully extended the functionality from intertie resources to proxy demand resources in 2019, and CAISO will test this enhanced functionality before implementation.[78] The CAISO is not otherwise changing the bidding rules or dispatch parameters for RDRRs.

C. Tariff Changes to Enhance EIM Operations

The CAISO proposes two tariff changes associated with operating the Western EIM. These changes address certain aspects of the EIM-related issues identified in the Final Root Cause Analysis.[79] The first change is to include an "uncertainty requirement"

Readiness-Draft-Final-Proposal-Feb26-2021.pdf.

[76] *See Cal. Indep. Sys. Operator Corp.*, 146 FERC ¶ 61,204 at PP 59 *et seq.* (2014) (establishing hourly block bidding rules for intertie resources) ("An important goal of the revised market design, and one of the objectives of Order No. 764, is to encourage flexible scheduling on 15-minute intervals. We find that providing bid cost recovery for hourly bids would detract from this objective and effectively reinstate the prior 'bid or better' rule, which created gaming opportunities and resulted in substantial uplift costs. We find that CAISO has provided hourly schedulers with adequate opportunities to address any risks by, for example, participating in the day-ahead market or by reflecting the impact of their ineligibility for bid cost recovery in their hourly intertie bids").

[77] *See id.*; *Cal. Indep. Sys. Operator Corp.*, Letter Order, Docket No. ER19-2733 (Nov. 6, 2019) (extending hourly block bidding to proxy demand resources under same rules as intertie resources).

[78] *Id*.

[79] As discussed *infra*, the CAISO will consider and evaluate further changes to address these EIM related issues through additional stakeholder efforts.

in the capacity test within the EIM resource sufficiency evaluation. This uncertainty requirement is similar to that used by the CAISO real-time market in procuring of the flexible ramping product. The second change requires automation of the EIM mirror resource functionality at CAISO scheduling points.

1. Including the Uncertainty Requirement in the Capacity Test

The EIM includes a resource sufficiency evaluation to ensure each balancing authority area participating in the EIM provides sufficient resources to serve its load reliably, thereby minimizing inequitable resource "leaning" between balancing authority areas.[80] One component of this evaluation is the capacity test. This test applies to all EIM balancing authority areas at T-40 to the hour, and validates that a balancing authority area possesses sufficient capacity to meet its load and export obligations.[81] As currently implemented, if a balancing authority area in the EIM fails the capacity test portion of the resource sufficiency evaluation, the balancing authority area will have its EIM transfers limited to the transfer level established in the interval that it most recently passed the test.

The Final Root Cause Analysis noted the CAISO balancing authority area only failed the more restrictive flexible ramping sufficiency portion of the resource sufficiency evaluation for less than two hours on each of August 14 and 15.[82] The CAISO balancing authority area did not fail the resource sufficiency evaluation's capacity test. During this period, the CAISO experienced multiple hours of a declared energy emergency, including two separate firm load-shedding events. A balancing authority area's ability to pass the capacity test during these emergency conditions indicates there may be shortcomings in the design or implementation of the capacity test.[83]

The CAISO proposes tariff revisions to enhance the capacity test portion of the EIM resource sufficiency evaluation by including net load uncertainty within each balancing authority area's bid range capacity requirement.[84] Net load uncertainty is currently part of the CAISO market's calculation of the quantity of flexible ramping

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80 Existing CAISO tariff sections 29.34(k)-(n).

81 Existing CAISO tariff sections 29.34(l). The CAISO also proposes in this filing to clarify application of the capacity test to the CAISO balancing authority area as part of this amendment. Further, the CAISO has requested in Docket No. ER21-955 to move the timeline for the final opportunity to adjust EIM base schedules from T-40 to T-30. This filing is pending before the Commission.

82 *See* Final Root Cause Analysis, at 130-131.

83 *See* MSC Opinion at 7-8.

84 *See* Revised CAISO tariff sections 29.34(l)-(n) (adding the uncertainty requirement to the capacity test portion of the resource sufficiency evaluation and clarifying application of the capacity test to the CAISO balancing authority area).

product to procure, and is defined as each balancing authority area's calculated flexible ramping requirement minus the diversity benefit created by EIM participation.

Including uncertainty within the capacity test will reasonably reduce the potential for a balancing authority area to lean on the EIM to address its uncertainty by effectively increasing the requirement to pass the capacity test by a corresponding amount. Although including uncertainty within the capacity test could limit the economic benefit of EIM participation within the EIM if a balancing authority area cannot meet this requirement, requiring each balancing authority area to show this additional capacity to benefit from incremental increases in EIM transfers is preferable. Balancing authority areas in the EIM should focus on procuring sufficient capacity to meet all of their obligations before the EIM, including uncertainty, to prevent a balancing authority area in the EIM from inappropriately relying on the EIM to meet its net load needs, thus promoting regional reliability and the principles underpinning the resource sufficiency evaluation.

The CAISO recognizes including the uncertainty requirement might cause balancing authority areas in the EIM to fail the capacity test more frequently. However, the CAISO believes losing the incremental economic activity provided by the EIM during tight supply conditions is an appropriate trade off to ensure balancing authority areas participate in the EIM with sufficient capacity to meet their obligations. Further, as a safeguard, the revised tariff provisions authorize the CAISO to disable the uncertainty requirement in the capacity test portion of the resource sufficiency evaluation if it observes specified conditions during the first 12 months following activation.[85] Specifically, the CAISO can disable the uncertainty requirement three business days after issuing a market notice that explains how unintended resource sufficiency test failures exceed the reasonably expected results, *i.e.*, economic transfers are being unduly limited in non-tight supply conditions. In exercising this authority, the CAISO will consider the frequency, magnitude, and circumstances associated with any test failures. In addition, exercising this authority obligates the CAISO to submit an informational report to the Commission explaining the circumstances supporting its conclusion within 30 days of disabling the feature. This safety net will reassure entities concerned an incremental change to a complex evaluation may produce unintended results, while allowing the CAISO to implement the proposal for summer 2021.[86]

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[85] Revised CAISO tariff sections 29.34(l).

[86] The MSC supports including a feature that allows the CAISO to "switch this [uncertainty] feature off on short notice if it becomes apparent it is operating in a manner different than intended." The MSC was concerned adding uncertainty to the capacity test requirement might conflict with the flexible ramping product design, which forgoes procuring capacity for uncertainty if it is too expensive. The MSC noted HASP might not schedule imports for the CAISO to meet the additional capacity test if they are too expensive. However, the MSC recognized there is a general consensus the current capacity test is based on too low of a target and adding the uncertainty requirement is an objective way to increase it. Being able to disable the feature is the best way to obtain the benefit of objectively increasing the requirement to pass the capacity test, while protecting against potential failures for unexpected reasons.

Most stakeholders, including the CAISO's Department of Market Monitoring (DMM), support the CAISO's proposed change because it incrementally improves the resource sufficiency evaluation. Initially, many stakeholders requested the CAISO pursue more extensive changes to the resource sufficiency evaluation as part of this stakeholder initiative. They believed the August heat wave events revealed deeper flaws in the resource sufficiency evaluation requiring remediation. However, these stakeholders recognized the incremental improvement the CAISO proposal provides and favored moving ahead with it, provided the CAISO committed to consider their broader concerns regarding the design of the resource sufficiency test and the consequences of failing the tests. The CAISO will be starting an initiative in April to address these broader issues.[87]

Two stakeholders believed the CAISO should make no changes to the resource sufficiency evaluation until after conducting a more comprehensive review. One maintained this would harm reliability because it increases the likelihood that balancing authority areas will fail the resource sufficiency evaluation, potentially resulting in capped transfers during system emergencies resulting from tight supply conditions. The other expressed general concern about the expedited development of the proposal and stated it was not critical to summer reliability. The CAISO agrees that the proposal will increase the likelihood of failing the capacity test during tight supply conditions; however, the CAISO disagrees this will undermine reliability. To the extent EIM transfers are limited and additional external supply is available, BAAs can access that external supply outside of the EIM via emergency operator action without harm to reliability. The solution to this concern should be to provide additional capacity before participation, not retain a more relaxed version of the capacity test. The fact this proposal may increase forward procurement by BAAs participating in the EIM should improve, not hinder, reliability given its potential to decrease capacity shortages through increased forward procurement.

Some stakeholder also asked for greater visibility and explanation of the impact of these changes after the CAISO implements them. The CAISO has committed to discuss the performance and impact of these changes in its regularly scheduled held Market Performance and Planning Forum.

There is no reason to defer including the uncertainty requirement in the capacity test portion of the resource sufficiency evaluation until the CAISO completes the more comprehensive stakeholder process it has committed to undertake. The CAISO's proposal will immediately improve the resource sufficiency evaluation, and it includes safeguards against potential unintended consequences, should they arise. The proposal, which the EIM Governing body unanimously approved, will reduce the opportunity for inappropriate leaning during summer 2021 by requiring each balancing

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[87] CAISO EIM Governing Body Memorandum dated March 3, 2021, at 6.

authority area in the EIM to have sufficient capacity available for uncertainty procurement. The CAISO should not defer an incremental improvement that will provide near-term benefits, particularly given its commitment to undertake a more comprehensive assessment of the resource sufficiency evaluation.

2. Requiring Automation of Mirror Resources at CAISO Scheduling Points

The mirror resource functionality is a modeling process whereby an EIM entity balances a CAISO intertie schedule associated with energy that originates in, is consumed in, or wheels through the EIM entity balancing authority area for delivery at a CAISO scheduling point. Today an EIM entity scheduling coordinator can update mirror resources either manually or on an automated basis. The CAISO proposes herein to require automation of the mirror resource functionality at CAISO scheduling points to ensure accurate representation of interchange transactions between the CAISO and a neighboring EIM BAA.[88]

Using mirror resources facilitates participation by system resources in CAISO markets at CAISO scheduling points by modeling the energy interchange out of the EIM balancing authority area separately from transfers resulting from the EIM's resource-specific dispatch. The CAISO market model nets all transactions on an internal EIM intertie, while the EIM balances interchange between the transacting balancing authorities. The mirror resource allows the CAISO to account for interchange transactions sourced from, or wheeled through, an EIM balancing authority area separately from the resource-specific EIM dispatch that produces EIM transfers. The auto-mirror feature further facilitates the mirroring of intertie schedules with the CAISO balancing authority area at CAISO intertie scheduling points by eliminating the need for an EIM entity scheduling coordinator to update their system resources manually to reflect intertie awards at CAISO scheduling points. Manually updating mirror resources can increase the risk of error, particularly under stressed conditions. Requiring automation of mirror resources will ensure correct modeling of cleared interchange transactions between the CAISO and the EIM entity because it will eliminate the risk of error that can occur through a manual update process.

Failure to adjust mirror system resources correctly to reflect market schedules can adversely affect reliability. For example, system anomalies and operational issues occurred one day during last summer's heat events because the CAISO market's systems and corresponding EIM balancing authority area used incorrect information. The CAISO experienced high levels of north-to-south congestion that gave rise to a condition wherein an intertie schedule and a mirror resource within an EIM entity's balancing authority area was cut to 0 MW as part of the optimal solution. Effectively,

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[88] Currently, an EIM entity has the option to use the automated mirror resource update functionality. *See* revised CAISO tariff section 29.27(c).

the market software determined adjusting an intertie schedule was the optimal solution before relaxing a congestion-based constraint modeled within the CAISO balancing authority area. However, due to an oversight in updating a mirror resource's schedule during these tight conditions, the mirror resource did not manually reflect the intertie schedule change resulting in approximately 1200 MW area control error deviation within the EIM entity's balancing authority area. The CAISO's proposal to require automating of mirror resources will prevent this from occurring. Stakeholders do not oppose this change.

D. Pricing Enhancements During System Emergencies

1. Background

Like every BAA and market operator, the CAISO procures operating reserves to dispatch if a contingency or emergency occurs that threatens reliability.[89] Although it is an essential practice to avoid blackouts, dispatching these reserves to provide energy under such circumstances occurs infrequently. More frequently, real-time system conditions change resulting in *excess* reserves. When this happens, operators release "non-contingency only" reserves they no longer need back into the market at their energy bid cost. On normal days, with excess reserves, this practice makes sense. However, the CAISO also releases "non-contingency reserves" at bid cost when it is short of operating reserves from actual generators and relying on standby, quick-access controlled load-shed to meet its reserve requirements. When in this emergency operating state, even though the CAISO is short of reserves from actual generators, the optimization dispatches the released reserves at generator bid cost, rather than a price that signals tight supply conditions and incentivizes additional capacity. This causes a faulty pricing anomaly: low energy prices even though the CAISO BAA is short of reserves.

The CAISO tariff provides distinct rules for how the CAISO market optimization prices energy when dispatched from resources scheduled to provide reserves. The rules for dispatching contingency only reserves in an emergency produce efficient market outcomes, but the rules for dispatching non-contingency only reserves in an emergency produce faulty, inefficient price signals. Specifically, if the CAISO dispatches "Contingency Only" reserves in the real-time contingency dispatch market process,[90] the CAISO prices the energy based on the resources' corresponding energy

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[89] Operating reserves include Spinning and Non-Spinning Reserves required to meet NERC and WECC reliability standards and any requirements of the NRC for reliable operation of the CAISO Balancing Authority Area. "Operating Reserve," Appendix A to the CAISO tariff.

[90] The Real-Time Contingency Dispatch (RTCD) is the mode of operation run in response to a significant Contingency event, such that waiting until the next normal RTD run is not adequate and/or Operating Reserves identified as Contingency Only need to be activated in response to the event.

bids.[91] Contingency-Only reserves are operating reserves the CAISO may dispatch only in the event of a contingency or an imminent or actual system emergency.[92] All reserves the CAISO procures through real-time market processes are considered Contingency Only reserves.[93] If the CAISO dispatches Contingency-Only operating reserves in the real-time disturbance dispatch process,[94] the CAISO prices the energy based on the bid of the highest priced dispatched resource.[95] If the CAISO dispatches Contingency-Only reserves in response to a system emergency that occurs because the CAISO has run out of economic bids when no contingency event has occurred, the CAISO prices Contingency-Only reserves at the hard energy bid cap.[96]

During the August 2020 heat event, the CAISO observed that when it dispatched operating reserves to provide energy during system emergencies, marginal real-time energy prices were lower than expected.[97] Such lower prices insufficiently signaled the need for additional energy during tight system conditions. Although the CAISO appropriately prices *Contingency-Only* operating reserves at the bid cap when dispatched during a system emergency, it prices operating non-contingency only reserves based on resources' bids. This pricing construct contributed to deflating real-time energy prices in conditions where real-time energy prices should have been higher to signal the need for more energy. Put simply, the CAISO should price all reserves dispatched to provide additional energy at the bid cap when the CAISO arms load to meet reserve requirements during an emergency. This will signal tight system conditions and avoid sending the incorrect price signals to market participants.

Section 34.5.2.1 of the CAISO tariff.

91 Existing CAISO tariff section 34.5.2.1.

92 *See* "Contingency Only," Appendix A to the CAISO tariff.

93 Existing CAISO tariff section 34.2.3.

94 The RTDD is a special mode of the RTCD available to the CAISO Operator when 300 MW or more of capacity is needed to respond to a significant Contingency event. Existing CAISO tariff section 34.5.2.2.

95 Existing CAISO tariff section 34.5.2.2.

96 Existing CAISO tariff section 34.10.

97 Under applicable reliability standards, the CAISO must arm load to make up the operating reserve deficiency caused by dispatching operating reserves for energy to meet demand. Arming load is a process whereby CAISO system operators inform load-serving entities to make all preparations necessary to be able to drop load in a controlled manner if a generation contingency occurs. The load-serving entities inform CAISO system operators how much load they are able to arm and work with the operators to determine an appropriate quantity. This process happens before or simultaneous with the dispatch of operating reserves in a system emergency.

2. Proposed Tariff Revisions

The CAISO proposes to revise the tariff to price *all* operating reserves at the applicable energy bid cap when dispatched to provide energy in a system emergency and the CAISO has run out of economic bids.[98] In other words, instead of pricing solely "Contingency-Only" reserves at the bid cap, the CAISO also will price non-contingency only reserves at the bid cap when dispatched during a system emergency for energy. This proposal will avoid *deflating* real-time prices during tight system conditions, which should help attract additional supply when most needed, and it will send a strong financial incentive for scheduled supply to deliver.

The CAISO expects the market will price energy based on this enhancement sparingly, if ever. System emergencies are rare, and system emergencies where the CAISO must dispatch operating reserves to meet base system demand are even rarer.[99] With additional supply during peak demand, the CAISO will not need to rely on these pricing enhancements. Nevertheless, the real-time pricing enhancement is critical because its *potential* to set energy prices during tight supply conditions will positively influence supply and demand participation in the CAISO's markets. If the situation occurs, the CAISO does not desire to repeat the pricing inefficiencies of the August heat event.

The Commission should approve the CAISO's proposed tariff revisions. They incrementally extend and enhance the CAISO's current practice for pricing contingency only reserves, will avoid price deflation during tight supply conditions, will help attract additional supply when needed, and will send a strong financial incentive for scheduled supply to deliver. Finally, the CAISO's proposal is consistent with basic shortage pricing principles, and it will improve price formation and enhance overall system reliability.

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[98] Revised CAISO tariff section 34.10. As discussed above, the CAISO will arm load simultaneously to comply with reliability standards. The currently effective tariff would price operating reserves dispatched for energy during a system emergency at the hard energy bid cap of $2,000/MWh; however, the CAISO has related pending tariff revisions to the same provision in Docket No. ER21-1192 that would price such reserves at the applicable soft energy bid cap unless specified circumstances occur, in which case the CAISO would price the reserves at the hard energy bid cap. Both the currently effective tariff and the CAISO's pending revisions refer to Contingency Only reserves only. As discussed herein, the CAISO's instant revisions would broaden the pricing to include *all* operating reserves dispatched to provide energy during a system emergency in Real-Time Economic Dispatch (*i.e.*, absent a contingency). The CAISO shows pending tariff revisions as highlighted in the attachments to this transmittal letter.

[99] From 2002 to today, the CAISO has declared a stage two system emergency only ten times (with the majority, six, occurring in 2020), and it has declared a stage three emergency only twice (both in 2020). *See* CAISO AWE Grid History Report at http://www.caiso.com/Documents/AWE-Grid-History-Report-1998-Present.pdf.

Some stakeholders expressed concern scheduling coordinators could use these enhancements to bypass the bid cost verification rules the CAISO has proposed in its Order No. 831-related market enhancements currently pending with the Commission.[100] They suggest a scheduling coordinator could avoid having to verify costs above the soft energy bid cap in the following circumstances: the CAISO schedules a resource to provide operating reserves instead of energy, declares a system emergency, and dispatches the resource to provide energy to meet demand as part of the emergency, but the dispatch does not occur in response to a specific contingency. Stakeholders also suggest scheduling coordinators could attempt to withhold physical capacity to create these circumstances. Finally, stakeholders argue that pricing operating reserves at the cap is simply excessive.

The CAISO notes the Commission already approved using the hard energy bid cap to price Contingency-Only operating reserves dispatched in an emergency to provide energy.[101] The CAISO is merely extending that practice to non-contingency-only reserves to avoid the real-time price deflation experienced during the August heat wave and to help signal tight supply conditions in real-time. The CAISO's DMM,[102] the MSC,[103] and the EIM Governing Body in its advisory capacity, support the CAISO's proposed enhancements. Pricing the released reserves at the bid cap sends a critical signal to supply and imports. As the MSC found "Setting prices at a level that will attract additional net interchange in HASP and FMM will be even more important prospectively than in the past," when the CAISO priced non-contingency only reserves according to their bids.[104]

The CAISO submits stakeholders' concerns that scheduling coordinators may withhold capacity or game reserve pricing to evade bid cost verification are speculative. There is a very low probability scheduling coordinators would try to withhold capacity or seek to provide operating reserves *in lieu* of energy based on the mere chance they might evade bid verification. Events such as these are very rare, and the scheduling

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100 *Cal. Indep. Sys. Operator Corp*., "Tariff Amendment to Enhance Market Parameters and Import Bidding Related to Order No. 831," Docket No. ER21-1192 (Feb. 22, 2021).

101 Existing CAISO tariff Section 34.10.

102 DMM "supports this proposal as a way of helping to ensure prices are relatively high when system conditions are extremely tight, such that controlled dropping of load needs to be relied upon for operating reserve. This proposal is an extension of how contingency only reserves are prices when these resources are called upon to provide energy." Comments on Market Enhancements for summer 2021 Readiness Draft Final Proposal, Department of Market Monitoring (Feb. 26, 2021).

103 The MSC "agree[s] with the CAISO that some of the critical weaknesses of the current pricing rules need to be addressed with these changes in time to help avoid the need for load shedding during the coming summer." MSC Opinion at 7.

104 *Id*. at 4.

coordinator's opportunity costs for the energy it could provide *in lieu* of reserves would be very high.[105]

E. Interconnection Enhancements

1. Background

The CAISO has three interconnection request processes for transmission-connected resources: the annual cluster study process, the fast track process, and the independent study process.[106] The independent study process is designed for resources that need to come online more quickly than the cluster study process and are larger than the five MW limit imposed by the fast track process.[107] Recently, the CAISO learned of two issues that may unduly limit independent study interconnection customers' ability to create capacity load-serving entities can procure this summer. First, the CAISO's behind-the-meter expansion process caps expansions to the lower of 125 percent of the existing capacity or 100 MW.[108] The behind-the-meter expansion process allows interconnection customer to add generating capacity at their site, but without increasing the interconnection service capacity originally studied.[109] Hence the name "behind-the-meter expansion." The CAISO implemented the behind-the-meter cap before energy storage became a common addition to variable energy resources. The original intent behind the cap was to avoid interconnection customers' excessively building out capacity beyond the interconnection service capacity originally studied. However, today many variable energy resources seek to add energy storage capacity merely to shore up the MWh their generating facility can provide throughout the day, without needing to increase interconnection service capacity. For example, a solar resource could extend its ability to provide energy beyond sunset and even well into the evening with sufficient energy storage. Doing so would benefit the CAISO, the resource owners, and ratepayers. Currently, however, the tariff caps interconnection customers' additions.

Second, although the independent study process design contemplated interconnecting more quickly than the cluster study process, the CAISO and stakeholders included tariff provisions preventing "queue-jumping" for deliverability.[110]

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105 Stakeholders also ignore that this enhancement sets the price at an administrative price, not a bid price that would be cost verified.

106 *See* Existing CAISO tariff, Appendix DD.

107 Existing CAISO tariff, section 4.1 of Appendix DD.

108 Existing CAISO tariff, section 4.2.1.2 of Appendix DD.

109 Interconnection customers desiring to add generating capacity *and* interconnection service capacity must submit a new interconnection request seeking as much.

110 Existing CAISO tariff, section 4.6 of Appendix DD. Deliverability means the ability to delivery energy to load during peak conditions. Deliverability generally is a requirement to provide resource

As such, the CAISO requires independent study interconnection customers to participate as "energy only" until they can participate in the next cluster deliverability assessment. Typically, the next cluster deliverability assessment will not occur for more than a year after an interconnection customer submits an independent study interconnection request. If such an interconnection customer comes online before the deliverability assessment is complete,[111] it cannot provide resource adequacy capacity even if deliverability capacity is available. In other words, the CAISO cannot allocate available deliverability capacity to independent study interconnection customers—even on a temporary basis—until the next cluster deliverability assessment.

2. Proposed Tariff Revisions[112]

First, the CAISO proposes to remove the cap on behind-the-meter expansions.[113] Having now conducted behind-the-meter expansion studies and gained experience with the process, the CAISO foresees no issue with removing the cap. Most expansions today are battery additions on variable energy resources, which are unlikely to present reliability issues. Removing the cap will allow variable energy resources and other generators to hold excess energy when demand is low and then discharge that energy during the system peak. Removing the cap also is consistent with the CAISO's practice, nationalized in Order No. 845, of allowing interconnection customers to size their generating facility capacity and interconnection service capacity independently as they see fit so long as there are controls in place to ensure safety and reliability.[114] These provisions will ensure removing the cap cannot adversely affect reliability or other interconnection customers.

Second, the CAISO proposes to empower itself to award available interim deliverability on a temporary basis to independent study interconnection customers that achieve commercial operation before the next deliverability assessment.[115] The CAISO will determine whether interim deliverability is available, and will award it to the interconnection customer once online. Because independent studies proceed on a unique timetable, the CAISO will make this deliverability determination as soon as practical, but no later than the calendar month before the interconnection customer

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adequacy capacity.

111 And any required delivery network upgrades complete.

112 The CAISO notes each interconnection enhancement is severable and independent.

113 Revised CAISO tariff, section 4.2.1.2 of Appendix DD.

114 *See* Existing CAISO tariff, section 3.1 of Appendix DD (allowing interconnection service capacity below generating facility capacity so long as controls are established to maintain safety and reliability); *Reform of Generator Interconnection Procedures and Agreements*, Order No. 845, 163 FERC ¶ 61,043 at PP 343 *et seq.* (2018); *on rehearing and clarification*, Order No. 845-A, 166 FERC ¶ 61,137 (2019).

115 Revised CAISO tariff, section 4.6 of Appendix DD.

achieves commercial operation.[116] This proposal will maximize available deliverability capacity that could otherwise go unused, making additional capacity available and allowing load-serving entities to access additional resource adequacy capacity.

To continue to prevent queue jumping for deliverability, the independent study interconnection customer will maintain any interim deliverability only until (1) the interconnection customer originally allocated that deliverability achieves commercial operation, or (2) the CAISO completes the next scheduled deliverability assessment and the interconnection customer's delivery network upgrades are complete, enabling partial capacity or full capacity deliverability status.[117] This will ensure independent study interconnection customers can use available deliverability if they come online quickly, but it preserves the rights of earlier-queued interconnection customers.

The Commission should approve these interconnection enhancements, which stakeholders generally supported. They help address the most fundamental issue of the root-cause analysis: insufficient generating capacity. Moreover, these enhancements provide interconnection customers with additional options, avoid affecting other interconnection customers and existing generators, and benefit load-serving entities and ratepayers.

IV. EFFECTIVE DATE

To address the risks the CAISO faces in summer 2021, the proposed tariff revisions must be effective by the start of summer. Accordingly, the CAISO requests the Commission issue an order by May 25, 2021, accepting the proposed tariff revisions to be effective no later than June 15, 2021.[118] The CAISO also requests authorization to notify market participants of the effective date of the tariff changes at least five days before implementation.[119] The CAISO needs an order by May 25, 2021 so it can prepare to implement the proposed enhancements by its target effective date and satisfy the advance notification requirement.

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116 *Id*.

117 *Id*.

118 The CAISO tentatively plans on implementing the proposed enhancements on June 3, 2021, but desires flexibility regarding the implementation date if there is some slippage.

119 The CAISO has included an effective date of 12/31/9998 as part of the tariff records submitted in this filing. The CAISO will notify the Commission of the actual effective date of these tariff records within five business days of implementation in an eTariff submittal using Type of Filing code 150 – Report. *See Cal. Indep. Sys. Operator Corp.,* 172 FERC ¶ 61,263 (2020).

V. COMMUNICATIONS

Correspondence and other communications regarding this filing should be directed to:

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VI. SERVICE

The CAISO has served copies of this filing on the California Public Utilities Commission, the California Energy Commission, and all parties with scheduling coordinator agreements under the CAISO tariff. In addition, the CAISO has posted a copy of the filing on the CAISO website.

VII. CONTENTS OF FILING

In addition to this transmittal letter, this filing includes the following attachments:

Attachment A	Clean CAISO tariff sheets incorporating this tariff amendment
Attachment B	Red-lined document showing the revisions in this tariff amendment

Attachment C	Memorandum and Presentation to the EIM Governing Body regarding the Decision on Market Enhancements for Summer 2021 Readiness
Attachment D	Memorandum and Presentation to CAISO Board regarding the Decision on Market Enhancements for Summer 2021 Readiness; and March 17, 2021 DMM Update to CAISO Board
Attachment E	Market Surveillance Committee Opinion

VIII. CONCLUSION

For the reasons set forth in this filing, the CAISO respectfully requests the Commission approve the proposed tariff revisions consistent with the discussion in this filing.

Respectfully submitted,

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Attachment A – Clean Tariff

2021 Summer Readiness

California Independent System Operator Corporation

March 26, 2021

Section 4

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4.13.3 Identification of RDRRs and PDRs

Each Demand Response Provider shall provide data, as described in the Business Practice Manual, identifying each of its Reliability Demand Response Resources or Proxy Demand Resources and such information regarding the capacity and the operating characteristics of the Reliability Demand Response Resource or Proxy Demand Resource as may be reasonably requested from time to time by the CAISO. All information provided to the CAISO regarding the operational and technical constraints in the Master File shall be accurate and actually based on physical characteristics of the resources. Demand Response Providers for Proxy Demand Resources and Reliability Demand Response Resources may elect to specify in the Master File how the Proxy Demand Resource and Reliability Demand Response Resources will bid and be dispatched in the Real-Time Market: in (i) Hourly Blocks, (ii) fifteen (15) minute intervals, or (iii) five (5) minute intervals. Proxy Demand Resources using the load-shift methodology described in Section 4.13.4.7 may elect to bid and be dispatched in the Real-Time Market in fifteen (15) minute intervals or five (5) minute intervals. If Demand Response Providers do not submit an election in the Master File, the CAISO will set five (5) minute intervals as the default.

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Section 11

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11.6.4 Settlements of Proxy Demand Resources and Reliability Demand Response Resources in the Real-Time Market

The CAISO will calculate RTM Schedules and Awards for Proxy Demand Resources and Reliability Demand Response Resources at the relevant RTM Locational Marginal Price at the relevant Scheduling Point consistent with Section 11.5. The portion of an Hourly Block Schedule for Energy that becomes financially binding will constitute an FMM Schedule. A cleared Economic Hourly Block Bid is not eligible for Bid Cost Recovery. Ramping Energy Deviations, Residual Imbalance Energy, and Standard Ramping Energy do not apply to Proxy Demand Resources and Reliability Demand Response Resources with Hourly Block or FMM Schedules.

* * * * *

11.21 Make Whole Payments

11.21.1 Price Corrections for CAISO Demand and Exports

If the CAISO corrects an LMP in the upward direction pursuant to Section 35 that impacts Demand in the Day-Ahead Market and the FMM such that either a portion of or the entire cleared CAISO Demand or export Economic Bid curve becomes uneconomic, then the CAISO will calculate and apply the Price Correction Derived LMP for settlement of day-ahead CAISO Demand and exports in Sections 11.2.1.2, 11.2.1.3, and 11.2.1.4, and FMM exports in Section 11.5.1.1. The CAISO shall not calculate and apply a Price Correction Derived LMP for settlement of exports that are part of a Schedule that results from Bids submitted in violation of Section 30.5.5. The CAISO will calculate a Price Correction Derived LMP for each affected CAISO Demand and exports as follows: the total cleared MWhs of CAISO Demand or exports in the Day-Ahead Schedule or FMM Schedule, as applicable, multiplied by the corrected LMP, minus the make-whole payment amount, all of which is divided by the total cleared MWhs of CAISO Demand or export in the Day-Ahead Schedule or FMM Schedule, as applicable. The make-whole payment amount will be calculated on an hourly basis determined by the area between the Scheduling Coordinator's CAISO Demand or Export Bid curve and the corrected LMP, which is calculated as the MWhs for each of the cleared bid segments in the Day-Ahead Schedule or FMM Schedule for the affected resource, multiplied by the maximum of zero or the corrected LMP minus the bid segment price. For the purpose of this calculation, the CAISO will not factor in a make-whole payment amount for Self-

Scheduled CAISO Demand or exports. Any non-zero amounts in revenue collected as a result of the application of the Price Correction Derived LMP will be captured through the calculation of the IFM Congestion Charge reflected in Section 11.2.4.1 and the allocation of non-zero amounts of the sum of FMM Instructed Imbalance Energy and RTD Imbalance Energy, Uninstructed Imbalance Energy, and Unaccounted for Energy in accordance with Section 11.5.4.

11.21.2 Price Correction for Settlement of Virtual Awards

If the CAISO corrects an LMP pursuant to Section 35 that affects a Virtual Award such that either a portion or the entirety of the Virtual Bid Curve associated with the Virtual Award becomes uneconomic, then the CAISO will calculate and apply the price correction for settlement of Virtual Awards as follows: the total cleared MWhs of Virtual Awards multiplied by the corrected LMP, plus the make-whole amount. The make-whole amount for Virtual Demand Awards will be calculated on an hourly basis determined by the area between the Virtual Bid Curve and the corrected LMP, which is calculated as the MWhs in each of the cleared Virtual Bid segments of the Virtual Demand Bid multiplied by the maximum of zero or the corrected LMP minus the Virtual Bid segment price. For Virtual Supply Awards, the make-whole amount will be calculated on an hourly basis determined by the area between the Virtual Bid Curve and the corrected LMP, which is calculated as the MWhs in each of the cleared Virtual Bid segments of the Virtual Supply Bid multiplied by the maximum of zero or the Virtual Bid segment price minus the corrected LMP.

11.21.3 Make Whole Payments for HASP Block Intertie Schedules

11.21.3.1 Eligibility for Make Whole Payments

The CAISO may issue a notice of anticipated or actual Operating Reserve deficiencies either the day before an applicable Trading Day or during an applicable Trading Day. During any Trading Hours in which such a notice is in effect, Scheduling Coordinators with HASP Block Intertie Schedules that bid into the Real-Time Market in accordance with Section 30.5.7.3 or Section 30.5.7.4 and receive an FMM Schedule above their import Day-Ahead Scheduled Energy, if any, or an FMM Schedule below their export Day-Ahead Scheduled Energy will be eligible for an hourly make whole payment for FMM Optimal Energy as described in this Section. If, however, during the intervals in which the CAISO's notice is in effect a Scheduling Coordinator's Intertie resource has either an Under/Over Delivery Quantity in any FMM interval and is subject to the provisions of Section 11.31 or has an Intertie Day-Ahead Schedule that

is wholly or partially reversed through an FMM Schedule and is subject to the provisions of Section 11.32, then the Scheduling Coordinator's Intertie resource will not be eligible for the make whole payment described in this Section. HASP Block Intertie Schedules that are part of Wheeling Through transactions are not eligible for the make whole payment described in this Section.

The CAISO may suspend the effectiveness of this Section if the CAISO determines that make whole payments have not resulted in incremental supply. The CAISO may discontinue any suspension or limitation at any time it determines such suspension or limitation is no longer appropriate.

11.21.3.2 Calculation of Make Whole Payments

The CAISO will calculate an hourly make whole payment for each HASP Block Intertie Schedule based upon the FMM Optimal Energy above a Scheduling Coordinator's import Day-Ahead Scheduled Energy or as FMM Optimal Energy below a Scheduling Coordinator's export Day-Ahead Scheduled Energy. The make-whole payment will equal the positive difference between the Scheduling Coordinator's HASP Block Intertie Schedule Bid price and the relevant hourly average FMM Locational Marginal Prices for the applicable Trading Hour multiplied by the FMM Optimal Energy delivered by the HASP Block Intertie Schedule during that Trading Hour.

11.21.3.3 Allocation of Make Whole Payments Costs

The CAISO will calculate the cost of make whole payments for HASP Block Intertie Schedules in each Settlement Interval of the Trading Hour.

(a) The CAISO will allocate the cost of make whole payments attributed to the CAISO Balancing Authority Area as follows:

(1) Scheduling Coordinators in proportion to their Measured Demand in the same Trading Hour in which the CAISO calculates the make whole payment;

(2) Scheduling Coordinators for Metered Subsystem Operators that have elected (i) not to follow their Load, and (ii) gross Settlement, in proportion to their Measured Demand plus any FMM reductions not associated with valid and balanced Existing Transmission Contracts, Transmission Ownership Rights or Converted Rights Self-Schedules in the Day-Ahead Market in the same Trading Hour in which the CAISO calculates the make whole payment;

(3) Scheduling Coordinators for Metered Subsystem Operators that have elected (i) not to follow

their Load and (ii) net Settlement, in proportion to their Metered Subsystem Aggregation Net Measured Demand plus any FMM reductions not associated with valid and balanced Existing Transmission Contracts, Transmission Ownership Rights, or Converted Rights Self-Schedules in the Day-Ahead Market in the same Trading Hour in which the CAISO calculates the make whole payment.

(4) Scheduling Coordinators of Metered Subsystem Operators that have elected to follow their Load, in proportion to their Metered Subsystem Net Negative Uninstructed Deviation plus any FMM reductions not associated with valid and balanced Existing Transmission Contracts, Transmission Ownership Rights, or Converted Rights Self-Schedules in the Day-Ahead Market in the same Trading Hour in which the CAISO calculates the make whole payment.

* * * * *

Section 29

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29.27 CAISO Markets And Processes.

(a) **In General.** Except as provided in subsection (b) of this section, the provisions of Section 27 that are applicable to the Real-Time Market shall apply to EIM Market Participants.

(b) **Transition Period for New EIM Entities.**

(1) **Transmission Constraint Relaxation.** For a period of six months following the Implementation Date of a new EIM Entity, the provisions of Section 27.4.3.2 and the second sentence of Section 27.4.3.4 shall not apply to constraints that are within Balancing Authority Areas of the new EIM Entity or affect EIM Transfers between the Balancing Authority Areas of the new EIM Entity and any other EIM Entity that is subject to this subsection (b). For those intervals that experience

infeasibilities described in those provisions, the CAISO shall instead determine prices consistent with the provisions of Sections 27, 34, and Appendix C, that would apply in the absence of Section 27.4.3.2 and the second sentence of Section 27.4.3.4.

(2) **Flexible Ramping Product.** For a period of six months following the EIM Entity Implementation Date of a new EIM Entity, when the transmission and/or power balance constraints as specified in Sections 27.4.3.2 and 27.4.3.4, respectively, are relaxed, the CAISO shall set the Flexible Ramping Product parameter for pricing purposes, for the new EIM Entity Balancing Authority Area, at an amount between and including $0 and $0.01.

(3) **Extension of Transition Period Pricing.** Any extensions of the initial six-month transition period, as approved by the Federal Energy Regulatory Commission, are specified below. Sixty days prior to the expiration of the transition period, the CAISO will post on the CAISO website an assessment of whether an extension of the transition period, for up to an additional six months, is needed for the applicable EIM Entity. The CAISO will post an update to such assessment prior to the expiration of the transition period should there be any changes to its posted conclusions.

(A) [reserved]

(4) **Reports.** During the term of the transition period, the CAISO will submit monthly reports with the Commission on the infeasibilities observed in the applicable EIM Entity Balancing Authority Area, the nature of the issues causing the infeasibility and remedies adopted to address the issues identified.

(c) **Automated EIM Mirror.** If the CAISO updates an Interchange E-Tag for a schedule change outside of the Market Clearing of the Real-Time Market for System Resources and Scheduling Points and the associated energy is generated at, wheeled through, or consumed at an EIM Entity Balancing Authority Area, the CAISO will automatically EIM Mirror the schedule change using the relevant EIM Mirror System Resource in

accordance with the procedures specified in the Business Practice Manual for the Energy Imbalance Market.

(d) **Base GDFs for Aggregated EIM Non-Participating Resources.** The CAISO will allow base Generation Distribution Factor submission for aggregate EIM non-participating resources through the submission of EIM Base Schedules and will distribute the base schedule and any imbalances of aggregate EIM non-participating resources using the submitted base GDFs, if available, or otherwise the registered default base GDFs for the resource in the Master File, normalized for Outages.

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29.34 EIM Operations

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(l) **EIM Resource Plan Evaluation.**

(1) **Requirement.** The EIM Base Schedules for resources included in the EIM Resource Plan must balance the Demand Forecast for each EIM Entity Balancing Authority Area and the Uncertainty Requirement determined in accordance with Section 44.2.4, and for the CAISO Balancing Authority Area the RUC Schedules, the HASP Advisory Schedules and HASP Intertie Block Schedules or the FMM Schedules, as applicable and as detailed in Business Practice Manuals, must balance the Demand Forecast and the Uncertainty Requirement determined in accordance with Section 44.2.4.

(2) **Insufficient Supply.** An EIM Resource Plan or the CAISO equivalent shall be deemed to have insufficient Supply if the sum of EIM Base Schedules from non-participating resources and the sum of the highest quantity offers in the Energy Bid range from EIM Participating Resources, including Interchange with other

Balancing Authority Areas, is less than the total Demand Forecast that the EIM Entity Scheduling Coordinator has decided to use for the associated EIM Entity Balancing Authority Area and the Uncertainty Requirement determined in accordance with Section 44.2.4, and for the CAISO Balancing Authority Area the RUC Schedules, the HASP Advisory Schedules and HASP Intertie Block Schedules or the FMM Schedules, as applicable and as detailed in Business Practice Manuals, are less than the total Demand Forecast and the Uncertainty Requirement determined in accordance with Section 44.2.4.

(3) **Excess Supply.** An EIM Resource Plan or the CAISO equivalent shall be deemed to have excessive Supply if the sum of EIM Base Schedules from non-participating resources and the sum of the lowest quantity Bids in the Energy Bid range from EIM Participating Resources is greater than the total Demand Forecast that the EIM Entity Scheduling Coordinator has decided to use for the associated EIM Entity Balancing Authority Area plus the Uncertainty Requirement determined in accordance with Section 44.2.4, and for the CAISO Balancing Authority Area the RUC Schedules, the HASP Advisory Schedules and HASP Intertie Block Schedules or the FMM Schedules, as applicable and as detailed in Business Practice Manuals, are greater than the total Demand Forecast and the Uncertainty Requirement determined in accordance with Section 44.2.4.

(4) **Additional Hourly Capacity Requirements.**

(A) **In General.** If the CAISO determines under the procedures set forth in the Business Practice Manual for the Energy Imbalance Market that a Balancing Authority Area in the EIM Area has historically high import or export schedule changes between forty minutes and twenty minutes before the start of the Trading Hour, the CAISO will add to the Balancing Authority Area in the EIM Area’s capacity requirements an additional requirement.

(B) **Additional Capacity Requirement.** On a monthly basis, according to procedures set forth in the Business Practice Manual for the Energy Imbalance Market, the CAISO will calculate for each Balancing Authority Area in the EIM Area histograms of the percentage of the difference between imports and exports scheduled at forty minutes before the start of the Trading Hour and the final imports and exports at twenty minutes before the start of the Trading Hour based on the submitted E-Tags at those times and calculate additional upward and downward requirements for the capacity test component of the resource sufficiency evaluation.

(5) **Removal of the Uncertainty Requirement.**

For a period of 12 months after the Uncertainty Requirement has been included in accordance with this Section 29.34(l), the CAISO may upon Market Notice of at least three (3) Business Days no longer include the Uncertainty Requirement if—

(A) the frequency or magnitude of capacity test failures supports a conclusion that the results were unintended and caused by including the Uncertainty Requirement;

(B) the CAISO submits an informational report to FERC within 30 days explaining and supporting its conclusion; and

(C) the Uncertainty Requirement remains excluded from the capacity test unless and until FERC authorizes otherwise.

(m) **Flexible Ramping Sufficiency Determination.**

(1) **Review.**

(A) **EIM Entity Balancing Authority Areas.** The CAISO will review the EIM Resource Plan pursuant to the process set forth in the Business Practice Manual for the Energy Imbalance Market and verify that it has sufficient Bids for Ramping capability to meet the EIM Entity Balancing Authority Area upward and downward Ramping requirements, as adjusted

pursuant to Sections 29.34(m)(2), (3), and (5).

(B) **CAISO Balancing Authority Area.** The CAISO will review the Day-Ahead Schedules in the CAISO Balancing Authority Area and verify that it has sufficient Bids for Ramping capability to meet the CAISO Balancing Authority Area upward and downward Ramping requirements, as adjusted pursuant to Sections 29.34(m)(2), (3), (5), and (6).

(2) **Determination of EIM Diversity Benefit.** The CAISO will calculate separately the upward and downward EIM diversity benefit as the difference between the sum of the upward and downward Uncertainty Requirements for all Balancing Authority Areas in the EIM Area, and the Uncertainty Requirement for the EIM Area.

(3) **Effects of EIM Diversity Benefit.** For each Balancing Authority Area in the EIM Area, the CAISO will reduce the upward and downward Uncertainty Requirements by the Balancing Authority Area's pro rata share of the upward and downward EIM diversity benefit in the EIM Area as may be limited by –

(A) the available net import EIM Transfer capability into that Balancing Authority Area in the case of an upward Uncertainty Requirement; and

(B) the available net export EIM Transfer capability from that Balancing Authority Area in the case of a downward Uncertainty Requirement.

(4) **Determination of Flexible Ramping Sufficiency Credit.** The CAISO will calculate for each Balancing Authority Area in the EIM Area, the upward flexible Ramping sufficiency credit as the outgoing EIM Transfer from that area and the downward flexible Ramping sufficiency credit as the incoming EIM transfer into that area.

(5) **Effect of Flexible Ramping Sufficiency Credit.** The CAISO will reduce the upward Uncertainty Requirement of a Balancing Authority Area in the EIM Area by its upward flexible Ramping sufficiency credit, and will reduce the downward Uncertainty Requirement of a Balancing Authority Area in the EIM Area by its

downward flexible Ramping sufficiency credit.

(6) **Incremental Requirements.**

(i) **In General.** If the CAISO determines under the procedures set forth in the Business Practice Manual for the Energy Imbalance Market that an EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area has historically high import or export schedule changes between T-40 and T-20, the CAISO will add to the EIM Entity's or the CAISO's flexible capacity requirement an additional incremental requirement.

(ii) **Additional Incremental Requirement.** On a monthly basis, according to procedures set forth in the Business Practice Manual for the Energy Imbalance Market, the CAISO will calculate for each EIM Entity Balancing Authority Area and the CAISO Balancing Authority Area histograms of the percentage of the difference between imports and exports scheduled at T-40 and the final imports at T-20 based on the E-Tags submitted at T-40 and T-20 and calculate additional incremental and decremental requirements for the capacity test component of the resource sufficiency evaluation.

(n) **Effect of Resource Plan Insufficiency.**

(1) **Resource Plan Balance.** If, after the final opportunity for the EIM Entity to revise hourly Real-Time EIM Base Schedules as provided in Section 29.34(f)(1)(c), the EIM Resource Plan or the CAISO equivalent has insufficient supply as determined according to Section 29.34(l)-

(A) the CAISO will not include the EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area in the Uncertainty Requirement of the EIM Area;

(B) the CAISO will hold the EIM Transfer limit into or from the EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area, as specified in Section 29.34(n)(2), at the value for the last 15-minute

interval.

(2) **Flexible Ramping Insufficiency.** If, after the final opportunity for the EIM Entity to revise hourly Real-Time EIM Base Schedules or the CAISO equivalent as provided in Section 29.34(f)(1)(c), the CAISO determines-

(i) that an EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area has insufficient upward Ramping capacity according to Section 29.34(m), the CAISO will take the actions described in Section 29.34(n)(1)(A) and (B) in the upward and into the EIM Entity BAA or CAISO BAA direction; and

(ii) that an EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area has insufficient downward Ramping capacity according to Section 29.34(m), the CAISO will take the actions described in Section 29.34(n)(1)(A) and (B) in the downward and from the EIM Entity BAA or CAISO BAA direction.

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Section 30

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30.6.2.1 Bidding and Scheduling of RDRRs in the Real-Time Market

Pursuant to Section 4.13.3, Scheduling Coordinators for Reliability Demand Response Resources may submit Economic Bids for Energy in the Real-Time Markets. Scheduling Coordinators for Reliability Demand Response Resources may submit Economic Hourly Block Bids to be considered in the HASP, and to be accepted as binding Schedules with the same MWh award for each of the four FMM intervals. A cleared Economic Hourly Block Bid is not eligible for Bid Cost Recovery. Scheduling Coordinators for Reliability Demand Response Resources may not submit Economic Hourly Block Bids with an Intra-Hour

Option.

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30.6.2.1.2.1 Marginal Real-Time Dispatch Option

A Reliability Demand Response Resource that is subject to the Marginal Real-Time Dispatch Option:

(a) May submit either a single-segment Bid or a multi-segment bid in the Real-Time Market that must be at least ninety-five percent (95%) of the applicable Soft Energy Bid Cap.

(b) Shall be dispatched as a marginal resource if it is dispatched by the CAISO. For the purpose of making this determination and setting the Locational Marginal Price, the CAISO treats a Reliability Demand Response Resource as if it were flexible with an infinite Ramp Rate between zero (0) and its PMax.

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Section 34

****This section includes pending changes, highlighted in green, recently proposed in docket number ER21-1192****

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34.4 Fifteen Minute Market

The CAISO conducts the Fifteen Minute Market using the second interval of each RTUC run horizon as follows: (1) at approximately 7.5 minutes prior to the first Trading Hour, for T-45 minutes to T+60 minutes where the binding interval is T-30 to T-15; (2) at approximately 7.5 minutes into the current hour for T-30

minutes to T+60 minutes where the binding interval is T-15 to T; (3) at approximately 22.5 minutes into the current hour for T-15 minutes to T+60 minutes for the binding interval T to T+15; and (4) at approximately 37.5 minutes into the current hour for T to T+60 minutes for the binding interval T+15 to T+30, where T is the beginning of the next Trading Hour. In these intervals the CAISO conducts the FMM to (1) determine financially binding FMM Schedules and corresponding Locational Marginal Prices for all Pricing Nodes, including all Scheduling Points; (2) determine financially and operationally binding Ancillary Services Awards and corresponding ASMPs, procure required additional Ancillary Services and calculate ASMP used for settling procured Ancillary Service capacity for the next fifteen-minute Real-Time Ancillary Service interval for all Pricing Nodes, including Scheduling Points; (3) determine LAP Locational Marginal Price s that are the basis for settling Demand; and (4) determine FMM Uncertainty Awards. In any FMM interval that falls within a time period in which a Multi-Stage Generating Resource is transitioning from one MSG Configuration to another MSG Configuration, the CAISO: (1) will not award any incremental Ancillary Services; (2) will disqualify any Day-Ahead Ancillary Services Awards; (3) will disqualify Day-Ahead qualified Submissions to Self-Provide Ancillary Services Award, and (4) will disqualify Submissions to Self-Provide Ancillary Services in RTM. Each particular FMM market optimization produces binding settlement prices for Energy, Flexible Ramping Product, and Ancillary Services for the first FMM interval in the FMM horizon but the optimization considers the advisory results from subsequent market intervals within the FMM horizon. The CAISO settles Hourly Block Schedules from Proxy Demand Resources, Reliability Demand Response Resources, Hourly Intertie Schedules, and Hourly Ancillary Services Awards accepted in the HASP as FMM Schedules and FMM Ancillary Services Awards in accordance with Section 11.5 and 11.10.1.2, respectively. In the event that a FMM run fails, the CAISO reverts to Day-Ahead Market Ancillary Services Awards and RUC Schedules results corresponding to the same interval, or the corresponding interval from the previous RTUC. The FMM will clear Supply against the CAISO Forecast of CAISO Demand and exports. The FMM issues Energy Schedules and Ancillary Services Awards by twenty-two and a half minutes prior to the binding fifteen-minute interval.

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34.10 Dispatch of Energy from Ancillary Services

The CAISO may issue Dispatch Instructions to Participating Generators, Participating Loads, Proxy Demand Resources, (via communication with the Scheduling Coordinators of Demand Response Providers) System Units and System Resources contracted to provide Ancillary Services (either procured through the CAISO Markets, Self-Provided by Scheduling Coordinators, or through Exceptional Dispatch or dispatched in accordance with a Legacy RMR Contract) for the Supply of Energy. During normal operating conditions, the CAISO may Dispatch those Participating Generators, Participating Loads, Proxy Demand Resources, System Units and System Resources that have contracted to provide Spinning Reserve and Non-Spinning Reserve, except for those reserves designated as Contingency Only, in conjunction with the normal Dispatch of Energy. Contingency Only reserves are Operating Reserve capacity that have been designated, either by the Scheduling Coordinator or the CAISO, as available to supply Energy in the Real-Time only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency. During normal operating conditions, the CAISO may also elect to designate any reserve not previously identified as Contingency Only by Scheduling Coordinator as Contingency Only reserves. In the event of an unplanned Outage, a Contingency or a threatened or actual System Emergency, the CAISO may dispatch Contingency Only reserves. If Contingency Only reserves are dispatched through the RTCD, which as described in Section 34.5.2 only Dispatches in the event of a Contingency, such Dispatch and pricing will be based on the original Energy Bids. If Contingency Only or other scheduled reserves are dispatched in response to a System Emergency that has occurred because the CAISO has run out of Economic Bids when no Contingency event has occurred, the RTED will Dispatch such reserves using the Soft Energy Bid Cap as the Energy Bids for such reserves and will set prices accordingly. For CAISO Market intervals for which the conditions and parameters specified in Section 27.4.3.3 apply, the RTED will Dispatch such reserves using the Hard Energy Bid Cap as the Energy Bids for such reserves and will set prices accordingly. If a Participating Generator, Participating Load, System Unit or System Resource that is supplying Operating Reserve is Dispatched to provide Energy, the CAISO shall replace the Operating Reserve as necessary to maintain NERC and WECC reliability standards, including any requirements of the NRC. If the CAISO

uses Operating Reserve to meet Real-Time Energy requirements, and if the CAISO needs Operating Reserves to satisfy NERC and WECC reliability standards, including any requirements of the NRC, the CAISO shall restore the Operating Reserves to the extent necessary to meet NERC and WECC reliability standards, including any requirements of the NRC through either the procurement of additional Operating Reserve in the RTM or the Dispatch of other Energy Bids in SCED to allow the resources that were providing Energy from the Operating Reserve to return to their Dispatch Operating Target. The Energy Bid Curve is not used by the AGC system when Dispatching Energy from Regulation. For Regulation Up capacity, the upper portion of the resource capacity from its Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve. For a resource providing Regulation Up or Operating Reserves the remaining Energy Bid Curve shall be allocated to any RTM AS Awards in the following order from higher to lower capacity where applicable: (a) Spinning Reserve; and (b) Non-Spinning Reserve. For resources providing Regulation Up, the applicable upper Regulation Limit shall be used as the basis of allocation if it is lower than the upper portion of the Energy Bid Curve. The remaining portion of the Energy Bid Curve, if there is any, shall constitute a Bid for RTM Energy. For Regulation Down capacity, the lower portion of the resource capacity from its applicable Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve.

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Appendix DD

****This section includes pending changes, highlighted in grey, recently proposed in docket number ER21-1304****

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4.2.1.2 Requirement Set Number Two: for Requests for Independent Study of Behind-the-Meter Capacity Expansion of Generating Facilities

This Section 4.2.1.2 applies to an Interconnection Request relating to a behind-the-meter capacity expansion of a Generating Facility. Such an Interconnection Request submitted under the Independent Study Process will satisfy the requirements of Section 4.2.1 if it satisfies all of the following technical and business criteria:

(i) Technical criteria.

1) The behind-the-meter capacity expansion shall not take place until after the original Generating Facility has achieved Commercial Operation and all Reliability Network Upgrades for the original Generating Facility have been placed in service. An Interconnection Request for behind-the-meter capacity expansion may be submitted prior to the Commercial Operation Date of the original Generating Facility.

2) The Interconnection Customer must install an automatic generator tripping scheme sufficient to ensure that the total output of the Generating Facility, including the behind-the-meter capacity expansion, does not at any time exceed the capacity studied in the Generating Facility's original Interconnection Request. The CAISO will have the authority to trip the generating equipment subject to the

automatic generator tripping scheme or take any other actions necessary to limit the output of the Generating Facility so that the total output of the Generating Facility does not exceed the originally studied capacity.

(ii) Business criteria.

1) The Deliverability Status (Full Capacity, Partial Capacity or Energy-Only, and Off-Peak Deliverability Status or Off-Peak Energy Only) of the original Generating Facility will remain the same after the behind-the-meter capacity expansion. The capacity expansion will have Energy-Only, Off-Peak Energy Only Deliverability Statuses unless otherwise specified in this GIDAP, and the original Generating Facility and the behind-the-meter capacity expansion will be metered separately from one another and be assigned separate Resource IDs, except as set forth in (2) below.

2) If the original Generating Facility has Full Capacity Deliverability Status and/or Off-Peak Deliverability Status and the behind-the-meter capacity expansion will use the same technology as the original Generating Facility, the Interconnection Customer may elect to have the original Generating Facility and the behind-the-meter capacity expansion metered together, in which case both the original Generating Facility and the behind-the-meter capacity expansion may have Partial Capacity Deliverability Status and Off-Peak Deliverability Status, as applicable, pursuant to CAISO study results to determine Deliverability, and

a separate Resource ID will not be established for the behind-the-meter capacity expansion.

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4.6 Deliverability Assessments

Interconnection Customers under the Independent Study Process that request Partial Capacity, Full Capacity Deliverability Status, or Off-Peak Deliverability Status will be deemed to have selected Option (A) under Section 7.2 and will have Deliverability Assessments performed as part of the next scheduled Phase I and Phase II Interconnection Studies for the Queue Cluster study performed for the next Queue Cluster Window that opens after the CAISO received the request. If the Deliverability Assessment identifies any Network Upgrades that are triggered by the Interconnection Request, the Interconnection Customer will be responsible to pay its proportionate share of the costs of those Upgrades, pursuant to Sections 6, 7, and 8, and for posting Interconnection Financial Security pursuant to the rules for Interconnection Customers in Queue Clusters pursuant to Section 11.

If the Generating Facility (or increase in capacity of an existing Generating Facility) achieves its Commercial Operation Date before the Deliverability Assessment is completed or before any necessary Delivery Network Upgrades are in service, the CAISO will determine whether Interim Deliverability is available, and will award it to the Generating Facility. The CAISO will make this determination as soon as practical, but no later than the calendar month before the Generating Facility or capacity increase achieves its Commercial Operation Date. The Generating Facility will maintain any Interim Deliverability until (1) the Interconnection Customer to which that Deliverability was originally allocated achieves its Commercial Operation Date; or (2) the CAISO completes the next scheduled Deliverability Assessment and the Generating Facility's Delivery Network Upgrades are complete, enabling Partial Capacity or Full Capacity Deliverability Status.

If the CAISO determines Interim Deliverability is not available, the Generating Facility or capacity increase will be Energy Only until the CAISO completes the next scheduled Deliverability Assessment and the Generating Facility's Delivery Network Upgrades are complete.

This Section shall not apply to Interconnection Customers requesting behind-the-meter capacity expansion under Section 4.2.1.2. Separate rules regarding the Deliverability Status of such requests are set forth in that Section.

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Attachment B – Marked Tariff

2021 Summer Readiness

California Independent System Operator Corporation

March 26, 2021

Section 4

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4.13.3 Identification of RDRRs and PDRs

Each Demand Response Provider shall provide data, as described in the Business Practice Manual, identifying each of its Reliability Demand Response Resources or Proxy Demand Resources and such information regarding the capacity and the operating characteristics of the Reliability Demand Response Resource or Proxy Demand Resource as may be reasonably requested from time to time by the CAISO. All information provided to the CAISO regarding the operational and technical constraints in the Master File shall be accurate and actually based on physical characteristics of the resources. Demand Response Providers for Proxy Demand Resources and Reliability Demand Response Resources may elect to specify in the Master File how the Proxy Demand Resource and Reliability Demand Response Resources will bid and be dispatched in the Real-Time Market: in (i) Hourly Blocks, (ii) fifteen (15) minute intervals, or (iii) five (5) minute intervals. Proxy Demand Resources using the load-shift methodology described in Section 4.13.4.7 may elect to bid and be dispatched in the Real-Time Market in fifteen (15) minute intervals or five (5) minute intervals. If Demand Response Providers do not submit an election in the Master File, the CAISO will set five (5) minute intervals as the default.

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Section 11

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11.6.4 Settlements of Proxy Demand Resources and Reliability Demand Response Resources in the Real-Time Market

The CAISO will calculate RTM Schedules and Awards for Proxy Demand Resources and Reliability Demand Response Resources at the relevant RTM Locational Marginal Price ~~LMP~~ at the relevant Scheduling Point consistent with Section 11.5. The portion of an Hourly Block Schedule for Energy that becomes financially binding will constitute an FMM Schedule. A cleared Economic Hourly Block Bid is not eligible for Bid Cost Recovery. Ramping Energy Deviations, Residual Imbalance Energy, and Standard Ramping Energy do not apply to Proxy Demand Resources and Reliability Demand Response Resources with Hourly Block or FMM Schedules.

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11.21 Make Whole Payments ~~for Price Corrections~~

11.21.1 Price Corrections for CAISO Demand and Exports

If the CAISO corrects an LMP in the upward direction pursuant to Section 35 that impacts Demand in the Day-Ahead Market and the FMM such that either a portion of or the entire cleared CAISO Demand or export Economic Bid curve becomes uneconomic, then the CAISO will calculate and apply the Price Correction Derived LMP for settlement of day-ahead CAISO Demand and exports in Sections 11.2.1.2, 11.2.1.3, and 11.2.1.4, and FMM exports in Section 11.5.1.1. The CAISO shall not calculate and apply a Price Correction Derived LMP for settlement of exports that are part of a Schedule that results from Bids submitted in violation of Section 30.5.5. The CAISO will calculate a Price Correction Derived LMP for each affected CAISO Demand and exports as follows: the total cleared MWhs of CAISO Demand or exports in the Day-Ahead Schedule or FMM Schedule, as applicable, multiplied by the corrected LMP, minus the make-whole payment amount, all of which is divided by the total cleared MWhs of CAISO Demand or export in the Day-Ahead Schedule or FMM Schedule, as applicable. The make-whole payment amount will be calculated on an hourly basis determined by the area between the Scheduling Coordinator's CAISO Demand or Export Bid curve and the corrected LMP, which is calculated as the MWhs for each of the cleared bid segments in the Day-Ahead Schedule or FMM Schedule for the affected resource, multiplied by the maximum of zero or the corrected LMP minus the bid segment price. For the purpose of this calculation, the CAISO will not factor in a make-whole payment amount for Self-

Scheduled CAISO Demand or exports. Any non-zero amounts in revenue collected as a result of the application of the Price Correction Derived LMP will be captured through the calculation of the IFM Congestion Charge reflected in Section 11.2.4.1 and the allocation of non-zero amounts of the sum of FMM Instructed Imbalance Energy and RTD Imbalance Energy, Uninstructed Imbalance Energy, and Unaccounted for Energy in accordance with Section 11.5.4.

11.21.2 Price Correction for Settlement of Virtual Awards

If the CAISO corrects an LMP pursuant to Section 35 that affects a Virtual Award such that either a portion or the entirety of the Virtual Bid Curve associated with the Virtual Award becomes uneconomic, then the CAISO will calculate and apply the price correction for settlement of Virtual Awards as follows: the total cleared MWhs of Virtual Awards multiplied by the corrected LMP, plus the make-whole amount. The make-whole amount for Virtual Demand Awards will be calculated on an hourly basis determined by the area between the Virtual Bid Curve and the corrected LMP, which is calculated as the MWhs in each of the cleared Virtual Bid segments of the Virtual Demand Bid multiplied by the maximum of zero or the corrected LMP minus the Virtual Bid segment price. For Virtual Supply Awards, the make-whole amount will be calculated on an hourly basis determined by the area between the Virtual Bid Curve and the corrected LMP, which is calculated as the MWhs in each of the cleared Virtual Bid segments of the Virtual Supply Bid multiplied by the maximum of zero or the Virtual Bid segment price minus the corrected LMP.

11.21.3 Make Whole Payments for HASP Block Intertie Schedules

11.21.3.1 Eligibility for Make Whole Payments

The CAISO may issue a notice of anticipated or actual Operating Reserve deficiencies either the day before an applicable Trading Day or during an applicable Trading Day. During any Trading Hours in which such a notice is in effect, Scheduling Coordinators with HASP Block Intertie Schedules that bid into the Real-Time Market in accordance with Section 30.5.7.3 or Section 30.5.7.4 and receive an FMM Schedule above their import Day-Ahead Scheduled Energy, if any, or an FMM Schedule below their export Day-Ahead Scheduled Energy will be eligible for an hourly make whole payment for FMM Optimal Energy as described in this Section. If, however, during the intervals in which the CAISO's notice is in effect a Scheduling Coordinator's Intertie resource has either an Under/Over Delivery Quantity in any FMM interval and is subject to the provisions of Section 11.31 or has an Intertie Day-Ahead Schedule that

is wholly or partially reversed through an FMM Schedule and is subject to the provisions of Section 11.32, then the Scheduling Coordinator's Intertie resource will not be eligible for the make whole payment described in this Section. HASP Block Intertie Schedules that are part of Wheeling Through transactions are not eligible for the make whole payment described in this Section.

The CAISO may suspend the effectiveness of this Section if the CAISO determines that make whole payments have not resulted in incremental supply. The CAISO may discontinue any suspension or limitation at any time it determines such suspension or limitation is no longer appropriate.

11.21.3.2 Calculation of Make Whole Payments

The CAISO will calculate an hourly make whole payment for each HASP Block Intertie Schedule based upon the FMM Optimal Energy above a Scheduling Coordinator's import Day-Ahead Scheduled Energy or as FMM Optimal Energy below a Scheduling Coordinator's export Day-Ahead Scheduled Energy. The make-whole payment will equal the positive difference between the Scheduling Coordinator's HASP Block Intertie Schedule Bid price and the relevant hourly average FMM Locational Marginal Prices for the applicable Trading Hour multiplied by the FMM Optimal Energy delivered by the HASP Block Intertie Schedule during that Trading Hour.

11.21.3.3 Allocation of Make Whole Payments Costs

The CAISO will calculate the cost of make whole payments for HASP Block Intertie Schedules in each Settlement Interval of the Trading Hour.

(a) The CAISO will allocate the cost of make whole payments attributed to the CAISO Balancing Authority Area as follows:

(1) Scheduling Coordinators in proportion to their Measured Demand in the same Trading Hour in which the CAISO calculates the make whole payment;

(2) Scheduling Coordinators for Metered Subsystem Operators that have elected (i) not to follow their Load, and (ii) gross Settlement, in proportion to their Measured Demand plus any FMM reductions not associated with valid and balanced Existing Transmission Contracts, Transmission Ownership Rights or Converted Rights Self-Schedules in the Day-Ahead Market in the same Trading Hour in which the CAISO calculates the make whole payment;

(3) Scheduling Coordinators for Metered Subsystem Operators that have elected (i) not to follow

their Load and (ii) net Settlement, in proportion to their Metered Subsystem Aggregation Net Measured Demand plus any FMM reductions not associated with valid and balanced Existing Transmission Contracts, Transmission Ownership Rights, or Converted Rights Self-Schedules in the Day-Ahead Market in the same Trading Hour in which the CAISO calculates the make whole payment.

(4) Scheduling Coordinators of Metered Subsystem Operators that have elected to follow their Load, in proportion to their Metered Subsystem Net Negative Uninstructed Deviation plus any FMM reductions not associated with valid and balanced Existing Transmission Contracts, Transmission Ownership Rights, or Converted Rights Self-Schedules in the Day-Ahead Market in the same Trading Hour in which the CAISO calculates the make whole payment.

* * * * *

Section 29

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29.27 CAISO Markets And Processes.

(a) **In General.** Except as provided in subsection (b) of this section, the provisions of Section 27 that are applicable to the Real-Time Market shall apply to EIM Market Participants.

(b) **Transition Period for New EIM Entities.**

(1) **Transmission Constraint Relaxation.** For a period of six months following the Implementation Date of a new EIM Entity, the provisions of Section 27.4.3.2 and the second sentence of Section 27.4.3.4 shall not apply to constraints that are within Balancing Authority Areas of the new EIM Entity or affect EIM Transfers between the Balancing Authority Areas of the new EIM Entity and any other EIM Entity that is subject to this subsection (b). For those intervals that experience

infeasibilities described in those provisions, the CAISO shall instead determine prices consistent with the provisions of Sections 27, 34, and Appendix C, that would apply in the absence of Section 27.4.3.2 and the second sentence of Section 27.4.3.4.

(2) **Flexible Ramping Product.** For a period of six months following the EIM Entity Implementation Date of a new EIM Entity, when the transmission and/or power balance constraints as specified in Sections 27.4.3.2 and 27.4.3.4, respectively, are relaxed, the CAISO shall set the Flexible Ramping Product parameter for pricing purposes, for the new EIM Entity Balancing Authority Area, at an amount between and including $0 and $0.01.

(3) **Extension of Transition Period Pricing.** Any extensions of the initial six-month transition period, as approved by the Federal Energy Regulatory Commission, are specified below. Sixty days prior to the expiration of the transition period, the CAISO will post on the CAISO website an assessment of whether an extension of the transition period, for up to an additional six months, is needed for the applicable EIM Entity. The CAISO will post an update to such assessment prior to the expiration of the transition period should there be any changes to its posted conclusions.

(A) [reserved]

(4) **Reports.** During the term of the transition period, the CAISO will submit monthly reports with the Commission on the infeasibilities observed in the applicable EIM Entity Balancing Authority Area, the nature of the issues causing the infeasibility and remedies adopted to address the issues identified.

(c) **Automated EIM Mirror.** If the CAISO updates an Interchange E-Tag for a schedule change outside of the Market Clearing of the Real-Time Market for System Resources and Scheduling Points and the associated energy is generated at, wheeled through, or consumed at an EIM Entity Balancing Authority Area, the CAISO will~~can~~ automatically EIM Mirror the schedule change using the relevant EIM Mirror System Resource ~~if~~

~~requested by the EIM Entity~~ in accordance with the procedures specified in the Business Practice Manual for the Energy Imbalance Market.

(d) **Base GDFs for Aggregated EIM Non-Participating Resources.** The CAISO will allow base Generation Distribution Factor submission for aggregate EIM non-participating resources through the submission of EIM Base Schedules and will distribute the base schedule and any imbalances of aggregate EIM non-participating resources using the submitted base GDFs, if available, or otherwise the registered default base GDFs for the resource in the Master File, normalized for Outages.

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29.34 EIM Operations

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(l) **EIM Resource Plan Evaluation.**

(1) **Requirement.** The EIM Base Schedules for resources included in the EIM Resource Plan must balance the Demand Forecast for each EIM Entity Balancing Authority Area and the Uncertainty Requirement determined in accordance with Section 44.2.4, and for the CAISO Balancing Authority Area the RUC Schedules, the HASP Advisory Schedules and HASP Intertie Block Schedules or the FMM Schedules, as applicable and as detailed in Business Practice Manuals, must balance the Demand Forecast and the Uncertainty Requirement determined in accordance with Section 44.2.4.

(2) **Insufficient Supply.** An EIM Resource Plan or the CAISO equivalent shall be deemed to have insufficient Supply if the sum of EIM Base Schedules from non-participating resources and the sum of the highest quantity offers in the Energy Bid range from EIM Participating Resources, including Interchange with other

Balancing Authority Areas, is less than the total Demand Forecast that the EIM Entity Scheduling Coordinator has decided to use for the associated EIM Entity Balancing Authority Area and the Uncertainty Requirement determined in accordance with Section 44.2.4, and for the CAISO Balancing Authority Area the RUC Schedules, the HASP Advisory Schedules and HASP Intertie Block Schedules or the FMM Schedules, as applicable and as detailed in Business Practice Manuals, are less than the total Demand Forecast and the Uncertainty Requirement determined in accordance with Section 44.2.4.

(3) **Excess Supply.** An EIM Resource Plan or the CAISO equivalent shall be deemed to have excessive Supply if the sum of EIM Base Schedules from non-participating resources and the sum of the lowest quantity Bids in the Energy Bid range from EIM Participating Resources is greater than the total Demand Forecast that the EIM Entity Scheduling Coordinator has decided to use for the associated EIM Entity Balancing Authority Area plus the Uncertainty Requirement determined in accordance with Section 44.2.4, and for the CAISO Balancing Authority Area the RUC Schedules, the HASP Advisory Schedules and HASP Intertie Block Schedules or the FMM Schedules, as applicable and as detailed in Business Practice Manuals, are greater than the total Demand Forecast and the Uncertainty Requirement determined in accordance with Section 44.2.4.

(4) **Additional Hourly Capacity Requirements.**

(A) **In General.** If the CAISO determines under the procedures set forth in the Business Practice Manual for the Energy Imbalance Market that a Balancing Authority Area in the EIM Area has historically high import or export schedule changes between forty minutes and twenty minutes before the start of the Trading Hour, the CAISO will add to the Balancing Authority Area in the EIM Area's capacity requirements an additional requirement.

(B) **Additional Capacity Requirement.** On a monthly basis, according to procedures set forth in the Business Practice Manual for the Energy Imbalance Market, the CAISO will calculate for each Balancing Authority Area in the EIM Area histograms of the percentage of the difference between imports and exports scheduled at forty minutes before the start of the Trading Hour and the final imports and exports at twenty minutes before the start of the Trading Hour based on the submitted E-Tags at those times and calculate additional upward and downward requirements for the capacity test component of the resource sufficiency evaluation.

(5) **Removal of the Uncertainty Requirement.**

For a period of 12 months after the Uncertainty Requirement has been included in accordance with this Section 29.34(l), the CAISO may upon Market Notice of at least three (3) Business Days no longer include the Uncertainty Requirement if—

(A) the frequency or magnitude of capacity test failures supports a conclusion that the results were unintended and caused by including the Uncertainty Requirement;

(B) the CAISO submits an informational report to FERC within 30 days explaining and supporting its conclusion; and

(C) the Uncertainty Requirement remains excluded from the capacity test unless and until FERC authorizes otherwise.

(m) **Flexible Ramping Sufficiency Determination.**

(1) **Review.**

(A) **EIM Entity Balancing Authority Areas.** The CAISO will review the EIM Resource Plan pursuant to the process set forth in the Business Practice Manual for the Energy Imbalance Market and verify that it has sufficient Bids for Ramping capability to meet the EIM Entity Balancing Authority Area upward and downward Ramping requirements, as adjusted

pursuant to Sections 29.34(m)(2), (3), and (5).

(B) **CAISO Balancing Authority Area.** The CAISO will review the Day-Ahead Schedules in the CAISO Balancing Authority Area and verify that it has sufficient Bids for Ramping capability to meet the CAISO Balancing Authority Area upward and downward Ramping requirements, as adjusted pursuant to Sections 29.34(m)(2), (3), (5), and (6).

(2) **Determination of EIM Diversity Benefit.** The CAISO will calculate separately the upward and downward EIM diversity benefit as the difference between the sum of the upward and downward Uncertainty Requirements for all Balancing Authority Areas in the EIM Area, and the Uncertainty Requirement for the EIM Area.

(3) **Effects of EIM Diversity Benefit.** For each Balancing Authority Area in the EIM Area, the CAISO will reduce the upward and downward Uncertainty Requirements by the Balancing Authority Area's pro rata share of the upward and downward EIM diversity benefit in the EIM Area as may be limited by –

(A) the available net import EIM Transfer capability into that Balancing Authority Area in the case of an upward Uncertainty Requirement; and

(B) the available net export EIM Transfer capability from that Balancing Authority Area in the case of a downward Uncertainty Requirement.

(4) **Determination of Flexible Ramping Sufficiency Credit.** The CAISO will calculate for each Balancing Authority Area in the EIM Area, the upward flexible Ramping sufficiency credit as the outgoing EIM Transfer from that area and the downward flexible Ramping sufficiency credit as the incoming EIM transfer into that area.

(5) **Effect of Flexible Ramping Sufficiency Credit.** The CAISO will reduce the upward Uncertainty Requirement of a Balancing Authority Area in the EIM Area by its upward flexible Ramping sufficiency credit, and will reduce the downward Uncertainty Requirement of a Balancing Authority Area in the EIM Area by its

downward flexible Ramping sufficiency credit.

(6) **Incremental Requirements.**

(i) **In General.** If the CAISO determines under the procedures set forth in the Business Practice Manual for the Energy Imbalance Market that an EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area has historically high import or export schedule changes between T-40 and T-20, the CAISO will add to the EIM Entity's or the CAISO's flexible capacity requirement an additional incremental requirement.

(ii) **Additional Incremental Requirement.** On a monthly basis, according to procedures set forth in the Business Practice Manual for the Energy Imbalance Market, the CAISO will calculate for each EIM Entity Balancing Authority Area and the CAISO Balancing Authority Area histograms of the percentage of the difference between imports and exports scheduled at T-40 and the final imports at T-20 based on the E-Tags submitted at T-40 and T-20 and calculate additional incremental and decremental requirements for the capacity test component of the resource sufficiency evaluation.

(n) **Effect of Resource Plan Insufficiency.**

(1) **Resource Plan Balance.** If, after the final opportunity for the EIM Entity to revise hourly Real-Time EIM Base Schedules as provided in Section 29.34(f)(1)(c), the EIM Resource Plan or the CAISO equivalent has insufficient supply as determined according to Section 29.34(l)-

(A) the CAISO will not include the EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area in the Uncertainty Requirement of the EIM Area;

(B) the CAISO will hold the EIM Transfer limit into or from the EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area, as specified in Section 29.34(n)(2), at the value for the last 15-minute

interval.

(2) **Flexible Ramping Insufficiency.** If, after the final opportunity for the EIM Entity to revise hourly Real-Time EIM Base Schedules or the CAISO equivalent as provided in Section 29.34(f)(1)(c), the CAISO determines-

(i) that an EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area has insufficient upward Ramping capacity according to Section 29.34(m), the CAISO will take the actions described in Section 29.34(n)(1)(A) and (B) in the upward and into the EIM Entity BAA or CAISO BAA direction; and

(ii) that an EIM Entity Balancing Authority Area or the CAISO Balancing Authority Area has insufficient downward Ramping capacity according to Section 29.34(m), the CAISO will take the actions described in Section 29.34(n)(1)(A) and (B) in the downward and from the EIM Entity BAA or CAISO BAA direction.

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Section 30

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30.6.2.1 Bidding and Scheduling of RDRRs in the Real-Time Market

Pursuant to Section 4.13.3, Scheduling Coordinators for Reliability Demand Response Resources may submit Economic Bids for Energy in the Real-Time Markets. Scheduling Coordinators for Reliability Demand Response Resources may submit Economic Hourly Block Bids to be considered in the HASP, and to be accepted as binding Schedules with the same MWh award for each of the four FMM intervals. A cleared Economic Hourly Block Bid is not eligible for Bid Cost Recovery. Scheduling Coordinators for Reliability Demand Response Resources may not submit Economic Hourly Block Bids with an Intra-Hour

Option.

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30.6.2.1.2.1 Marginal Real-Time Dispatch Option

A Reliability Demand Response Resource that is subject to the Marginal Real-Time Dispatch Option:

(a) May submit either a single-segment Bid or a multi-segment bid in the Real-Time Market that must be at least ninety-five percent (95%) of the applicable Soft Energy Bid Cap.

(b) Shall be dispatched as a marginal resource if it is dispatched by the CAISO. For the purpose of making this determination and setting the Locational Marginal Price, the CAISO treats a Reliability Demand Response Resource as if it were flexible with an infinite Ramp Rate between zero (0) and its PMax.

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Section 34

****This section includes pending changes, highlighted in green, recently proposed in docket number ER21-1192****

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34.4 Fifteen Minute Market

The CAISO conducts the Fifteen Minute Market using the second interval of each RTUC run horizon as follows: (1) at approximately 7.5 minutes prior to the first Trading Hour, for T-45 minutes to T+60 minutes where the binding interval is T-30 to T-15; (2) at approximately 7.5 minutes into the current hour for T-30

minutes to T+60 minutes where the binding interval is T-15 to T; (3) at approximately 22.5 minutes into the current hour for T-15 minutes to T+60 minutes for the binding interval T to T+15; and (4) at approximately 37.5 minutes into the current hour for T to T+60 minutes for the binding interval T+15 to T+30, where T is the beginning of the next Trading Hour. In these intervals the CAISO conducts the FMM to (1) determine financially binding FMM Schedules and corresponding Locational Marginal Price~~LMP~~s for all Pricing Nodes, including all Scheduling Points; (2) determine financially and operationally binding Ancillary Services Awards and corresponding ASMPs, procure required additional Ancillary Services and calculate ASMP used for settling procured Ancillary Service capacity for the next fifteen-minute Real-Time Ancillary Service interval for all Pricing Nodes, including Scheduling Points; (3) determine LAP Locational Marginal Price ~~LMP~~s that are the basis for settling Demand; and (4) determine FMM Uncertainty Awards. In any FMM interval that falls within a time period in which a Multi-Stage Generating Resource is transitioning from one MSG Configuration to another MSG Configuration, the CAISO: (1) will not award any incremental Ancillary Services; (2) will disqualify any Day-Ahead Ancillary Services Awards; (3) will disqualify Day-Ahead qualified Submissions to Self-Provide Ancillary Services Award, and (4) will disqualify Submissions to Self-Provide Ancillary Services in RTM. Each particular FMM market optimization produces binding settlement prices for Energy, Flexible Ramping Product, and Ancillary Services for the first FMM interval in the FMM horizon but the optimization considers the advisory results from subsequent market intervals within the FMM horizon. The CAISO settles Hourly Block Schedules from Proxy Demand Resources, Reliability Demand Response Resources, Hourly Intertie Schedules, and Hourly Ancillary Services Awards accepted in the HASP as FMM Schedules and FMM Ancillary Services Awards in accordance with Section 11.5 and 11.10.1.2, respectively. In the event that a FMM run fails, the CAISO reverts to Day-Ahead Market Ancillary Services Awards and RUC Schedules results corresponding to the same interval, or the corresponding interval from the previous RTUC. The FMM will clear Supply against the CAISO Forecast of CAISO Demand and exports. The FMM issues Energy Schedules and Ancillary Services Awards by twenty-two and a half minutes prior to the binding fifteen-minute interval.

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34.10 Dispatch of Energy from Ancillary Services

The CAISO may issue Dispatch Instructions to Participating Generators, Participating Loads, Proxy Demand Resources, (via communication with the Scheduling Coordinators of Demand Response Providers) System Units and System Resources contracted to provide Ancillary Services (either procured through the CAISO Markets, Self-Provided by Scheduling Coordinators, or through Exceptional Dispatch or dispatched in accordance with a Legacy RMR Contract) for the Supply of Energy. During normal operating conditions, the CAISO may Dispatch those Participating Generators, Participating Loads, Proxy Demand Resources, System Units and System Resources that have contracted to provide Spinning Reserve and Non-Spinning Reserve, except for those reserves designated as Contingency Only, in conjunction with the normal Dispatch of Energy. Contingency Only reserves are Operating Reserve capacity that have been designated, either by the Scheduling Coordinator or the CAISO, as available to supply Energy in the Real-Time only in the event of the occurrence of an unplanned Outage, a Contingency or an imminent or actual System Emergency. During normal operating conditions, the CAISO may also elect to designate any reserve not previously identified as Contingency Only by Scheduling Coordinator as Contingency Only reserves. In the event of an unplanned Outage, a Contingency or a threatened or actual System Emergency, the CAISO may dispatch Contingency Only reserves. If Contingency Only reserves are dispatched through the RTCD, which as described in Section 34.5.2 only Dispatches in the event of a Contingency, such Dispatch and pricing will be based on the original Energy Bids. If Contingency Only or other scheduled reserves are dispatched in response to a System Emergency that has occurred because the CAISO has run out of Economic Bids when no Contingency event has occurred, the RTED will Dispatch such ~~Contingency Only~~ reserves using the Soft Energy Bid Cap as the Energy Bids for such reserves and will set prices accordingly. For CAISO Market intervals for which the conditions and parameters specified in Section 27.4.3.3 apply, the RTED will Dispatch such reserves ~~Contingency Only~~ using the Hard Energy Bid Cap as the Energy Bids for such reserves and will set prices accordingly. If a Participating Generator, Participating Load, System Unit or System Resource that is supplying Operating Reserve is Dispatched to provide Energy, the CAISO shall replace the Operating Reserve as necessary to maintain NERC and WECC reliability standards, including

any requirements of the NRC. If the CAISO uses Operating Reserve to meet Real-Time Energy requirements, and if the CAISO needs Operating Reserves to satisfy NERC and WECC reliability standards, including any requirements of the NRC, the CAISO shall restore the Operating Reserves to the extent necessary to meet NERC and WECC reliability standards, including any requirements of the NRC through either the procurement of additional Operating Reserve in the RTM or the Dispatch of other Energy Bids in SCED to allow the resources that were providing Energy from the Operating Reserve to return to their Dispatch Operating Target. The Energy Bid Curve is not used by the AGC system when Dispatching Energy from Regulation. For Regulation Up capacity, the upper portion of the resource capacity from its Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve. For a resource providing Regulation Up or Operating Reserves the remaining Energy Bid Curve shall be allocated to any RTM AS Awards in the following order from higher to lower capacity where applicable: (a) Spinning Reserve; and (b) Non-Spinning Reserve. For resources providing Regulation Up, the applicable upper Regulation Limit shall be used as the basis of allocation if it is lower than the upper portion of the Energy Bid Curve. The remaining portion of the Energy Bid Curve, if there is any, shall constitute a Bid for RTM Energy. For Regulation Down capacity, the lower portion of the resource capacity from its applicable Regulation Limit is allocated to Regulation regardless of its Energy Bid Curve.

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Appendix DD

****This section includes pending changes, highlighted in grey, recently proposed in docket number ER21-1304****

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4.2.1.2 Requirement Set Number Two: for Requests for Independent Study of Behind-the-Meter Capacity Expansion of Generating Facilities

This Section 4.2.1.2 applies to an Interconnection Request relating to a behind-the-meter capacity expansion of a Generating Facility. Such an Interconnection Request submitted under the Independent Study Process will satisfy the requirements of Section 4.2.1 if it satisfies all of the following technical and business criteria:

(i) Technical criteria.

~~1)~~ ~~The total nameplate capacity of the existing Generating Facility plus the incremental increase in capacity does not exceed in the aggregate one hundred twenty-five (125) percent of its previously studied capacity and the incremental increase in capacity does not exceed, in the aggregate, including any prior behind-the-meter capacity expansions implemented pursuant to this Section 4.2.1.2, one hundred (100) MW.~~

1~~2~~) The behind-the-meter capacity expansion shall not take place until after the original Generating Facility has achieved Commercial Operation and all Reliability Network Upgrades for the original Generating Facility have been placed in service. An Interconnection Request for behind-the-meter capacity expansion may be submitted prior to the Commercial Operation Date of the original Generating Facility.

23) The Interconnection Customer must install an automatic generator tripping scheme sufficient to ensure that the total output of the Generating Facility, including the behind-the-meter capacity expansion, does not at any time exceed the capacity studied in the Generating Facility's original Interconnection Request. The CAISO will have the authority to trip the generating equipment subject to the automatic generator tripping scheme or take any other actions necessary to limit the output of the Generating Facility so that the total output of the Generating Facility does not exceed the originally studied capacity.

(ii) Business criteria.

1) The Deliverability Status (Full Capacity, Partial Capacity or Energy-Only, and Off-Peak Deliverability Status or Off-Peak Energy Only) of the original Generating Facility will remain the same after the behind-the-meter capacity expansion. The capacity expansion will have Energy-Only, Off-Peak Energy Only Deliverability Statuses unless otherwise specified in this GIDAP, and the original Generating Facility and the behind-the-meter capacity expansion will be metered separately from one another and be assigned separate Resource IDs, except as set forth in (2) below.

2) If the original Generating Facility has Full Capacity Deliverability Status and/or Off-Peak Deliverability Status and the behind-the-meter capacity expansion will use the same technology as the original Generating Facility, the Interconnection Customer may

elect to have the original Generating Facility and the behind-the-meter capacity expansion metered together, in which case both the original Generating Facility and the behind-the-meter capacity expansion may have Partial Capacity Deliverability Status and Off-Peak Deliverability Status, as applicable, pursuant to CAISO study results to determine Deliverability, and a separate Resource ID will not be established for the behind-the-meter capacity expansion.

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4.6 Deliverability Assessments

Interconnection Customers under the Independent Study Process that request Partial Capacity, Full Capacity Deliverability Status, or Off-Peak Deliverability Status will be deemed to have selected Option (A) under Section 7.2 and will have Deliverability Assessments performed as part of the next scheduled Phase I and Phase II Interconnection Studies for the Queue Cluster study performed for the next Queue Cluster Window that opens after the CAISO received the request. If the Deliverability Assessment identifies any Network Upgrades that are triggered by the Interconnection Request, the Interconnection Customer will be responsible to pay its proportionate share of the costs of those Upgrades, pursuant to Sections 6, 7, and 8, and for posting Interconnection Financial Security pursuant to the rules for Interconnection Customers in Queue Clusters pursuant to Section 11.

If the Generating Facility (or increase in capacity of an existing Generating Facility) achieves its Commercial Operation Date before the Deliverability Assessment is completed ~~and~~ or before any necessary Delivery Network Upgrades are in service, ~~the proposed Generating Facility (or increase in capacity) will be treated as an Energy-Only, Interim, or Partial Capacity Deliverability~~

~~Status Generating Facility until such Delivery Network Upgrades are in service~~the CAISO will determine whether Interim Deliverability is available, and will award it to the Generating Facility. The CAISO will make this determination as soon as practical, but no later than the calendar month before the Generating Facility or capacity increase achieves its Commercial Operation Date. The Generating Facility will maintain any Interim Deliverability until (1) the Interconnection Customer to which that Deliverability was originally allocated achieves its Commercial Operation Date; or (2) the CAISO completes the next scheduled Deliverability Assessment and the Generating Facility's Delivery Network Upgrades are complete, enabling Partial Capacity or Full Capacity Deliverability Status. If the CAISO determines Interim Deliverability is not available, the Generating Facility or capacity increase will be Energy Only until the CAISO completes the next scheduled Deliverability Assessment and the Generating Facility's Delivery Network Upgrades are complete.

This Section shall not apply to Interconnection Customers requesting behind-the-meter capacity expansion under Section 4.2.1.2. Separate rules regarding the Deliverability Status of such requests are set forth in that Section.

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Attachment C – Memo and Presentation to the EIM Governing Body

2021 Summer Readiness

California Independent System Operator Corporation

March 26, 2021

Memorandum

To: Energy Imbalance Market Governing Body

From: Anna McKenna, Interim Vice President, Market Policy and Performance

Date: March 3, 2021[1]

Re: Decision on market enhancements for summer 2021 readiness proposal

This memorandum requires EIM Governing Body action.

EXECUTIVE SUMMARY

Management proposes a set of market enhancements to prepare for this upcoming summer in response to market performance issues that arose during last summer's heat events. The enhancements are focused on changes that are feasible for both the ISO and market participants to implement by summer 2021. Management plans to address potential longer-term changes in upcoming stakeholder processes. Despite this initiative's fast timeline, stakeholders have provided valuable input that has shaped Management's proposal.

The first proposed change enhances the Western Energy Imbalance Market's (EIM's) resource sufficiency evaluation to better ensure each balancing authority area participates in the EIM with sufficient resources. Management proposes to enhance the resource sufficiency evaluation to ensure each balancing authority area has sufficient resources to account for the uncertainty of its net load, in addition to sufficient resources to meet its load forecast.

The second proposed change will improve operational coordination between balancing authority areas in the EIM. This enhancement addresses a market modeling issue related to energy interchanges between EIM balancing authority areas and the ISO balancing authority area that caused operational issues during last summer's tight conditions.

The third proposed change improves ISO market pricing during very tight supply conditions. Management proposes to price energy based on the market's energy bid cap when the ISO is arming load to meet the ISO balancing authority area's contingency reserve requirements.

[1] Note: Memo updated on March 17, 2021 to reflect corrected motion language

The proposed tariff rules to implement the enhancements to the resource sufficiency evaluation and to address the energy interchange modeling issue are EIM-specific and are under the EIM Governing Body's primary approval authority. The enhancement to address market pricing under tight supply are under the EIM Governing Body's advisory role as they are generally applicable to the ISO's real-time market.

Management is also considering enhancements to the market parameters for managing load, export and wheel through scheduling priorities for the ISO balancing authority area. Any such enhancements would be under the EIM Governing Body's advisory role and would be presented at a subsequent meeting.

Management proposes the following motion:

> ***Moved, that the EIM Governing Body approves the proposal for* enhancements to the resource sufficiency evaluation and to address the energy interchange modeling issue*, as described in the memorandum dated March 3, 2021; and***
>
> ***Moved, that the EIM Governing Body authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposal described in the memorandum, including any filings that implement the overarching initiative policy but contain discrete revisions to incorporate Commission guidance in any initial ruling on the proposed tariff amendment.***

BACKGROUND

A historic heat wave affected the western United States for several consecutive days in mid-August 2020, causing energy supply shortages that led to two rotating power outages in the ISO balancing authority area on August 14 and 15. The *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave* report documents these events.[2] The ISO initiated this expedited initiative in response to these events and is committed to developing actions to prevent supply shortages and to ensure equitable EIM participation in advance of summer 2021.

PROPOSAL

Management proposes enhancements to:

- Better ensure each balancing authority area participates in the EIM with sufficient resources and improve the way the real-time market reflects operations related to transfers between balancing authority areas; and

[2] California Independent System Operator, California Public Utilities Commission, and California Energy Commission. Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave. January 13, 2021.

- Provide improved incentives for supply to be available during tight system conditions.

EIM resource sufficiency evaluation and EIM coordination review

Management proposes an enhancement to the EIM's resource sufficiency evaluation to better ensure each balancing authority area participates in the EIM with sufficient resources. The EIM's resource sufficiency evaluation is designed to ensure each balancing authority area participating in the EIM provides sufficient resources to reliably serve its load, thereby minimizing inequitable resource "leaning" between balancing authority areas. The resource sufficiency evaluation includes two tests designed to ensure each balancing authority area has sufficient resources while participating in the EIM: the "capacity test" and the "flexible ramp sufficiency test." If a balancing authority area fails the resource sufficiency evaluation in a fifteen-minute market interval, its EIM energy transfers cannot increase beyond the amount scheduled in the previous interval.

Management's proposal to enhance the resource sufficiency evaluation results from the ISO's review, conducted in coordination with stakeholders, of the resource sufficiency evaluation's performance during last summer's tight conditions. This review was prompted by the *Final Root Cause Analysis*'s findings that the ISO balancing authority area failed the resource sufficiency evaluation in only very limited periods despite being in emergency conditions for extended periods.

Management proposes to enhance the EIM's resource sufficiency evaluation's capacity test so that it accounts for net load uncertainty in addition to each balancing authority area's net load forecast. The capacity test is designed to ensure each balancing authority area provides a sufficient quantity of energy schedules and bids to meet its load. Net load is total load minus renewable output. Actual net load can be significantly different than forecast, particularly with significant amounts of renewable resources. For example, an unexpected sudden decrease in solar output increases the net load that must be met by dispatchable resources.

Management proposes to enhance the capacity test to require each balancing authority area to submit sufficient energy schedules and bids to account for net load forecast uncertainty, in addition to sufficient schedules and bids to cover its forecast load. This will better ensure each balancing authority provides sufficient schedules and bids and the associated resource capacity to meet its actual net load, including net load that may be different than forecast. The resource evaluation's "flexible ramping test" also accounts for net load uncertainty, but it only looks at ramp rate capability between market intervals and consequently does not ensure each balancing authority area has sufficient overall capacity based on its resource schedules and energy bids to meet its forecast net load and account for net load uncertainty.

The net load uncertainty amount used in the resource sufficiency evaluation is determined by similar principles that the ISO market systems use for the real-time market's flexible ramping product procurement. The requirement accounts for the net

load forecast error between the fifteen-minute and five-minute real-time market dispatch. This amount is adjusted to reflect the diversity benefit of meeting net load uncertainty across the EIM with one set of resources.

The ISO also identified and corrected software errors that contributed to resource sufficiency evaluation inaccuracies during the August heat events. These affected how the resource sufficiency evaluation accounted for the capacity of resources with partial outages and how it accounted for energy interchanges between balancing authority areas. The ISO is making various other software fixes to correct system issues and adding additional market features to improve operational coordination between balancing authority areas in the EIM, particularly during tight and contingency conditions. These enhancements do not require tariff changes.

In addition to enhancing the resource sufficiency evaluation, Management also proposes an enhancement related to how the real-time market models energy interchanges into the ISO balancing authority areas at intertie scheduling points that are sourced from adjacent balancing authority areas in the EIM. This enhancement resulted from the ISO's review of operational issues that occurred during last summer's heat events because the ISO market's systems and EIM balancing authority area used incorrect information in a particular situation. Management proposes to make it mandatory for EIM balancing authority areas to use an automated market feature that updates the EIM balancing authority area's "mirror resource" when the ISO market awards an import at an ISO intertie scheduling point that was sourced from the EIM balancing area. These are separate from EIM transfers resulting from the EIM's resource-specific dispatch. These mirror resources model the energy interchange out of the EIM balancing authority area. It is currently optional to use the automated update functionality. An oversight in updating a mirror resource's schedule during tight conditions last summer resulted in system anomalies and operational issues.

Real-time scarcity price enhancements

Management proposes an enhancement to improve market pricing when system conditions are very tight and the ISO system operators are "arming load" to meet the balancing authority area's contingency reserve requirements and using resources previously providing contingency reserves to serve load.

This enhancement will price energy that is from generation the ISO is releasing from contingency reserves to serve load at the market's applicable energy bid cap. The applicable bid cap will be either $1,000/MWh or $2,000/MWh as determined under the ISO's *FERC Order No. 831 – Import Bidding and Market Parameters* proposal that is currently under consideration at FERC.

The ISO system operators "arm load" by contacting the utility distribution companies and having them configure their systems to immediately shed certain portions of their load in the event the ISO experiences an unexpected supply loss. This allows the ISO real-time market to dispatch supply resources for energy that the market was previously

reserving for contingency reserves. Under current market rules, prices can decrease in this situation because the price of the energy bids of the supply resources put into the real-time market can be below the current real-time market price. Because the EIM does not manage or optimize operating reserves for other balancing authority areas that participate in the EIM, this change will not apply to energy from operating reserves managed by EIM entities. Management's proposed pricing policy more appropriately reflects that the ISO is short supply under these conditions. This will improve incentives for supply to be available during tight system conditions and for load to more fully schedule in the day-ahead market.

STAKEHOLDER POSITIONS

Stakeholders generally support or are not opposed to adding the net load uncertainty requirement to the resource sufficiency evaluation's capacity test although Pacific Gas & Electric and California Public Utilities Commission staff oppose adding it. The EIM Body of State Regulators urges the ISO to continue to develop further resource sufficiency evaluation enhancements to implement for summer 2021 and believes that the capacity test should account for all capacity required to meet a balancing authority's obligations, including those due to net load uncertainty.

The ISO Department of Market Monitoring supports Management's proposal stating that adding net load uncertainty to the capacity test would make it more accurate. DMM also urges the ISO to continue to consider more comprehensive resource sufficiency evaluation changes.

The ISO Market Surveillance Committee urges the ISO to carefully test for unintended consequences in adding net load uncertainty to the capacity test. They point out interactions between the market's flexible ramping product procurement and the capacity test that could result in test failures. They suggest the ISO have the ability to reverse this change if there are unintended consequences.

EIM participants outside of the ISO balancing authority area believe that adding the uncertainty requirement to the resource sufficiency evaluation's capacity test and fixing identified software errors are incremental improvements. However, they maintain the ISO should work with stakeholders to develop further resource sufficiency evaluation enhancements to implement for summer 2021. They maintain these should include (1) further enhancing the capacity test, including accounting for off-line resources, (2) modifying the consequences of resource sufficiency evaluation failure, and (3) modifying how the resource sufficiency evaluations count EIM transfers towards a balancing authority area's available capacity.

PG&E opposes adding the net load uncertainty requirement to the capacity test. PG&E maintains this will harm reliability because it increases the likelihood that balancing authority areas will fail the resource sufficiency evaluation, potentially resulting in capped transfers during system emergencies resulting from tight supply conditions. The CPUC staff oppose adding the net load uncertainty requirement to the capacity test,

maintaining this enhancement has been very rapidly developed and is not critical to summer reliability.

Management believes its proposal provides a reasonable improvement to the resource sufficiency evaluation that will result in it better reflecting each balancing authority area's capacity needs and further decrease leaning. PG&E is correct that it could increase resource sufficiency evaluation failures and the resultant limiting of EIM transfers, but the premise of the resource sufficiency evaluation is that each balancing authority area participate in the EIM with sufficient supply to meet its own needs. Management believes the proposed change will incent EIM participants to bring more capacity to the market during tight supply conditions.

Management will also continue to analyze the effects of this change and its interactions with other market functionality. If feasible, it will implement the market system changes so that net load uncertainty can be removed from the capacity test if there are unintended consequences.

Management will also continue working with stakeholders to develop further enhancements to the resource sufficiency evaluation and is planning a stakeholder initiative later this year. However, Management notes that the topics the EIM participants request to be addressed are complex and/or involve examining the fundamental tenants of the resource sufficiency evaluation and the EIM. Consequently, it is not feasible to implement these changes by this summer.

Stakeholders support the change to make it mandatory to use an automated market feature that updates the EIM balancing authority area's "mirror resource" when the ISO market awards an import at an ISO intertie scheduling point sourced from an EIM balancing authority area. They state this is an important enhancement to ensure operational coordination.

Most stakeholders support the ISO's proposal to release reserves to the market at bid cap prices for use as energy priced when the ISO must arm load to meet its contingency reserve requirements, stating it results in market prices that better reflect system conditions. PG&E is concerned that the proposal may incentivize suppliers to physically withhold supply in the real-time market. Southern California Edison maintains the proposal could aggravate system market power without system market power mitigation in-place. CPUC staff believes this change should be considered along with more comprehensive market changes.

Management believes its proposal provides the appropriate price signal to reflect tight supply conditions, which should incent more supply to be available. Management does not believe system market power mitigation is needed in conjunction with this change because the resulting prices are unaffected by submitted supply resource bid prices.

Appendix A summarizes stakeholder comments.

CONCLUSION

Management requests the EIM Governing Body approve the proposed enhancements to the resource sufficiency evaluation described in this memorandum because they will better ensure each balancing authority area participates in the EIM with sufficient resources to meet its load and will improve operational coordination between balancing authority areas. Management also request the EIM Governing Body support its proposal for market pricing when the ISO is arming load to meet its contingency reserve requirement as it will improve market incentives during tight supply conditions.

WESTERN ENERGY IMBALANCE MARKET

Decision on Market Enhancements for Summer 2021 Readiness

Brad Cooper
Senior Manager, Market Design Policy

EIM Governing Body Meeting
General Session
March 10, 2021

California ISO

Management proposes enhancements to prepare for this upcoming summer in light of the performance of the ISO markets during last summer's heat events

1. Enhance the EIM's resource sufficiency evaluation to better ensure each BAA participates in the EIM with sufficient resources
2. Enhance energy interchange modeling with the ISO BAA to improve operational performance
3. Enhance market pricing during tight supply conditions by pricing reserve energy at the energy bid cap when arming ISO BAA load to meet contingency reserve requirements

EIM Governing Body governance role

- Primary approval authority:
  - Enhancements to resource sufficiency evaluation
  - Enhancements to energy interchange modeling
- Advisory role:
  - Enhancement to energy pricing when the ISO is arming load and releasing contingency reserves

Resource sufficiency evaluation is intended to ensure each BAA in the EIM participates with sufficient resources to reliably serve its load to minimize “leaning”

- Resource sufficiency evaluation includes two tests that address leaning:
  - Capacity test: ensures submitted schedules and energy bids meet load forecast
  - Flexible ramp sufficiency test: ensures submitted energy bids provide sufficient ramping capability to ramp from one market interval’s to the next interval’s load forecast plus an amount to account for net load uncertainty
- Failure of either test results in capping the BAA’s transfers at the amount scheduled in the previous market interval

Proposed resource sufficiency enhancement and other fixes result from review of resource sufficiency evaluation's performance during the August heat events

- Concerns raised with ISO passing capacity test when it appeared to be short capacity
  - May mean resource sufficiency evaluation was not fully capturing resource needs and resource availability
- Review also identified software errors that contributed to ISO erroneously passing resource sufficiency evaluation
  - Partial resource outages not accounted for
  - Energy transfers double-counted

Management proposes to enhance resource sufficiency evaluation's capacity test to account for net load uncertainty in addition to forecast load

- Net load can be significantly different than forecast, particularly with large amounts of renewable resources
- Flexible ramping sufficiency test evaluates ramping capability between intervals, including that need for net load uncertainty, but not overall capacity
- Enhancement better ensures each BAA provides sufficient energy bids and the associated resource capacity to meet its net load, including net load uncertainty
- Similar net load uncertainty requirement as flexible ramping product procurement

Adding net load uncertainty to capacity test ensures each BAA offers sufficient resource capacity to account for net load uncertainty

- Capacity Test:

  Energy bids + schedules >= forecast demand+ **net load uncertainty** + net interchange

- Flexible Ramp Sufficiency Test:

  Bid and scheduled ramping capability >= forecast change in demand + **net load uncertainty** + net interchange

Management proposes an enhancement to require "automatic mirroring" of ISO intertie schedule changes

- Market models energy interchange between ISO's intertie scheduling points and an EIM BAA through a "system resource" within the EIM BAA that is linked to the intertie scheduling point
- Under existing rules, it is optional for an EIM BAA to elect to automatically update a system resource's schedule to correspond to intertie awards
- Management proposes to require this functionality to ensure balanced resource and interchange schedules
  - Avoids operational issues such as occurred last summer when a system resource schedule was inadvertently not updated

Management proposes an enhancement to improve market pricing when system conditions are very tight and the ISO is arming load to meet its contingency reserve requirements

- "Arming load" is when system operators configure the system to be able to immediately perform controlled load shedding
  - Armed load can count for contingency reserves in this event
  - Makes supply resources providing contingency reserves available to serve load
- Current market rules can result in lower market prices when contingency reserves released to serve load
- Propose to price energy at energy bid cap from resources released from contingency reserves to serve load
  - Provides appropriate price signals during tight supply conditions to improve incentives

Stakeholder's generally support or do not oppose adding net load uncertainty to the capacity test. PG&E and CPUC staff oppose it.

- EIM participants, BOSR, and DMM believe proposed change and fixing software errors are incremental improvements but urge ISO to develop more extensive modifications, including modifying consequences of resource sufficiency evaluation failure
  - ISO planning initiative to examine more comprehensive changes
- PG&E and CPUC believe adding uncertainty to capacity test may have unintended consequences and harm reliability
- Market surveillance committee believes change should be carefully tested and ISO should retain ability to reverse it
  - ISO planning additional analysis and ability to reverse

Stakeholders largely support other changes

- Widespread support for mandatory “auto-mirroring” as it will improve operational coordination
- Most stakeholders support pricing energy at bid cap from contingency reserves released when arming load
  - CPUC and PG&E believe changes needs to be more comprehensively examined
  - SCE continues to advocate to couple scarcity pricing changes without implementing system market power mitigation
  - Management believes change provides valuable market incentives

Management requests the EIM Governing Body approve the proposed resource sufficiency evaluation and mandatory auto-mirroring changes and support its real-time scarcity price change

- Enhances the EIM's resource sufficiency evaluation to better ensure each BAA can meet its net load including net load uncertainty
- Enhances energy interchange modeling to improve operational performance
- Enhances market pricing during tight supply conditions

Attachment D – Memo and Presentation to the CAISO Board of Governors and DMM Update

2021 Summer Readiness

California Independent System Operator Corporation

March 26, 2021

Memorandum

To: ISO Board of Governors

From: Anna McKenna, Interim Vice President, Market Policy and Performance

Date: March 17, 2021

Re: **Decision market enhancements for summer 2021 readiness proposal**

This memorandum requires Board of Governors action.

EXECUTIVE SUMMARY

Management proposes a set of market enhancements to prepare for this upcoming summer, and mitigate concerns arising from last summer's heatwave and consequent load shedding. These enhancements are focused on improving incentives for supply to be available during tight conditions. Management also proposes targeted interconnection process changes to expedite bringing additional supply on-line by summer 2021.

Management believes these enhancements are feasible for both the ISO and market participants to implement by summer 2021. Management plans to address potential longer-term changes in upcoming stakeholder processes. While this initiative has had a fast timeline, stakeholders have provided valuable input shaping Management's proposal.

The first proposed change is to provide imports a make-whole payment under specified tight supply conditions if settlement at ISO market prices does not cover the energy bid price. This change will strengthen incentives to offer imports to the real-time market during tight supply conditions by eliminating the risk a supplier could be paid less than its bid price.

The second proposed change is to price energy based on the market's energy bid cap when the ISO is arming load to meet the ISO balancing authority area's contingency reserve requirement. This change will price energy more appropriately under tight supply conditions, which will incentivize suppliers to offer supply during such conditions.

The third proposed change is to allow market participants to specify whether a reliability demand response resource is eligible to be dispatched in hourly blocks, fifteen-minute intervals, or five-minute intervals. This change would also include these resources in the ISO's real-time pre-dispatch process, and allow "discrete-dispatch" reliability demand response resources to set ISO market prices. This change will reduce the

need to for ISO operators to dispatch these resources manually, better allow the market to reflect the energy bid price of reliability demand response resources, and improve market incentives during tight supply conditions.

In addition to these market enhancements, Management also proposes changes to the ISO's resource interconnection request process to expedite bringing more supply on-line by summer 2021. Management proposes to remove a cap on behind-the-meter expansions and allow the ISO to temporarily award deliverability to new resources.

The market enhancements for summer 2021 readiness stakeholder process resulted in two other changes that Management presented to the EIM Governing Body at their March 10, 2021 meeting. First, Management proposed a change to address the Western Energy Imbalance Market's resource sufficiency evaluation to better ensure each balancing authority area participates in the EIM with sufficient resources. Second, Management proposed a change to address a market modeling issue regarding energy interchanges between EIM balancing authority areas and the ISO balancing authority area that caused operational issues during last summer's tight conditions.[1] The EIM Governing Body approved these changes under their primary approval authority and they are included on the Board of Governors' consent agenda.

The EIM Governing Body also voted to provide a verbal advisory input to the Board of Governors, to support the scarcity pricing element of the proposal. This will allow for the pricing of energy based on the market's energy bid cap when the ISO is arming load to meet the ISO balancing authority area's contingency reserve requirements.

The *market enhancements for summer 2021 readiness* stakeholder process is also considering enhancements to the market parameters for managing load, export and wheel through scheduling priorities for the ISO balancing authority area. Management plans to bring these changes to the EIM Governing Body under its advisory role and to the Board of Governors for approval during special meetings scheduled in April 2021.

Management proposes the following motion:

> ***Moved, that the ISO Board of Governors approves the market enhancements for summer 2021 readiness proposal, as described in the memorandum dated March 17, 2021; and***
>
> ***Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposal described in the memorandum, including any filings that implement the overarching initiative policy but contain discrete revisions to incorporate Commission guidance in any initial ruling on the proposed tariff amendment.***

[1] These changes are described in the March 3, 2021 memorandum to the EIM Governing Body posted at https://www.westerneim.com/Documents/Decision-on-Market-Enhancments-for-Summer-2021-Readiness-Memo-Mar2021.pdf.

BACKGROUND

A historic heat wave affected the western United States for several days in mid-August 2020, causing energy supply shortages that led to rotating power outages in the ISO balancing authority area on August 14 and 15. The *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave* report documents these events.[2] The ISO initiated this expedited initiative in response to these events and is committed to implementing measures to prevent supply shortages in advance of summer 2021.

PROPOSAL

The Management proposes the following enhancements.

Make-Whole Payment for Hourly Imports

Management proposes to provide for bid price make-whole payments for hourly block economic imports dispatched by the real-time market during tight supply conditions. These changes will better incentivize suppliers to offer import supply to the ISO balancing authority area during tight supply conditions when it can especially need imports.

Suppliers may at times have insufficient incentives to offer hourly block economic import supply into the real-time market because the ISO's import settlement rules do not guarantee payment at a price at least equal to a submitted import bid's price. The ISO's real-time market clears hourly block economic import bids based on hour-ahead scheduling process prices, but pays these imports the fifteen-minute market price. Consequently, an import supplier may receive a fifteen-minute market price less than its submitted import bid price.

This issue does not exist for fifteen-minute dispatchable import offers scheduled in the fifteen-minute market consistent with their bid price. However, suppliers have less incentive to offer fifteen-minute imports because they are not assured of being scheduled for the entire hour.

This risk of receiving less than bid price can be a disincentive for suppliers to offer imports to the real-time market. Importantly, this risk can be greater during tight supply conditions. During these conditions, ISO operators tend to take out-of-market measures to ensure reliability that tend to lower fifteen-minute market prices relative to hour-ahead scheduling process. These measures include upward adjustments to the load forecast used in the hour-ahead scheduling process and out-of-market import purchases. These measures can suppress fifteen-minute market prices relative to hour-ahead scheduling process prices because the fifteen-minute market uses a lower load forecast and/or has access to more supply.

[2] California Independent System Operator, California Public Utilities Commission, and California Energy Commission. Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave. January 13, 2021.

Providing strong incentives to offer import supply during tight supply conditions is important because the *Final Root Cause Analysis* noted the ISO balancing authority area needed energy in excess of its resource adequacy capacity during the summer heat wave. Suppliers consider the risk of receiving less than their bid price when deciding whether to offer imports into the ISO real-time market or sell the energy elsewhere in the west's bilateral market.

Consequently, Management proposes a make-whole payment for real-time market hourly block economic imports during specified tight supply conditions. The ISO would define tight system conditions as hours which:

- The ISO issues an alert notice by 3 p.m. the day before an operating day that states the ISO anticipates an operating reserve deficiency for specified hours; or

- The ISO issues a warning notice or emergency notice during an operating day that states the ISO anticipates or is experiencing an operating reserve deficiency during specified hours.

Management proposes to apply the make-whole payment for imports only during these tight supply conditions. Under routine conditions, the existing market structure that schedules hourly block imports and exports in the hour-ahead scheduling process and settles them at fifteen-minute market prices has important benefits such as minimizing uplift charges to load and incenting fifteen-minute market dispatchable imports and exports. During shortage conditions, the additional uplift is justified to ensure the ISO can access imports needed to serve its load.

Import amounts incremental to any import amount scheduled in the day-ahead market are eligible for the proposed make-whole payment. Imports scheduled in the day-ahead market would not be eligible for a make-whole payment because the day-ahead market ensures imports are paid at least their bid price. Also, additional real-time market supply that results when the real-tie market reduces an export scheduled in the day-ahead market would be eligible for a make-whole payment. The ISO would calculate make-whole payments hourly as the positive difference between each price segment of a supplier's submitted bid price and the hourly average fifteen-minute locational marginal price.

Management proposes to allocate the make-whole payment costs to measured demand, which includes metered demand and exports. Exports are interchange transactions at ISO intertie scheduling points and do not include EIM transfers.

Management proposes not to provide make-whole payments for imports that are not delivered or for day-ahead market exports reduced in the hour-ahead scheduling process whose settlement prices are adjusted under the existing "hour-ahead scheduling process reversal rule"

Enhance Market Pricing During Tight Supply Conditions

Management proposes an enhancement to improve market pricing when system conditions are very tight and ISO s operators are in the process of "arming load" to meet the balancing authority area's contingency reserve requirement by using resources previously providing contingency reserves to serve load.

This enhancement will price energy from generation the ISO is releasing from contingency reserves to serve load at the applicable energy bid cap. The applicable energy bid cap will be either $1,000/MWh or $2,000/MWh as determined under the ISO's *FERC Order No. 831 – Import Bidding and Market Parameters* proposal that is currently under consideration at FERC. Under the *FERC Order No. 831 – Import Bidding and Market Parameters* proposal, the hard energy bid cap increases from $1,000/MWh to $2,000/MWh when there is a cost-verified resource-specific energy bid greater than $1,000/MWh or the ISO-calculated "maximum energy bid price" is greater than $1,000/MWh.

ISO system operators "arm load" by contacting the utility distribution companies and having them configure their systems to immediately shed certain portions of their load in the event the ISO experiences an unexpected supply loss. This allows the ISO real-time market to dispatch supply resources for energy the market was previously reserving for contingency reserves. Under current market rules, prices can decrease in this situation because the energy bids supply resources submit in the real-time market can be below the current real-time market price. This was an issue during last summer's heat events.

Management's proposed pricing rule appropriately reflects the ISO is short supply under these conditions. This will improve incentives for additional real-time supply, including imports, to be available. It will also improve incentives for supply scheduled in the day-ahead market to be available in the real-time market because suppliers will have to buy back such supply in the real-time market at the bid cap if it is unavailable. Finally, the proposal will improve incentives for load to more fully schedule in the day-ahead market because it could be faced with higher real-time prices.

Reliability Demand Response Resource Dispatch

Management proposes market enhancements to improve market pricing when reliability demand response resources are dispatched. Reliability demand response resources are resources participating in investor-owned utility reliability-based and emergency-triggered demand response programs. The ISO can only dispatch them in response to emergency conditions. These resources must bid into the real-time market at prices from $950/MWh to $1,000/MWh.

The *Final Root Cause Analysis* indicated ISO system operators manually dispatched these resources outside of the market optimization. Because these resources could not set market prices, market prices were suppressed even though there was supply scarcity.

Management proposes enhancements so the real-time market will dispatch reliability demand response resources more optimally, and reflect their bids in market prices. Currently, reliability demand response resources are only dispatched in five-minute granularity real-time dispatch and potentially can only set five-minute real-time dispatch prices. Management proposes to allow market participants to specify whether the ISO market will dispatch a reliability demand response resource in hourly blocks, fifteen-minute intervals, or five-minute intervals. These are the same dispatch options afforded proxy demand resources, the other demand response model the ISO market uses. These options better reflect the resources' operational characteristics and will set prices more appropriately.

In addition, Management proposes changes that will enable reliability demand resources for which the market participant has selected the "discrete dispatch" option to set ISO market prices. The discrete dispatch option allows a reliability demand response resource to be dispatched only for a specified quantity of energy. This change will enable the market to model these resources as being flexibly dispatched when it is setting prices so they can potentially be a marginal resource and set prices.

Fifteen- and five-minute dispatchable reliability demand response resources would be settled at fifteen-minute market and five-minute real-time dispatch prices, as applicable, and can set fifteen-minute market prices. Allowing reliability demand response resources to set fifteen-market prices will better reflect the corresponding tight conditions in the market, improving market incentives.

Reliability demand response resources under the hourly dispatch option would be settled at fifteen-minute market prices, but they will be ineligible to set fifteen-minute market prices.

Fifteen- and five-minute dispatchable reliability demand response resources will be eligible for bid cost recovery, but hourly dispatchable resources will not be eligible.

These changes should reduce ISO operators' manual dispatch of reliability demand response resources because the market will more optimally dispatch them, and they will be included in the real-time market's real-time pre-dispatch process, which looks out as far ahead as one hour and forty-five minutes. Currently, reliability demand response resources are only included in the five-minute real-time dispatch, which looks out only one hour. This longer look ahead will allow the market to dispatch reliability demand response resources more optimally because it can consider the time required to start them up and their minimum run time.

Interconnection Enhancements

Management proposes changes to the ISO's resource interconnection request process to expedite bringing more supply on-line by summer 2021 and going forward. These changes apply to the ISO's "independent study" process. The two features of the existing independent study rules can limit new resource interconnections in time for this this summer. First, the ISO's behind-the-meter expansion process for transmission-connected resources caps expansions to the lesser of 125 percent of the existing

capacity or 100 MW. Second, the independent study process was designed to prevent "queue-jumping" for deliverability,[3] and as such, requires independent study interconnection customers to participate as "energy only" until they can participate in the next cluster deliverability assessment. Deliverability means the ability to delivery energy to load during peak conditions, and is a fundamental requirement to provide resource adequacy capacity. Under the current rules, even if deliverability is available and unused, the ISO cannot allocate it to independent study interconnection customers on a temporary basis.

Management's first proposed change removes the cap on behind-the-meter expansions. The ISO's experience with behind-the-meter resources has led Management to conclude the cap is not necessary. Moreover, most expansions today are battery additions to variable energy resources, which are less likely to present the issues for which the cap was designed. Removing the cap will allow variable energy resources to hold excess energy when demand is low and then discharge that energy during the system peak.

Management's second proposed change allows the ISO to temporarily award available interim deliverability. This will allow load-serving entities to shore up portfolios in tight summer months and maximize use of available transmission capacity. Independent study interconnection customers can avail themselves of the deliverability until (1) the interconnecting resource for which the delivery network upgrades are being constructed comes online, or (2) the independent study interconnection customer can participate in the next deliverability assessment, receive its own permanent allocation, and have its delivery network upgrades constructed. This will ensure independent study interconnection customers can use available deliverability if they come online quickly, while preventing queue jumping for deliverability.

STAKEHOLDER POSITIONS

Stakeholders generally support Management's proposal for an import bid make-whole payment. Idaho Power Company (Idaho Power) objected to the cost-allocation approach in the draft final proposal that would have allocated a share of the costs to EIM transfers out of the ISO. Idaho Power noted that even though an import can support a transfer, the impetus for the make-whole payment is to incent supply for ISO balancing authority area reliability. In response, Management revised its proposal to remove EIM transfers from the cost allocation.

Most stakeholders support Management's proposal to release reserves to the market at bid cap prices for use as energy priced when the ISO arms load to meet its contingency reserve requirements. They recognize the proposal produces market prices that better reflect system conditions. Pacific Gas & Electric and Southern California Edison are concerned the proposal may incentivize suppliers to physically withhold supply in the real-time market. Southern California Edison maintains the proposal should not be implemented without system market power mitigation measures in-place. CPUC staff

[3] Deliverability means the ability to delivery energy to load during peak conditions. Deliverability generally is a fundamental requirement to provide resource adequacy capacity.

believes this change should be considered in connection with more comprehensive market changes.

Management believes its proposal provides the appropriate price signal to reflect tight supply conditions, which should incent more supply to be available when most needed. Additionally, the resource adequacy rule requirement to submit energy bids addresses physical withholding concerns. Management does not believe system market power mitigation is needed in conjunction with this change because the resulting prices are unaffected by submitted supply resource bid prices.

Stakeholders generally support management's proposal to improve reliability demand response resource's dispatch and to better reflect it in market pricing. California Large Energy Consumers Association is concerned the changes were developed too rapidly and may result in dispatches that do not respect reliability demand response resources' notification times and use limitations. Management notes its proposed changes will result in the market better reflecting these constraints. Calpine believes hourly dispatchable reliability demand response resources should be able to set fifteen-minute market prices. Management believes they should not set the price in the fifteen-minute market because they cannot respond with fifteen-minute granularity, similar to hourly-block imports, which also cannot set fifteen-minute market prices.

Stakeholder's support management's proposals to enhance the ISO's interconnection process as a way to expedite more capacity for summer 2021.

The ISO Department of Market Monitoring and the Market Surveillance Committee support Management's proposal as a reasonable short-term measure to incent additional supply.[4] The Market Surveillance Committee's written opinion, adopted on March 8, 2021, is enclosed as Attachment A.

Attachment B summarizes stakeholder comments in more detail.

CONCLUSION

Management requests the Board of Governors adopt the proposed enhancements to (1) provide an import make-whole payment, (2) improve market pricing under tight supply conditions, (3) improve reliability demand response dispatch and pricing, and (4) expedite the interconnection process. These enhancements will better ensure supply is available to the ISO market in tight supply conditions during summer 2021.

[4] The Department of Market Monitoring did not provide comments on the proposed interconnection rules enhancements. The Market Surveillance Committee's written opinion did not address the reliability demand response dispatch and interconnection enhancements.

California ISO

Decision on market enhancements for Summer 2021 readiness

Greg Cook
Executive Director, Market and Infrastructure Policy

Board of Governors Meeting
General Session
March 24, 2021

Management proposes enhancements to address concerns arising from last summer's heatwave

- Strengthen import offer incentives for hourly imports during tight supply conditions
- Provide stronger prices signals for enhanced supply incentives during tight supply conditions
- Enhance dispatch of reliability demand response resources through the market to provide more accurate pricing
- Enhance interconnection process changes to expedite new supply interconnections to the grid

Enhancements respond to ISO/CPUC/CEC Final Root Cause Analysis report and other analyses

- Proposed enhancements are limited to changes that can be implemented by this summer
  - Significant stakeholder input shaped proposals despite initiative's fast timeline
- Longer-term changes will be addressed in upcoming stakeholder initiatives
- Management is also finalizing proposal for additional summer 2021 enhancements addressing export and wheeling scheduling priorities

Management proposes an import bid price make-whole payment during tight system conditions to strengthen import supply incentives

- Hourly imports may have insufficient incentives to offer supply due to risk of being paid less than their offer price

- Real-time market clears hourly block economic import bids based on hour-ahead scheduling process prices but pays fifteen-minute market price
  - Risk is greater during tight system conditions because operator out-of-market actions can lower fifteen-minute prices relative to the hour-ahead scheduling process
  - Risk does not exist for fifteen-minute dispatchable imports

Hourly import make-whole payment would only apply under limited tight supply conditions

- Fifteen-minute market design has important benefits under most conditions
- Tight system conditions defined as
  - Day-ahead alert notice anticipating operating reserve deficiency, or
  - Real-time warning notice indicating operating reserve deficiency or emergency stages 1-3
- Would apply to real-time market hourly block imports:
  - Real-time market imports incremental to day-ahead schedules
  - Day-ahead scheduled exports reduced in the real-time market
- Allocate uplift costs to load and exports

Management proposes enhancement to improve price signals during very tight supply conditions

- New provision would apply when operators arm load to meet contingency reserve requirements
  - Arming load occurs when operators configure the system to be able to immediately perform controlled load shedding
  - Armed load can count for contingency reserves
  - Makes supply resources scheduled for contingency reserves available to serve load
- Current market rules can result in lower market prices when contingency reserves released to serve load
- Propose to price energy from resources released from contingency reserves to serve load at energy bid cap

Current process for dispatching reliability demand response resources can mute price signals during tight supply conditions

- Reliability demand response resources are dispatched pursuant to a settlement agreement
  - Only dispatched upon issuance of system condition warning notice
  - Resources must bid at $950/MWh or higher
- Reliability demand response resources seldom set price because operators typically manually dispatch them
- Dispatch of reliability demand response resources can suppress market prices if not incorporated into load forecast

Management proposes to enhance reliability demand response resources dispatch to preserve price signals

- Provide ability to specify reliability demand response resources as hourly, fifteen-minute, or five-minute dispatchable
  - Fifteen- and five-minute dispatchable reliability demand response resource's ability to set fifteen-market prices will improve pricing
  - Use in the real-time pre-dispatch process of the real-time market will reduce manual dispatch
- Allow reliability demand response resources under "discrete dispatch" option to set market prices
- Automate reliability demand response resource dispatch into load forecast

Management proposes targeted interconnection process changes to expedite connection of additional supply for summer 2021

- Remove 100MW or 125% cap on behind-the-meter expansion requests
  - Since inception, the ISO has not found the cap to be critical
  - Majority of expansions are battery additions to variable energy resources, which do not present interconnection issues and help meet peak demand
- Allow the ISO to award available deliverability temporarily to online projects until earlier-queued project comes online
  - Allows temporary use of transmission upgrades to expedite new supply capacity

Stakeholders generally support management's proposals (slide 1 of 2)

- Stakeholder's generally support management's import make-whole payment proposal but IPC objected to allocating a portion of costs to EIM transfers
  - Management revised proposal remove transfers from allocation
- Most stakeholders support pricing energy at bid cap from contingency reserves released when arming load
  - CPUC and PG&E believe changes needs to be more comprehensively examined
  - SCE continues to advocate to couple scarcity pricing changes with implementing system market power mitigation
  - Management believes change accurately reflects system conditions and provides proper market incentives

Stakeholders generally support management's proposals (slide 2 of 2)

- Stakeholder's generally support management's proposal to improve reliability demand response resource dispatch and better reflect it in ISO market pricing
  - CLECA is concerned dispatches may not reflect resource start-up times and use limitations
    - Management notes changes will result in market better respecting these constraints
  - Calpine believes hourly dispatchable reliability demand response resources should be able to set fifteen-minute market prices
    - Management believes that they should not because they cannot respond with fifteen-minute granularity
- Stakeholder's support management's proposals to enhance the ISO's interconnection process as a way to expedite more capacity for summer 2021

Management requests the Board of Governors approve its market enhancements for summer 2021 proposals

- Strengthens incentives for suppliers to offer import supply
- Improves ISO market incentives under very tight supply conditions
- Better reflects using reliability demand response resources in ISO market pricing
- Expedites connecting additional supply for summer 2021

Memorandum

To: ISO Board of Governors

From: Eric Hildebrandt, Executive Director, Market Monitoring

Date: March 17, 2021

Re: **Department of Market Monitoring update**

This memorandum does not require Board action.

EXECUTIVE SUMMARY

This memo provides comments by the Department of Market Monitoring (DMM) on two proposals being presented to the Board for approval.

- Market enhancements for summer 2021
- Resource adequacy enhancements phase 1

DMM supports both of these proposals, which represent significant improvements in the current market design.

MARKET ENHANCEMENTS FOR SUMMER 2021

DMM appreciates the ISO's efforts to facilitate as much discussion as possible given the accelerated timelines needed to develop enhancements that can be implemented in summer 2021. DMM submitted detailed comments as part of this stakeholder process.[1]

EIM resource sufficiency tests

DMM supports the proposed changes to the EIM capacity test. These changes will make the capacity test more accurate and should reduce the number of instances in which the CAISO balancing area passes the capacity test when insufficient capacity is actually available. DMM understands that due to the complexity of these issues and the compressed timeframe for the summer readiness initiative, the ISO is constrained to making limited changes to the capacity test at this time.

DMM supports the ISO and stakeholders exploring broader changes to the design that could more effectively deter balancing areas from leaning on each other while still enabling the

[1] *Comments on market enhancements for summer 2021,* DMM, February 26, 2021. http://www.caiso.com/Documents/DMMComments-on-Market-Enhancements-for-Summer-2021-Readiness-Draft-Final-Proposal-Feb26-2021.pdf

efficiency of inter-balancing area trades. DMM supports the ISO starting a separate initiative as soon as feasible to consider more comprehensive changes to the EIM resource sufficiency tests.

Import and export market incentives during tight system conditions

DMM supports the ISO proposal to compensate hourly block import bids clearing the hour ahead scheduling process at the maximum of each resource's bid or fifteen-minute market price during very tight system conditions. This enhanced compensation should effectively address market participant concerns that real-time hourly block imports will not offer power to the ISO during tight system conditions because of the risk that market revenues will not meet their offer price.

In practice, hourly block schedules tended to receive higher payments at fifteen-minute market prices than they would have if they had been paid the hour-ahead scheduling process prices over the third quarter of last year. However, there is some risk that 15-minute prices can be lower than an import resource's accepted bid price in the hourly process.

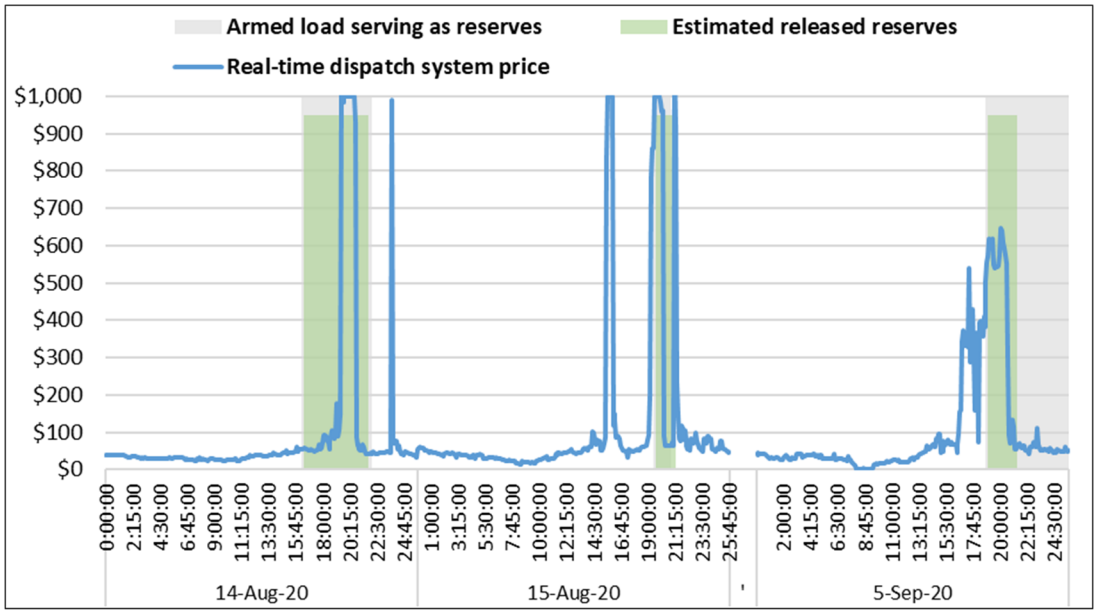
Since the proposal removes the risk that imports could get paid below their offer price in any given hour during tight system conditions, the ISO proposal should provide sufficient protection to incent hourly block imports to offer to the ISO during these tight system conditions. Ensuring hourly block imports receive at least their offer price on an hourly basis under very tight system conditions avoids issues with netting bid cost recovery over the day. This settlement is also similar to how manually dispatched imports are settled.

Short-term scarcity pricing enhancements

Under the ISO's proposal, when the ISO arms load (i.e. prepares to shed load in a controlled manner if needed) to serve as operating reserves and then releases generation that was serving as reserves into the energy supply stack, the ISO will set the bid price of the reserves added to the energy supply stack at the energy bid cap. DMM supports this proposal as a way of helping to ensure that prices are relatively high when system conditions are extremely tight, such that controlled dropping of load needs to be relied upon for operating reserve. This proposal is an extension of how contingency only reserves are priced when these resources are called upon to provide energy.

Figure 1 shows DMM's estimate of the periods where load was armed as reserves and generation capacity was released into the market. DMM estimates that the proposed policy would have been in effect for over eight hours over these three days.

Figure 1. Arming load serving as reserves and released generation reserves August and September, 2020



Reliability demand response resource dispatch and real-time price impacts

DMM supports all of the ISO's proposed reliability demand response resource modeling enhancements. The ISO proposes to allow reliability demand response resources to register as 60-minute or 15-minute dispatchable, rather than just 5-minute dispatchable. The ISO also proposes to allow the hour-ahead and 15-minute markets to economically dispatch reliability demand response resources, and to include manual and economic reliability demand response resource dispatches in the hour-ahead and 15-minute market solutions.

During periods when reliability demand response resources are deployed, these enhancements should increase the efficiency of the real-time markets' solutions. The proposal to add the expected load curtailment from reliability demand response resource dispatches onto the load forecast in each market should help to prevent the dispatches from inappropriately suppressing market prices.

System market power mitigation

The ISO no longer plans to move forward with system market power mitigation for summer 2021. Given this decision, DMM recommends that for summer 2021, the ISO develop a highly simplified form of system market power mitigation that could be implemented quickly through emergency filing if needed.

Such an approach could rely on a greatly simplified trigger to test for and establish the presence of uncompetitive system conditions (e.g. based on net load level or forecasted supply/demand conditions). Under these conditions, mitigation could be implemented by inserting an estimate of marginal cost for all ISO resources. For example, this approach

could utilize the default energy bids currently used in local market power mitigation plus some configurable margin or adder.

This type of approach would not be intended as a long-term approach to system market power mitigation, but would provide a valuable tool for the ISO in case significant system market power conditions materialize this summer.

RESOURCE ADEQUACY ENHANCEMENTS PHASE 1

Planned outage process enhancements

The ISO proposes to require all resource adequacy resources taking planned outages to provide substitute capacity starting in summer 2021. DMM is not certain that the potential benefits of the proposal will outweigh the potential risks and costs the proposal could create. However, given that the ISO and CPUC staff believe that this interim policy will be beneficial overall for reliability, DMM will defer to their judgment and supports this proposal.

On one hand, the proposal may create stronger incentives for resource owners that are planning maintenance far in advance of the outage date to try to procure substitute capacity farther in advance. On the other hand, DMM has some concern that the proposal may increase incentives for suppliers to delay reporting intended maintenance outages to the ISO in the planned outage timeframe in situations where suppliers cannot find reasonably priced substitute capacity. DMM believes the proposal could also increase incentives for suppliers to withhold excess capacity from bilateral markets in order to reserve it for their own unforeseen maintenance needs. Therefore, the proposal could further tighten bilateral resource adequacy markets, making it more difficult for suppliers to find reasonably priced substitute capacity for important maintenance outages.

DMM looks forward to working with the ISO and stakeholders on a longer term proposal under the resource adequacy enhancements phase 2 initiative which could address these issues.

Minimum state of charge proposal for storage resources

DMM does not oppose the ISO's revised proposal for utilizing a minimum state of charge constraint for energy storage resources. The ISO has pared this proposal down significantly, so that the functionality would only be used on days with residual unit commitment infeasibilities. On these limited days, operators would also have the option to eliminate the minimum stage of charge requirements in real-time. DMM's understanding is that in the absence of this proposal, operators would still have the authority to effectuate the exact same outcomes through less transparent manual dispatches.

DMM continues to recommend that the ISO continue to seek ways to improve their processes for issuing exceptional dispatches to storage resources for this summer and to address shortcomings in current processes that DMM identified in prior comments on the

resource adequacy enhancements initiative.[2]

Backstop procurement for energy deficiencies in local areas

DMM supports the ISO expanding its backstop capacity procurement mechanism authority to ensure that local capacity resources can meet energy needs in local areas and sub-areas. While DMM supports the ISO extending its backstop procurement authority under this proposal, DMM suggests that the ISO continue to work on developing new cost allocation rules for capacity procurement mechanism designations issued to address energy deficiencies.

[2] *Comments on resource adequacy enhancements draft final proposal – phase 1*, DMM, January 21, 2021, pp. 8-10: http://www.caiso.com/Documents/DMMCommentsonResourceAdequacyEnhancementsDraftFinalProposalPhase1-Jan212021.pdf

Attachment E – Market Surveillance Committee Opinion

2021 Summer Readiness

California Independent System Operator Corporation

March 26, 2021

Opinion on
Market Enhancements for Summer 2021 Readiness

James Bushnell, Member
Scott M. Harvey, Member
Benjamin F. Hobbs, Chair

Members of the Market Surveillance Committee of the California ISO[1]

Final, March 8, 2021

1. Introduction and Summary

The Market Surveillance Committee has been asked to comment on elements of this initiative. The initiative is in response to the events of August 2020,[2] and its purpose is to implement changes to market rules and procedures that are practical to implement in the near-term to help ensure grid reliability during the upcoming summer high load period.[3]

The initiative is recommending changes to several features of the ISO markets. In this Opinion, we comment on three of the changes, some of which have attracted significant stakeholder attention. In particular, we address the following parts of the initiative: revision of short-term scarcity pricing capabilities (Section 2); resource sufficiency evaluation tests applied to individual balancing authority areas (BAAs) in the Energy Imbalance Market (EIM) (Section 3); and bid cost recovery provisions for block imports participating in the hour-ahead scheduling procedure (HASP) (Section 4).

In separate draft Opinions that will be considered for adoption later in March 2021, we consider two other elements of the ISO's proposals to address summer 2021 readiness: export and load scheduling priorities;[4] and a minimum state-of-charge requirement for short-term storage, which is part of the separate Resource Adequacy Enhancements, Phase I initiative.[5] Other areas in which changes are recommended by the readiness initiative include reliability demand response dispatch and real-time price impacts; however, we are not commenting on those proposed changes. The initiative also considered but did not recommend system market power mitigation, deferring that until that particular initiative can be coordinated together with a comprehensive review of scarcity pricing.

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[1] The opinions in this document reflect the personal views of the members of the committee and do not necessarily represent or reflect the views of any institutions with which they are affiliated.

[2] See California Independent System Operator, California Public Utilities Commission, and California Energy Commission, *Root Cause Analysis, Mid-August 2020 Extreme Heat Wave, Final Report*, January 13, 2021 www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf

[3] See https://stakeholdercenter.caiso.com/StakeholderInitiatives/Market-enhancements-for-summer-2021-readiness

[4] Ibid., pp. 14-29.

[5] See https://stakeholdercenter.caiso.com/StakeholderInitiatives/Resource-adequacy-enhancements.

In preparation for this Opinion, the MSC held public meetings that included agenda items addressing the heat wave events of August 2020 on October 9, 2020 and November 13, 2020. The MSC then reviewed the elements of the Summer 2021 readiness initiative with stakeholders and ISO staff in a public meeting held on February 11, 2021.

The opinion devotes a section to each of the three areas of the initiative that we are commenting on (Sections 2-4). Each section closes with a summary of the conclusions the analysis.

2. Scarcity Pricing

2.1 Background

It is somewhat of an overstatement to describe the CAISO pricing proposal as a "Scarcity Pricing" proposal as both staff and stakeholders have acknowledged. The proposed pricing change will not implement a scarcity pricing design in the sense that such designs are implemented in eastern ISOs. Instead, the proposed pricing rule will set prices that will be more consistent with system conditions when the CAISO is on the verge of controlled load shedding and CAISO load is at risk of being shed within minutes were a major CAISO generator to trip off-line. The proposed design will continue to block resources scheduled to provide reserves in the IFM off from the real-time dispatch in either RTPD or RTD without regard to their relative economics unless released by the operation of the proposed rules.

In contrast, a complete scarcity pricing proposal would define mechanisms for prices to rise in increments as the probability of load shedding increases as a result of falling reserve margins and would reoptimize resource schedules between the energy dispatch and ancillary services in both RTPD and RTD to meet load with the least cost mix of resources in real-time. Furthermore, the scarcity prices in a more complete scarcity pricing design would be predictably, transparently, and logically related to the likelihood of, and of consumer costs resulting from, load shedding and to the costs that the CAISO is required to incur to meet NERC and WECC reliability standards. Nevertheless, the CAISO proposal is a substantial and needed improvement over the current design during periods when the system is so close to load shedding that the CAISO must arm load in order to meet WECC reserve requirements. Moreover, we understand that these changes can be implemented by this summer because the CAISO's design makes use of existing software capabilities.

The flexible ramp (flexiramp) product design should serve an important role in scarcity pricing in the CAISO market, causing prices to rise as the CAISO supply demand balance tightens. But it presently does not have this effect because of the flaws in the current flexiramp implementation that were discussed in the flexiramp improvements stakeholder process. The ineffectiveness of the flexiramp design in sending scarcity signals was evident last summer, when the price of flexiramp remained around zero until 5:30 pm on August 14,[6] and until 6 pm on August 15.[7]

In the next subsection, we analyze the proposed pricing rule revision that would apply when reserves are provided by arming load for shedding. Then in Section 2.3, we consider the implications of the changes in import pricing under FERC Order 831 as well as the readiness initiative's

[6] See www.caiso.com/Documents/Real-TimeDailyMarketWatchAug14-2020.html.

[7] See www.caiso.com/Documents/Real-TimeDailyMarketWatchAug15-2020.html.

proposed changes to block import pricing. (The proposed block import pricing changes are further considered in Section 4 of this Opinion.) We conclude that these two elements do not by themselves provide effective scarcity pricing and should not be considered adequate substitutes for this element of the readiness proposal A summary of our conclusions closes this section (Section 2.4).

2.2 Revised Pricing Rule when Load Armed for Shedding is Used to Provide Reserves

During the heatwave of August 2020, day-of market prices appear to have been inconsistent with system conditions in several hours leading up to the load shedding events. During several periods, energy prices were relatively low despite the fact that operating reserves were reaching critically low levels and utilities were preparing to shed load. The inappropriately low prices may have contributed to the CAISO's inability to schedule sufficient imports and avoid the need for load shedding. The proposed pricing rule will avoid the potential for the CAISO market software to set HASP, FMM and RTD prices at levels that are substantially inconsistent with system conditions at times when CAISO has "armed load" for shedding in order to comply with WECC requirements.

Under extremely tight supply conditions, load can be armed for shedding in order to provide non-spinning operating reserve, thereby allowing conventional resources that had been providing reserves to be released to provide energy. This process of arming load in order to provide reserves is not the same as instructing the distribution companies to prepare load for shedding with rolling blackouts when the CAISO is unable to maintain reserves. The process of arming load to provide reserves occurred during the August heatwave, with rolling blackouts occurring later after the generation resources released from providing reserves by arming load had been used to meet load. When load was armed to provide reserves, and generation providing reserves was released into the bid stack during the load-shed days in August, that released generation was dispatched at its offer price, resulting in the outcome that HASP, FMM and RTD prices remained in the range of $100 to $200 as load shedding approached. The purpose of this part of the readiness proposal is to eliminate such occurrences of low prices that are inconsistent with conditions of severe system stress.

Under this proposal, the energy offer price of any generation scheduled to provide reserves but released for dispatch when the reserves were replaced by armed load would be automatically set at the prevailing bid cap level, which is either $1000 under normal conditions, or $2000/MWh if Order 831 conditions were triggered. Market energy prices would be set by these bid cap level offer prices if the released reserves were needed to meet load. If load were armed for shedding but changes in conditions allowed load to be met without dispatching the released reserves, prices would continue to be set by incremental energy offers. Hence, prices would not be set at $1000 or $2000 per MWh whenever load is armed to provide reserves. Prices would only be set at these levels when the reserves released by arming load were actually dispatched to meet load.

As PG&E has noted, this design, like the current design, would not reoptimize resource schedules between energy and reserves in either RTPD or RTD, so it could be the case that load would not be met with the least-cost mix of resources. This lack of real-time co-optimization of energy and ancillary service schedules is a core feature of the current CAISO real-time market design.

As desirable as it might be, shifting to a design based on real-time co-optimization would be a major design and software change that could not possibly be implemented by this summer.

With the proposed pricing changes, it is anticipated that the CAISO market software will send a price signal that will attract additional imports during periods that load has been armed for shedding. If available, this additional supply will reduce the amount of load that would need to be shed following a significant generation or transmission contingency and also reduce the likelihood that reserves will fall to a level that requires load shedding. Setting prices at a level that will attract additional net interchange in HASP and FMM will be even more important prospectively than in the past because of the increased potential for the CAISO to be locked out of receiving incremental EIM imports as a result of failing the resource sufficiency bid range test.[8]

It would be preferable to implement a full scarcity pricing design that would cause prices to gradually rise as the CAISO approached the point at which it was necessary for the CAISO to "arm load" and rely on load shedding to meet its WECC reserve requirements, and that would also re-optimize IFM energy and ancillary service schedules in real-time, as PG&E recommends. There is, however, not nearly enough time to develop and implement a complete scarcity pricing design for summer 2021. The CAISO's proposed pricing changes are a reasonable approach to expeditiously addressing one of the more problematic failings of the current pricing design during shortage conditions. These changes can be implemented in time to reduce the need for load shedding should the coming summer have heat waves similar to last year, or if the CAISO encounters other unanticipated conditions that lead to extreme reserve shortages.

As we briefly discuss in Section 2.3 below, the CAISO initially proposed to also set a $2000/MWh price during load shedding conditions in real-time by using higher penalty parameters for the load balance constraint. The objective was to reduce the likelihood of the need for load shedding by increasing the incentive of LSEs to schedule imports to cover their load, provide stronger incentives for importers to deliver power to cover their day-ahead market schedules and more appropriately price both exports and wheel-through transactions. However, we understand there were complexities to implementing this design in combination with the as-yet unimplemented Order 831 that have deterred the CAISO from also implementing those changes for summer 2021.

2.3 Discussion of Import Payment Impacts: Proposed Uplift Payments to Import Transactions Scheduled in HASP and Day-Ahead Market Export Transactions, and Order 831

Impact of Proposed Uplift Payments. The CAISO has also proposed rules that would make uplift payments to real-time import transactions scheduled in HASP and to day-ahead market export transactions that are not scheduled in HASP (Option 2, discussed in Section 4). There are several reasons that the proposed uplift payments for import supply scheduled in HASP are not a substitute for the application of the proposed pricing changes when reserves have been released to meet load and load has been armed for shedding in the event of a contingency.

[8] See Section 3 of this Opinion, *infra*.

First and most critically, *the proposed uplift rules will have no impact on the pricing of import supply needed to avoid load shedding if HASP prices are low because reserves have been released at the time HASP is run.* This is not an abstract hypothetical concern. Although there has not been a complete discussion of the HASP results in the hours leading up to load shedding in August, or of actual results when the reserves released by arming load were modeled in HASP, it does appear that HASP and FMM prices remained low after the point in time at which the CAISO found it necessary to release generation providing reserves to meet load while using armed load to meet its reserve requirement.[9] The proposed rules providing uplift to imports scheduled in HASP, and to curtailed exports, will have no impact in a situation in which both HASP and FMM prices are artificially low because generation providing reserves has been replaced with armed load, with those reserves being dispatched to meet load based on their offer prices. This would occur even as the CAISO slides closer to load shedding with every megawatt of reserves dispatched in this manner. In contrast to the uplift rules, the proposed scarcity pricing rules will directly address and reduce the potential for HASP prices to remain at inappropriately low levels after reserves have been released; by reducing this potential, the risk of load shedding can be decreased because interchange supply that might be available would be more likely to be scheduled in HASP or FMM.

Second, *uplift payments to real-time imports and day-ahead exports to compensate for low FMM prices will not provide appropriate incentives for imports scheduled in the day-ahead market to be delivered in real-time* if FMM prices are depressed due to reserves being released. The pricing anomalies that would be addressed by the proposed changes could, if not corrected, result in imports not being delivered when the CAISO needs them most--when the CAISO is already short of reserves and approaching load shedding. It is noteworthy that while the CAISO intertie deviations settlements changes impose penalties on import transactions that are scheduled in HASP but do not flow, those penalties are based on the LMP price, so are much less meaningful if the LMP price is $100/MWh than if it is $1000/MWh.[10]

Third, *the proposed pricing rules, which will apply when the CAISO relies on load shedding to meet WECC reserve requirements, will mitigate some of the pernicious effects of the uplift payments for imports on load serving entity procurement incentives,* thereby helping to avoid putting the CAISO in a position in which load shedding is necessary. The uplift paid to transactions scheduled in HASP when FMM prices are low will be allocated to all load and exports.[11] This allocation of uplift costs will have the undesirable effect that LSEs that have scheduled enough supply to cover their real-time load will share the uplift costs associated with the CAISO acquiring supply in HASP to cover the supply of LSEs that failed to schedule enough supply to meet their real-time load. In contrast, if FMM prices are set at $1000 when the CAISO is so short of reserves that it must arm load for load shedding in order to meet WECC reserve requirements,

[9] See California ISO, Department of Market Monitoring, *Report on System and Market Conditions, Issues and Performance: August and September 2020*, November 24, 2020 Figure 3.5, p. 15.

[10] See the California ISO filing letter in Docket ER20-1890. We note that 50% of $100 provides a minimal deterrent to non-delivery during tight system conditions, while a $500/MWh charge provides much more effective deterrence to non-delivery when the CAISO is relying on armed load to meet WECC reserve requirements.

[11] See California ISO, *Market Enhancements for Summer 2021 Readiness*, Draft Final Proposal, February 18, 2021, pp. 32-33.

the FMM price will only be paid by the LSEs responsible for the problem—those that neither cleared enough supply in the day-ahead market to cover their real-time load, nor took actions intra-day to contract for additional imports to cover their load. The present arrangements that shift the costs of such failures from LSEs that failed to cover their real-time load onto LSEs that have procured enough supply to cover their load constitutes an extremely inappropriate cost shift that undermines the incentive for LSEs to incur costs to cover their real-time loads. Furthermore, low FMM prices combined with uplift payments also increases the risk of load shedding because it reduces the incentive for LSEs to contract for import supply to cover their real-time load.[12]

Impact of Order 831 Implementation. We now consider what happens if load shedding is necessary and FERC Order 831 triggers based on the CAISO maximum import bid price. LSEs that fail to cover their real-time load and suppliers (including virtual suppliers) that fail to cover their day-ahead market schedules will be exposed to a $2000 imbalance price which will impose a more appropriate cost on those responsible for the need for load shedding, whether they are LSEs or suppliers.

However, it is not assured that Order 831 will trigger during summer load shedding conditions. Gas prices may not be particularly high during summer load shedding conditions; this was the situation during the reserve short periods in August and September 2020. It is also not assured that bilateral price indexes outside California will be high enough to trigger Order 831, as they apparently would not have been during a number of the reserve-short days over August and September 2020. Whether Order 831 is likely to trigger depends not only on bilateral hub prices but also on the shaping factors, which can vary considerably from day to day and between day-ahead and real-time.

Market participants will be aware that if the Order 831 provision to raise the price cap has not been triggered based on day-ahead bilateral hub prices, the imbalance price will not rise above $1000, even during periods when load shedding occurs. This knowledge will contribute to a higher risk of load shedding in general, and, in particular, more frequent load shedding if there are adverse conditions this summer. This is because LSEs that have not scheduled enough supply in the day-ahead market to cover their real-time load will have a reduced incentive to schedule high-cost imports to cover their real-time load if the highest possible real-time imbalance price is only $1000. If the highest price during load shedding is only around $1000, LSEs that did not cover their expected real-time load in the day-ahead market, perhaps because of load forecast error, or perhaps by intention, will have a diminished incentive to schedule imports costing $800 or $900 in order to cover their remaining real-time load. They will have a much stronger incentive to take actions to cover their real-time load if they would be charged $2000 for their uncovered load if load shedding becomes necessary. However, we understand there were more complexities involved in implementing penalty prices above $1000 in combination with Order 831 rules than could be resolved within the time available to the CAISO to prepare for summer 2021.

[12] If the need for load shedding is due to generators or import suppliers that failed to cover their day-ahead market schedules, artificially low FMM prices combined with uplift payments for imports shifts the cost of the supplier performance failure from the supplier onto load.

Our comments above have focused on the improved price signal for imports and exports. Another consideration is that there will be much more battery capacity on the CAISO system by the end of summer 2021 than was in operation during August 2020. It will therefore be more important than in summer 2020 to set prices that are consistent with system conditions so that the market software will charge and discharge batteries consistent with system conditions. While operators can use exceptional dispatch to override the software dispatch instructions, this will become more of an operational challenge for operators and more likely to lead to unintended outcomes as the number of batteries on the system increases and their importance in meeting CAISO load increases. The proposed pricing rule is a small but urgently needed step towards setting prices that will incent the efficient operation of California's storage resources to support system reliability needs.

2.4 Summary Conclusion

The pricing changes the CAISO proposes to apply when it must rely on load armed for shedding to meet WECC reserve requirement will fall far short of implementing a true scarcity pricing design. Nevertheless, those changes will address a critical limitation of the current pricing rules in time to reduce the potential need for load shedding as a result of inadequate supply during the coming summer. We agree with other commenters that these changes do not constitute a full scarcity pricing design, and we support the CAISO moving forward with the effort to develop a comprehensive scarcity pricing design. However, we also agree with the CAISO that some of the critical weaknesses of the current pricing rules need to be addressed with these changes in time to help avoid the need for load shedding during the coming summer.

3. Resource Sufficiency Test

3.1 Background and Proposal

We support the CAISO's intent to avoid implementing major changes in the resource sufficiency test design prior to summer 2021 and to instead focus on making sure that the current design is currently implemented, which we understand was not the case during summer 2020. The CAISO has identified some flaws in the implementation of the bid range resource sufficiency test during summer 2020 and plans to correct the software prior to summer 2021. We understand that the CAISO analysis indicates that these implementation flaws account for why the CAISO passed the bid range sufficiency test when it was in a Stage 3 emergency. However, these errors are not sufficient to explain why the CAISO passed the bid range sufficiency test in prior FMM intervals when the CAISO was in a Stage 2 emergency.[13] In Section 3.2, we discuss the need to verify the implementation of the resource sufficiency test, and to make any corrections that are needed.

One change in the resource sufficiency test that the CAISO proposes to make prior to summer 2021 is to include the flexiramp uncertainty requirement in the bid range requirement. We understand that there is relatively broad stakeholder support for this change. However, we have a concern that this change will create an inflexible requirement that is inconsistent with the de-

[13] Rahul Kalaskar, "Presentation on California ISO, Resource Sufficiency Evaluation," January 13, 2021, p. 17.

mand curve design of the flexiramp product and may have unintended consequences. We discuss this design change and other changes proposed by stakeholders below in Sections 3.3-3.5, prior to summarizing some conclusions in Section 3.6.

3.2 Analysis of Resource Sufficiency Test Implementation

We believe it is important for the CAISO to maintain confidence in the way the resource sufficiency test is applied by explaining how the CAISO passed the resource sufficiency test not just during the period of load shedding on August 14 and 15, 2020 but when the CAISO was in a Stage 2 emergency prior to load shedding.

Further examination may also show that the CAISO passed the resource sufficiency test because of core features of the test that would need to be broadly discussed within the EIM before changes are made that could impact both the CAISO and other EIM entities. However, it is also possible that this is not the case. In particular, it could be that there are simple, easy to correct software bugs that led to the anomalous outcomes, in addition to the issues already identified by the CAISO. Hence, the CAISO should prioritize continued examination of the factors that allowed the CAISO to pass the resource sufficiency test while being in a Stage 2 emergency, and whether this was an intended outcome of the current design or reflects some kind of software bug.

While a number of EIM entities have expressed a concern that the CAISO passed the bid range resource sufficiency test in part because EIM transfers created additional bid range on CAISO resources, it is our understanding that this should not have been the case. It is our understanding that while EIM transfers create additional bid range on CAISO resources that are dispatched down to accommodate the transfers, there should be no impact on the resource sufficiency test because the EIM transfers are to be added to the CAISO capacity requirement. While we understand that this is the *intended* design, it is possible that the CAISO may have passed the resource sufficiency test in some intervals when it should not have passed as a result of some kind of software implementation flaw. An example of such a possible flaw would be if the EIM transfers were not added to demand as intended. We do not know whether this or other implementation elements have been checked, but we think it would help maintain confidence in the resource sufficiency test if the CAISO would verify that the calculations accounting for EIM transfers were correctly carried out in the hours leading up to the load shedding events.[14]

On the other hand, it is also our understanding that the CAISO could pass the resource sufficiency bid range test when it might be expected to fail during emergency conditions because the increased bid range made available by releasing generation providing reserves for dispatch and then replacing those reserves with load armed for shedding is not offset by an increased capacity requirement.

Since this outcome is only applicable to EIM balancing areas that have entered a state of emergency and are using load shedding to meet WECC reserve requirements, it may be that the EIM entities indeed did not intend to freeze EIM transfers during these conditions. Indeed, it is our

[14] While this discussion focuses on the resources sufficiency test as applied to the CAISO, implementation errors that are identified in this review might impact BAA's in addition to the CAISO.

impression that the resource sufficiency test is intended to prevent a balancing area from being able to lean on other EIM entities so as to avoid entering a state of emergency; it is not intended to reduce the ability of a balancing area that has already entered a state of emergency to avoid shedding load. If it is intended that EIM entities would fail the bid range resource sufficiency test during conditions in which the balancing area has entered a stage of emergency and is using armed load to meet its WECC reserve requirement, the CAISO of course has visibility into the amount of its reserves that have been released for dispatch and replaced with armed load, and it could add that capacity to its own capacity requirement. Since we understand the CAISO does not have similar visibility into the amount of reserves that other balancing areas have released and used to meet their load, we presume that it was not intended that reliance on armed load would be taken into account in applying the resource sufficiency test. This is of course a design feature that could be reconsidered going forward.

Another element of the resource sufficiency test that might have contributed to the CAISO passing that test as the CAISO approached load shedding was the interaction between the way FMM import offers are accounted for in the resource sufficiency test and the way armed load impacted dispatch and pricing outcomes. FMM import offers are counted as part of CAISO supply based on the presumption that they would be scheduled if they were needed to meet CAISO load. However, because of the impact of the release of generation reserves at incremental cost on HASP and FMM prices, import supply offered in the FMM might not have been scheduled even as the CAISO approached load shedding because HASP and FMM prices remained very low.

The CAISO should examine whether the following combination of factors accounts for the CAISO passing the bid range sufficiency test in hours leading up to load shedding in August 2020. These factors include the calculation errors that have been identified, together with how the test treats released reserves, FMM imports that were offered but not scheduled, and capacity of resources that were coming on-line but unable to ramp up to their upper limit. Such an examination, together with any appropriate adjustments in the calculation of the bid range sufficiency test if any remaining implementation flaws are identified, would maintain confidence in the CAISO's application of that test. It is important that the resource sufficiency tests be applied correctly to both the CAISO and other balancing areas, particularly during high load summer conditions. To the extent that there is time to do so prior to summer, the CAISO should also undertake some review of how the resource sufficiency test was applied to EIM entities that frequently failed the test last summer and then assess whether there may have been software flaws that caused EIM entities to fail the test when they should not have failed.

In the course of our discussions of the application of the bid range resource sufficiency test with the CAISO, we have come to understand that there is also a potential for the CAISO to fail the bid range test when it should not. This potential exists because the HASP takes account of the amount and offer prices of EIM transfer supply in scheduling CAISO imports and exports in HASP. The HASP economic evaluation could choose not to schedule hourly block imports that would have allowed the CAISO to pass the bid range sufficiency test because lower cost supply would be available through EIM transfers than by scheduling the HASP transaction. Similarly, the HASP economic evaluation could choose to schedule hourly block exports that would in practice be supported by EIM transfers, without considering whether scheduling these exports would cause the CAISO to fail the bid range sufficiency test. These EIM transfers would not be included in the bid range resource sufficiency test supply, nor would the hourly import offers

they displaced in the HASP evaluation be included in supply, while the hourly block exports supported by EIM transfers in the HASP evaluation would be included in the CAISO capacity requirement. The failure of the HASP to take account of the need to schedule hourly imports and exports in a manner that allows the CAISO to pass the EIM resource sufficiency test could result in the CAISO failing the test when it could have passed the test by scheduling additional hourly imports or fewer exports.

While it might at first appear that these unintended outcomes could be addressed by not including EIM supply in the HASP evaluation, that approach would lead to other unintended consequences because CAISO FMM prices would then be systematically lower than HASP prices during periods in which EIM transfers would flow into the CAISO, and systematically higher than HASP prices during periods in which EIM transfers would flow out of the CAISO.[15] We do not propose that the CAISO take any short-run steps to address the potential for the CAISO to fail the resource sufficiency test when it should pass it because we view the issues as much too complex to address within the available timeline. However, we think that this interaction between HASP and the resource sufficiency test should be taken into account in considering other long-run changes in the resource sufficiency test or in the consequences of failing that test.

If the CAISO RUC pass clears without curtailing load, then there should generally be enough supply available in real-time to pass the resource sufficiency test. However, this will not be the case under any of the following conditions: if net load is higher than expected in real-time during particular hours; if HASP schedules additional exports not cleared in RUC, or if HASP does not schedule economic imports that were included in the RUC evaluation because of the availability of lower cost EIM transfers.

3.3 Including the Uncertainty Requirement in the Bid Range Resource Requirement

The CAISO proposes to include the full amount of the flexiramp uncertainty requirement in the bid range capacity requirement to be met with the resource sufficiency test. We understand that this change has fairly widespread stakeholder support but we have a few concerns about unintended consequences from this change if it were to be implemented for the first time going into this summer.

First, the flexiramp uncertainty requirement is defined as a demand curve. The intent is that the maximum amount would be procured if its cost was very low. It is explicitly not intended that the full target amount of ramp be procured at any cost. This is a particularly important consideration for the CAISO because HASP does not treat the flexiramp requirement as an absolute requirement but instead schedules ramp based on the demand curve. HASP might therefore not schedule imports that would have allowed the CAISO to pass a bid range test that included the uncertainty requirement because the imports were more expensive than the value of ramp based

[15] As with many other elements of the Western EIM, the scheduling of supply in HASP versus relying on EIM transfers is impacted by the flawed implementation of flexiramp (www.caiso.com/InitiativeDocuments/FinalProposal-FlexibleRampingProductRefinements.pdf). The economic evaluation of EIM transfers within a constrained EIM region should include the impact on flexiramp scarcity relative to a HASP import but this would not be the case if the flexiramp evaluation counts on ramp located outside the constrained area.

on the demand curve. We think the CAISO should examine how such a requirement would in practice operate in combination with the HASP.

Second, a number of current and prospective EIM entities have pointed out that the use of the historic histogram to set uncertainty requirements has the potential to set a high requirement based on historic upward uncertainty reflecting a high historical level of intermittent resource output that would be applied to a future interval in which intermittent resource output is projected to be low relative to historical levels, and hence cannot decline much more. The uncertainty requirement should be set low for these future intervals with low projected intermittent resource output, making capacity available to meet the higher net load. If a high uncertainty requirement is applied to intervals when intermittent output is projected to be low, balancing areas could fail the resource sufficiency test when they should not, and perhaps not be able to make use of the EIM diversity benefit as a consequence of failing the test.

The CAISO noted in the draft final proposal that these flaws in the current flexiramp histogram design will be addressed by design changes being developed in the flexiramp improvements stakeholder process.[16] These include use of quantile regression-based estimates of flexiramp requirements that will better reflect current resource conditions. However, these changes will not be implemented until after summer 2021 and we are not aware that any test results have been presented showing that the proposed changes will be effective in correcting the flaws in the current method for setting the flexiramp requirement. Until the flaws in the histogram method for setting the uncertainty requirement are corrected, including the uncertainty requirement in the bid range capacity requirement could result in some number of unintended sufficiency test failures. If the CAISO proceeds with implementing this change for summer 2021, the CAISO should carefully test the implementation in order to understand its impacts and avoid unintended impacts during this summer. The CAISO and EIM entities might also want to retain the ability to switch this feature off on short notice if it becomes apparent that it is operating in a manner materially different than intended.

3.4 Start Time, Ramp Constraints, and Resource Availability

We agree with the CAISO's intent to defer changes to the resources included in the bid range test prior to summer 2021. It might appear that it would be desirable to exclude from the bid range sufficiency test any resources that cannot be committed within the HASP time frame. However, if there is a very high level of intermittent resource output that is available for transfer within the EIM, it would neither be efficient nor consistent with the environmental goals that motivated the construction of those zero emission resources to require balancing areas to committed unneeded thermal generation to meet the resource sufficiency test requirements in order to avoid being cut off from zero emission imports.

The relevant start time under these conditions is not the time frame of the HASP evaluation but the time frame in which a large enough change in system conditions to require starting the units might occur. We think it will be very difficult to set a general rule for such a time frame. Ex-

[16] See California ISO, *Market Enhancements for Summer 2021 Readiness, Draft Final Proposal*, February 18, 2021 p. 27.

cluding resources that can be brought on-line within the operating day from the resource sufficiency test changes it from a resource sufficiency test to a short-term commitment decision test. The dispatch range test could potentially be modified to account for ramp rate constraints, but this would be very complex to implement without unintended consequences. A resource could be ramped down precisely because there is availability of surplus renewable output that is zero or even negatively priced, but once the resource is ramped down to accommodate this renewable output, it may not be able to reach its upper limit within particular time periods. We recommend that ramp and commitment-related changes be discussed among EIM entities and their impacts carefully evaluated before being implemented, which would be impractical to accomplish prior to summer 2021. Another set of issues that should perhaps be discussed would be how resources coming back on-line and ramping up should be accounted for in the resource sufficiency test.

Moreover, we have some reservations about whether a bid range resource sufficiency test based on intra-day unit commitment outcomes is necessarily appropriate. As we discuss in the next subsection, we believe that a thorough rethinking of the penalties for failure of the test should be undertaken. In particular, we think that a more appropriate consequence of failing to commit enough short-starting units to meet load at least cost within the operating day would be economic penalties, set by high prices if the BA is short. This of course requires that EIM prices send appropriate price signals, which they will not send at least until the flaws in the flexiramp implementation are corrected. This rethinking would not be possible prior to the summer of 2021, and should instead be undertaken as part of the planned comprehensive evaluation of the resource sufficiency test.

3.5 Changes in Penalties

As just stated, we support consideration of changes in the consequences for failing the various resource sufficiency tests. We also support the CAISO's intent to not try to develop and implement such changes prior to summer 2021. We do not believe any stakeholders have identified changes that are such a clear improvement on the current design, so easy to implement, and so devoid of potential adverse impacts that the CAISO should attempt to implement them prior to this summer. Ideally the penalties should serve as a deterrent to leaning and thereby result in improving overall reliability, rather than a punishment that could have the unintended consequence of harming reliability.

We also have reservations with implementing changes that materially increase the penalty for failing the test if it is expanded to include the uncertainty requirement until the ISO addresses the following two issues. First, flaws in the histogram approach should be corrected so that balancing areas are less likely to fail the resource sufficiency test when they should not, and, second, the CAISO should address the inconsistencies between its HASP evaluation and the way the resource sufficiency test is applied. Inappropriately high penalties, combined with sufficiency test failures due to flaws in the test, could produce the unintended consequence of discouraging participation in the EIM.

3.4 Summary Conclusion

In summary, we agree with the CAISO's view that EIM entities should not attempt to develop substantive changes in the way unit commitment decisions, start times and ramp constraints are

accounted for in applying the bid range sufficiency test prior to this summer. In our view there are complex interactions between participation in the EIM dispatch and potential tests that account for ramp and commitment decisions that could have serious unintended consequences if any changes to the test are not carefully developed and tested.

Second, we recommend that any discussion of changes to the consequences of failing the various sufficiency test need to consider the following issues. First, what should the consequences be for a balancing area that has declared a state of emergency relative to a balancing area that might be leaning on the EIM in order to avoid needing to declare a state of emergency? Second, how should any changes in penalties be applied to balancing areas that fail because of flaws in the histogram approach used to set ramp targets or that fail a revised test that includes rules that apply to unit commitment decisions and ramp constraints that may be based on very simplified rules.

Third, if the uncertainty requirement is included in the bid range test, we recommend that the CAISO and other EIM entities retain the ability to switch this feature off without delay if it proves to adversely impact EIM operations and reliability by frequently triggering failures that are not warranted by conditions.

Fourth and finally we recommend that the CAISO provide a more detailed accounting of how it passed the bid range resource sufficiency test in the hours leading up to load shedding in August 2020. This will likely result in one of two outcomes, or some combination of the two. The first possible outcome would be that this outcome was consistent with the design of the test and the actions the CAISO was taking. The second possible outcome is the identification of additional implementation errors that we hope could be corrected prior to the coming summer. In addition, the CAISO should conversely attempt to understand the reasons that other EIM entities failed the test during critical times or at high rates and verify that these failures were not due to some type of implementation error.

4. Make-Whole Payment Provisions for Imports in HASP

4.1 Background and ISO Proposal

The California market imports approximately one-quarter of its electricity needs, on average. The crisis of 2000-2001 and the heat wave of August 2020 show that disrupting imports can have severe consequences for costs and reliability. For that reason, under the 2008 Market Redesign and Technology Upgrade, the CAISO created both a real-time 5 minute dispatch market for clearing internal supply and demand for imbalance energy, as well as an Hour Ahead Scheduling Process in order to accommodate WECC rules governing the scheduling of imports from outside the ISO. At that time, these rules included hourly block scheduling for the majority of import sources, as well as deadlines for tagging accepted schedules at the CAISO interties that precede the cleared schedules flowing in the 5 minute market. HASP performs an optimization of import offers and internal ISO resources against forecast ISO internal demand and anticipated exports. HASP yields a financially binding schedule for import energy offers (to be settled at subsequent real-time prices) and a physical commitment schedule for internal resources that need to be com-

mitted within that time frame, but not a financially binding energy schedule for internal resources. The five-minute dispatch market was complemented by an every 15 minute real-time pre-dispatch (RTPD) which ran a short-term security constrained unit commitment that determined what resources would be available to be dispatched in the 5 minute market. One of the four RTPD commitment runs serves as the HASP market run, coinciding with the time frame required to schedule hourly block transactions.

Later, in 2014, the RTPD process was modified to create a fifteen-minute market (FMM) which determines financially binding energy schedules for internal resources. The FMM was implemented in anticipation that an increasing amount of imports on the interties would be dispatchable on a quarter hourly basis, in part because of FERC Order 764. This expectation has to a large extent not been realized. However, the FMM plays another important role, which is to calculate the prices at which the hour ahead import schedules are to be settled. In summary:

1. HASP creates financially-binding schedules for block imports at the interties, as well as physical unit commitment schedules for internal resources.
2. The FMM performs unit commitment and energy scheduling for internal resources, calculating LMPs that are used to settle both internal resource schedules and, after averaging over the relevant hour, HASP import schedules.
3. The 5 minute market redispatches internal resources, and the imbalances (relative to the FMM schedules) are settled at 5 minute prices.

Average prices in the FMM for a given hour may be less or more than the HASP market clearing prices for that hour. This means that there is a risk that HASP schedules will receive revenues that are less than their bid, but also a possibility of receiving revenues in excess of their bid or the HASP clearing price. As described by DMM,[17] there was a pattern in Q3 of 2020 in which 15 minute prices paid approximately $4M/hour more to hourly transactions scheduled in HASP than HASP prices would have during the early evening hours (19 and 20). In most hours, actual settlements (15 minute prices) were higher than HASP prices, but the differences in those hours were usually well below $1M/hour for the quarter. On net, import revenues based on 15 minute prices exceeded those that would have resulted from HASP prices.

Nevertheless, the risk of selling power for materially less than the offer price can be significant. The Proposal cites a case in which one intertie's HASP price during one hour on August 16, 2020 was +$262/MWh, while the corresponding average FMM price that any block import offer would've been settled at was -$149/MWh. We understand that this outcome was at least in part due to out-of-market import transactions that were scheduled by CAISO operators after HASP had run but that were reflected in FMM schedules and prices.[18] The ISO, DMM,[19] and stakeholders recognize that this risk can discourage non-RA imports when they are most needed, since they could choose to be sold into other Western markets without having to bear that risk. The

[17] CAISO Department of Market Monitoring, *Q3 2020 Report on Market Issues and Performance*, Special Issues, p. 114-116, www.caiso.com/Documents/2020ThirdQuarterReportonMarketIssuesandPerformance-Feb4-2021.pdf.

[18] California ISO, *Market Enhancements for Summer 2021 Readiness*, Draft Final Proposal, February 18, 2021, p. 30, www.caiso.com/InitiativeDocuments/DraftFinalProposal-MarketEnhancementsforSummer2021Readiness.pdf

[19] CAISO Department of Market Monitoring, *Q3 2020 Report on Market Issues and Performance*, Special Issues, p. 115, www.caiso.com/Documents/2020ThirdQuarterReportonMarketIssuesandPerformance-Feb4-2021.pdf.

potential for CAISO operators to schedule out-of-market transactions that could lead to wide divergence between HASP and FMM prices is much greater during highly stressed system conditions, such as those in August 2020, than during normal operating conditions.

Therefore, it is reasonable to conclude that removing this risk and the possible disincentive to scheduling imports during times of system stress for the ISO could increase available supply of non-RA imports. (RA imports are obliged to bid into the CAISO markets, but the price risks they bear are arguably a disincentive to perform.[20]) It is at such times that RA imports may be insufficient to meet system needs,[21] so incentivizing non-RA imports becomes even more important then.

There are several possible ways for this risk to be mitigated by altering how HASP schedules are settled. These include:

1. The ISO's "Option 1" (settle imports at the higher of HASP and FMM prices, guaranteeing that imports will recover their offer price, which the market software guarantees will be no more than the HASP price).
2. The ISO's "Option 2" (provide a make-whole payment based on the import's offer price, which would pay the positive difference between that offer price and the hourly average FMM price-based settlement).
3. Various versions of an "Option 3" proposed by stakeholders[22] (which would always pay the HASP price to real-time block imports).
4. Although it is not practical for the coming summer, a longer run solution would be the addition of a fourth spot market to the existing IFM, FMM, and 5 minute markets that would settle HASP imbalances (relative to day-ahead quantities) in imports, exports, internal resources, virtual trades, and load at HASP prices. The possibility of such a market was discussed by MSC members during the planning for MRTU, but not seriously considered at that time. However, improvements in software execution times, together with growth in variable renewables and the more accurate forecasts available several hours ahead compared to day-ahead, make this alternative worth considering if loads and supply side resources would make use of it.[23]

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[20] See www.caiso.com/Documents/MSC-OpinionontertieDeviationSettlment-Jan18_2019.pdf

[21] *Final Root Cause Analysis Mid-August 2020 Extreme Heat Wave report*, p. 48, www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf

[22] Stakeholder Comments on *Straw Proposal, Market Enhancements for Summer 2021 Readiness*, https://stakeholdercenter.caiso.com/StakeholderInitiatives/AllComments/bbc85fdd-01b0-4901-b544-81791ba65481#question-30128e8a-b686-4533-a965-8e7ada3872c7.

[23] Several European markets have developed intraday markets which, in Germany's case, now have a much greater volume than the nominal real-time imbalance market (T. Brijs, C. de Jonghe, B.F. Hobbs, and R. Belmans, "Interactions between the design of short-term electricity markets in the CWE region and power system flexibility," *Applied Energy*, *195*, 1 June 2017, pp. 36–51; see also Mastropietro, P., Rodilla, P., Rangel, L.E. and Batlle, C., 2020. "Reforming the Colombian electricity market for an efficient integration of renewables: A proposal," *Energy Policy*, *139*, p.111346.). The intraday and real-time market designs are very different from US markets, and so conclusions cannot be drawn about the desirability of instituting intraday markets in the US. In particular, real-time markets do not use locational market pricing and often involve nontransparent incs and decs, similar to the early California ISO market. Further, intraday markets in Germany and elsewhere involve matching of offers and bids as they

5. Another long-run solution would be a scarcity pricing design that incented load serving entities to contract intra-day for imports to cover their expected net load. This is not an alternative to the other four options above, but rather a market enhancement that in our opinion that would complement and strengthen each of them.

Variants of Options 1, 2, and 3 can be defined based on the circumstances under which their settlement rules would be used instead of the present FMM price-based rule. Those circumstances could be defined very narrowly, corresponding to emergency or highly stressed conditions alone. Alternatively, they could instead be defined broadly, including most or even all hours, or somewhere in between the two extremes. Variants of the options can also be defined regarding how any make whole payments or other extra costs borne by the ISO would be allocated.

The ISO's recommendation is Option 2, in which the provision of a make-whole payment based on the import's offer price would be applicable when system conditions are tight. These trigger conditions are defined by the proposal as an hour for which:

- The ISO issues an alert notice by 3 p.m. the day before an operating day that states that an operating reserve deficiency is anticipated by the ISO for the hour in question, or
- A warning or emergency notice is used by the ISO during an operating day that states that the ISO anticipates or is experiencing an operating reserve deficiency during the hour in question.

4.2 Analysis

There are several criteria by which the above proposals, along with the do-nothing alternative, could be compared:

- whether it is practical to test and implement by the summer of 2021;
- whether the proposal would ameliorate the risk of settlements being less than accepted bids in HASP;
- the desire to make no more changes than are needed to encourage import supply at critical times, and reduce the potential for unanticipated consequences;
- whether the proposal would weaken incentives for 15 minute bidding by imports;
- whether the proposal would increase discrimination against internal ISO resources;
- whether the proposal would be susceptible to gaming; and
- whether the cost allocation conforms with possible cost causality and fairness principles.

Below we compare Options 1, 2, and 3 with the status quo (do nothing) option. We consider the merits of a narrowly or broadly defined set of circumstances in which an option would be applied. We do not consider the long-run alternative of implementation of a full HASP market with settlements based on HASP prices for all internal and external resources and transactions.

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come in, which consideration of congestion management; although that is compatible with European zonal market designs, it is entirely incompatible with US LMP-based designs.

Considering first the criterion of practicality, the ISO has stated that they can't do Option 1 or the stakeholders' Option 3 by this summer because this would require expensive and complex revision of settlement systems to store and apply HASP prices to import transactions. This conclusion by the ISO has not been questioned by stakeholders; indeed, many stakeholders have been concerned about the complexity and implementability of other parts of this initiative, and we would expect that such concerns would also apply if the ISO were to put Options 1 or 3 forward. By this criterion, only Option 2 or doing nothing is viable for this summer.

Options 1, 2, and 3 would all satisfy the criterion of mitigating the risk of import offers being scheduled in HASP at offer prices that materially exceed the FMM price-based settlement. Conversely, doing-nothing would mean that risk would still exist next summer, possibly discouraging imports, especially at times that they would be most needed. Although importers would certainly prefer having this insurance in a broader set of circumstances, the ISO's and stakeholders' desire to keep the scope of changes narrow and the need to avoid the risk of unanticipated consequences imply that the change in settlements should only be applicable in a narrow set of circumstances. Moreover, there is no undue reliability risk if non-RA imports are not offered under normal operating conditions.

For a given level of a HASP offer, Option 2 results in less (or at least no more) payment to accepted import offers than Options 1 or 3. Thus, the issue of discriminating against within-CAISO resources (who only have the option of 15 minute and 5 minute prices in real-time) is less of an issue with Option 2.

There are two concerns about the potential for strategic behavior under these options. One concern applies to all three options. By potentially providing a make-whole payment that results in paying some or all intertie transactions more than the FMM prices, while maintaining FMM price-based settlements for other intertie transactions or virtual transactions, the possibility of profitable offsetting trades is opened up. Although offsetting trades would result in no net payment in the IFM, the two sides of the trades would be settled differently in the real-time markets (HASP and FMM). The entity involved could earn positive revenue, in the form of the make-whole payment whenever the transactions are settled at different prices in HASP or FMM.

The specific offsetting trade opportunity that is a risk differs between Options 1 and 2. Under Option 1, since all interchange transactions settle at the higher of the HASP- or FMM-based prices, imports and exports will settle at the same price, so there is no issue with offsetting interchange transactions. The issue is instead offsetting virtual supply and exports in the IFM, with the export not flowing in real-time. Since IFM virtual supply would settle as virtual demand at the FMM price, while the export would settle at the higher of the HASP or FMM price, this would be profitable if the HASP price is higher. The same strategy might be profitable for Option 3 if the HASP price was predictably higher in a given interval. Meanwhile, under Option 2 there are three offsetting trade opportunities:

i. Offsetting real-time imports and exports. This is not likely to be an issue because real-time exports would likely be curtailed under the circumstances when this rule would be applied, as the ISO notes in its proposal.

ii. Offsetting DAM exports and virtual supply as under Option 1. It would be much harder to earn profits from this strategy than under Option 1, however, because in order to be paid more than the FMM price the exporter would need to set an export bid price higher than the FMM price. That would create the risk that the export would be scheduled to flow in HASP, instead of being dispatched down, if the HASP price exceeded their bid. The FMM price might be high when this occurs, exposing the seller to losses on the virtual supply position. This strategy only appears to be likely to be profitable if there is a high probability that the HASP price will clear at a very high level.

iii. Have IFM imports that do not flow in real-time, settling the resulting imbalance at FMM price, while submitting high priced real-time imports to HASP that could get uplift if accepted and the FMM price was lower than the HASP price. This has the same risks as the second strategy, unless there is a high probability the HASP price will be significantly greater than FMM prices. There is an additional risk to the market party using this strategy of the real-time import not clearing in HASP and then having to dispose of the energy while possibly settling the IFM import deviation at a high price in FMM.

In summary, opportunity (i) appears unlikely, and options (ii) and (iii) are both riskier under Option 2 than under Option 1. Further, Option 2, by paying no more than Options 1 and 3, should be less subject to the risk of offsetting trades. The ISO claims that the conditions under which their proposed Option 2 would apply should minimize the probability of this strategy being pursued successfully. While the conditions in which significant round-trip transactions would be profitable appear to be unlikely, we cannot foresee all of the system conditions that may arise at particular times during the coming summer. Hence, we agree with the ISO that it will be prudent to monitor bidding behavior and have the capability to suspend the make-whole payments provision if adverse market outcomes are detected, as the ISO proposes.

A second strategic behavior concern applies to Option 2. An issue with the make-whole payment system like Option 2 is that importers will be incented to increase their bids to get closer to (while still remaining under) the HASP prices in order to maximize their revenue. Thus, the make-whole payment can provide incentives similar to pay-as-bid settlements, which have the potential for two negative effects. The first effect concerns the market efficiency implications of the incentive to misstate costs: a seller may misjudge what the HASP clearing price will be, and offer too high, and thereby not be selected. If other resources or imports are selected instead that are in reality more costly than the supply offered by seller who offered its supply at too high a price, the cost of serving load has been increased. The second potential effect is that a seller may decide to devote additional resources to estimating HASP prices; such efforts would be unnecessary in a first-price (market clearing-type) market, in which a competitive firm only needs to offer their true cost in order to maximize their profits. This increases the cost of market participation and can disadvantage small firms and thereby harm the competitiveness of the market.

To the extent that circumstances in which Option 2 would be invoked occur frequently and can be predicted prior to submitting offers, and to the extent that the level of HASP prices can be predicted, raising import offers can become more attractive and these two effects have the potential to lower market efficiency. However, if the trigger for providing the make-whole payment is

uncommon and difficult to predict, and if the HASP prices themselves are difficult to forecast, problems with these two types of adverse effects are less likely. Moreover, import supply offers are likely to reflect opportunity costs in other markets rather than incremental costs in the circumstances in which the CAISO rules are likely to apply; as a result, importers will have similar or identical costs so their offers would likely be similar anyway, so there appears less potential for the first effect (i.e., inflation of offers to the anticipated marginal clearing price level).

Regarding cost allocation, one set of stakeholder comments (Idaho Power) objected to any of the uplift costs of Option 2's make-whole payments being allocated to EIM transfers from the CAISO.[24] However, their comments also noted that the amount of such transfers during tight conditions are likely to be small or nonexistent, so that load and other exports would bear most or all of the uplift. We view this as a cost allocation issue that might be discussed in the long-term, but it is not so important as to justify holding up summer implementation. If the uplift to EIM transfers turns out to be significant, the ISO and its stakeholders could then consider if is worthwhile incurring additional costs for settlement system changes.

4.3 Summary Conclusion

We understand that the CAISO would be able to implement Option 2 for summer 2021 and that Option 2 would establish a relatively circumscribed application of make-whole payments for hourly block imports. We believe that Option 2 will be effective in eliminating the potential for import supply to be materially reduced during highly stressed system conditions by the risk of imports being scheduled in HASP but being paid materially less than their as-bid costs. We cannot predict the magnitude of impact of these rules on the amounts of non-RA imports that will be offered during tight conditions, but we anticipate it will be at least somewhat helpful. We also conclude that the risks of adverse market outcomes from strategic behavior, in the form of offsetting schedules or inflation of offers in order to increase make whole payments, are likely to be small, given the narrow set of circumstances in which the payments would be applicable. We agree that market behavior at such times should be closely monitored for such strategic behavior, and anticipate that offers and market outcomes will be highly scrutinized, as they have been for the heat wave event of last August.

An impact of this type of bid cost recovery proposal if implemented during normal market conditions, could be to discourage flexible (non-block, 15 minute) offers by imports. However, this is unlikely to be an issue during highly stressed system conditions when offer prices reflect the opportunity cost of selling to another buyer in the hourly market in the West. We encourage the ISO to investigate the reasons why importers and intertie owners continue to schedule on an hourly basis, since there are no apparent technical reasons blocking 15 minute scheduling. As a long-run remedy, we encourage consideration of the implementation of a HASP market with 15 minute prices that would settle all import, export, and internal resource deviations from day-ahead schedules. Such an intraday market would eliminate the source of the price risk that this part of the initiative is addressing. That market would also enable the ISO and market participants to take advantage of the resource and load forecasts that are available a few hours before

[24] Stakeholder Comments on *Draft Final Proposal, Market Enhancements for Summer 2021 Readiness*, https://stakeholdercenter.caiso.com/StakeholderInitiatives/AllComments/a1105b73-c668-4ba5-9858-9e183a2cd852. PowerEx also provided oral comments during a stakeholder call supporting these concerns.

real-time and that are more accurate than the forecasts used in the IFM. The creation of intraday markets in Europe is an example that could be followed by US markets if loads and suppliers were incented to make use of it.