



California Independent
System Operator Corporation

August 19, 2015

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

Re: California Independent System Operator Corporation

**Tariff Amendment in Compliance with July 20, 2015, Order,
Docket Nos. ER15-861-000 & EL15-53-000**

Dear Secretary Bose:

Pursuant to the “Order on Technical Conference”, the Commission issued in this proceeding on July 20, 2015,¹ the California Independent System Operator Corporation (“CAISO”)² submits this filing to include in its tariff enhancements to its Energy Imbalance Market, as proposed in the CAISO’s April 23, 2015, comments in this proceeding. Specifically, the CAISO proposes to enhance the Energy Imbalance Market (“EIM”) functionality so that it will automatically recognize and account for capacity the balancing authority area has available to maintain reliable operations. The proposed enhancement will enable the EIM entity to identify capacity it deems necessary to reliably operate its system and deploy such capacity through the Energy Imbalance Market to resolve power balance infeasibilities in the balancing authority area, and simultaneously participate in congestion management. This will allow the CAISO and EIM entity to prevent market run infeasibilities that would otherwise arise without this visibility. This is possible because the enhanced functionality will recognize and use this capacity to meet reliability requirements in the balancing authority area. The CAISO will not dispatch the capacity through the Energy Imbalance market

¹ *Cal. Indep. Sys. Operator Corp.*, 152 FERC ¶ 61,060 (2015) (“July 20 Order”).

² Capitalized terms not otherwise defined herein have the meanings set forth in appendix A to the CAISO tariff. References to numbered sections are references to sections of the CAISO tariff unless otherwise indicated. For the sake of clarity, this transmittal letter distinguishes between existing tariff provisions (*i.e.*, provisions in the current tariff that are unchanged by this filing), new tariff provisions (*i.e.*, new provisions that the CAISO proposes to add to the tariff in this filing), and revised tariff provisions (*i.e.*, tariff provisions in the current tariff that the CAISO proposes to revise in this filing).

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to serve such infeasibilities in other balancing authority areas participating in the Energy Imbalance Market.

The proposed solution is just and reasonable because it addresses the structural market design issue identified in this proceeding that contributed significantly the price spikes observed after the launch of the integration of the first EIM entity last fall. As required by the July 20 Order, this filing also addresses and responds to comments submitted by parties in this proceeding.

The CAISO requests an effective date of November 1, 2015, for the proposed tariff provisions. The CAISO recognizes its prior commitment to implement the proposal on August 24, 2015. However, because of the need for this compliance filing, the CAISO modified the implementation schedule to provide FERC and intervenors more time to evaluate the tariff provisions. This delay is not harmful to ratepayers given the Commission's prior extension of the pricing waivers, which are to remain in effect until the date the CAISO implements the proposal to address the issues identified in this proceeding.³

The CAISO respectfully requests that the Commission issue an order regarding the proposal by October 20, 2015, so that the CAISO and EIM participants have sufficient time to evaluate the impact of the order on implementation of the proposed enhancement on November 1, 2015.

I. EXECUTIVE SUMMARY

This filing seeks to enhance the CAISO's Energy Imbalance Market to significantly reduce the number of intervals in which the Energy Imbalance Market results in infeasible solutions due to power balance constraints. Under the CAISO tariff, when the Energy Imbalance Market – which operates as an extension of the CAISO's fifteen-minute and five-minute markets for real-time imbalance energy – fails to reach a feasible solution based on submitted bids, the software will clear the constraint by applying a penalty price. After implementing the Energy Imbalance Market for PacifiCorp, the CAISO observed that these constraints were binding more frequently than expected, resulting in atypically high prices in the fifteen-minute and five-minute markets in PacifiCorp's balancing authority areas.

In its March 16, 2015, order issued in these proceedings, the Commission determined that the CAISO's Energy Imbalance Market tariff provisions were unjust and unreasonable with respect to these price excursions, and instituted an investigation under Section 206 of the Federal Power Act to investigate the causes of the price excursions and facilitate the development of a just and reasonable solution.

³ See *Cal. Indep. Sys. Operator Corp.*, 151 FERC ¶ 61,247, at P 18 (2015).

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The CAISO and PacifiCorp have undertaken significant efforts to understand the root causes of these infeasibilities and identify potential solutions. The CAISO and PacifiCorp have presented their findings in monthly informational reports filed with the Commission, in presentations at a technical conference hosted by the Commission in April, and in comments filed subsequent to the technical conference. The information provided by the CAISO and PacifiCorp shows that the price excursions experienced after the launch had a number of root causes. These root causes have manifested as infeasibilities in the Energy Imbalance Market in two ways: (1) “learning curve” challenges associated with integrating PacifiCorp operations with the Energy Imbalance Market, which have sometimes caused the Energy Imbalance Market to operate based on imperfect information regarding actual imbalance conditions; and (2) a structural limitation in the current design of the Energy Imbalance Market, namely the lack of visibility to the market of capacity that is available to PacifiCorp to meet load in its balancing area and that is not bid into the Energy Imbalance Market. These infeasibilities have not been caused by a lack of resources sufficient to meet PacifiCorp’s balancing authority responsibilities. This is demonstrated by the CAISO’s and PacifiCorp’s analysis showing that PacifiCorp has been sufficiently resourced to balance its system and meet load consistent with North American Electric Reliability Corporation (“NERC”) requirements during the entire period of its participation in the Energy Imbalance Market.

The CAISO and PacifiCorp have made substantial strides in moving up the “learning curve” by improving coordination and deploying numerous system and process improvements. These improvements have resulted in a substantial reduction in the percentage of intervals in which the Energy Imbalance Market arrives at an infeasible solution. However, this learning process alone cannot address the structural market design issue also identified in this proceeding. It is also necessary to enhance the functionality of the Energy Imbalance Market to ensure that it can account for the capacity that an EIM entity identifies as necessary to operate its system reliably. Because the CAISO does not assume the balancing authority functions of EIM entities, it is appropriate that EIM entities not include all of the capacity they identify as needed to operate their systems reliably in the Energy Imbalance Market. This is done to ensure that EIM entities can use this capacity to meet load in real-time. However, without the ability to recognize and consider this capacity, the Energy Imbalance Market is more likely to reach an infeasible solution, which signals supply scarcity and thereby triggers penalty pricing. It is unreasonable for the Energy Imbalance Market to clear based on a penalty price that is substantially higher or lower than the marginal price when, in fact, there is no actual scarcity because the EIM entity retained sufficient capacity to balance its load and meet its reliability obligations, and the CAISO and the Energy Imbalance Market simply were not aware of such capacity.

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The CAISO is therefore proposing an enhancement to its Energy Imbalance Market functionality that will allow EIM entities to identify as part of their EIM resource plans capacity that they have available and can be used to resolve a potential power balance violation, defined as “EIM available balancing capacity.” The CAISO also proposes to adopt mechanisms to reflect this EIM available balancing capacity as part of the energy bid curves submitted for resources that are already participating in the Energy Imbalance Market, as well as to create bids based on default energy bids to reflect EIM available balancing capacity from resources that are available for use by an EIM entity but do not participate directly in the Energy Imbalance Market. The CAISO’s proposal will include measures that (1) ensure that EIM available balancing capacity is deployed to address potential power balance constraint infeasibilities only after all effective economic bids are exhausted, and (2) ensure that the deployed EIM available balancing capacity is not greater than the amount of the identified infeasibility. The CAISO’s proposal also specifies that any EIM available balancing capacity needed to resolve an infeasibility will be deployed in economic merit order, and will be settled identically to all other dispatches of participating and non-participating resources made through the Energy Imbalance Market.

The CAISO is confident that implementing this proposal will substantially ameliorate the remaining infeasibilities encountered in the PacifiCorp balancing authority areas, such that the percentage of remaining infeasible intervals in the Energy Imbalance Market will not be excessive relative to the CAISO’s internal markets and the markets operated by other Independent System Operators (“ISOs”) and Regional Transmission Organizations (“RTOs”). This conclusion is supported by data collected over the past few months that shows in almost all intervals the capacity available to PacifiCorp, which could have been reflected in the Energy Imbalance Market had the CAISO’s proposed enhancement been in place, was greater than the amount of the infeasibilities that occurred during these months. Moreover, the CAISO believes that this functionality, operating in conjunction with enhanced readiness criteria and a revised transition period process that the CAISO is pursuing in filings in other dockets, will be an important tool to reduce the impact of any “learning curve” issues that may arise during the early months of Energy Imbalance Market implementation in new balancing authority areas.

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II. BACKGROUND

A. Events Related to the Energy Imbalance Market that Resulted in the Commission Instituting a Technical Conference in this Proceeding

The EIM provides other balancing authority areas the opportunity to participate in the real-time market for imbalance energy that the CAISO operates in its own balancing authority area.⁴ Each balancing authority area that participates in the EIM continues to operate separately from the CAISO balancing authority area and as such continues to control how it satisfies its own reliability requirements.⁵ PacifiCorp's balancing authority areas (PacifiCorp East and PacifiCorp West) were the first two to join the Energy Imbalance Market.⁶

The launch of the EIM was an overall success and, after only six months of operations, both the CAISO and PacifiCorp, and their market participants, were experiencing significant benefits.⁷ As with any new significant market launch, however, there were some challenges. In particular, certain transitional conditions arose that restricted the timing and amount of capacity available through the market clearing process. These conditions caused the transmission and power balance constraints described in sections 27.4.3.2 and 27.4.3.4 of the CAISO tariff, respectfully, to bind more frequently than expected, producing atypically high prices in the fifteen-minute and five-minute markets in PacifiCorp's balancing authority areas.⁸

⁴ See *Cal. Indep. Sys. Operator Corp.*, 147 FERC ¶ 61,231, *order on reh'g, clarification, and compliance*, 149 FERC ¶ 61,058 (2014) (conditionally accepting proposed CAISO tariff revisions to implement the Energy Imbalance Market).

⁵ See, e.g., 147 FERC ¶ 61,231, at P 9 ("CAISO notes that each balancing authority that chooses to participate in the EIM will remain responsible for maintaining the reliability of its BAA [balancing authority area], including meeting operating reserve and capacity requirements, scheduling, and curtailment of the transmission facilities under its operational control, and manually dispatching resources out-of-market to maintain reliability.").

⁶ See *PacifiCorp*, 147 FERC ¶ 61,227, *order on reh'g, clarification, and compliance*, 149 FERC ¶ 61,057 (2014), *reh'g denied*, 150 FERC ¶ 61,084 (2015) (conditionally accepting in part and rejecting in part revisions to PacifiCorp's open access transmission tariff ("OATT") to enable participation in the Energy Imbalance Market).

⁷ See the CAISO's quarterly Energy Imbalance Market Benefits Reports, available at <http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyImbalanceMarketFoundation.aspx>.

⁸ Existing tariff section 27.4.3.2 describes the transmission constraint and existing tariff section 27.4.3.4 describes the system energy-balance constraint. But for the effectiveness of the tariff waiver discussed below, these constraints would trigger an administrative pricing parameter of \$1,000/MWh. See existing tariff section 39.6.1.1.

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The CAISO and PacifiCorp subsequently identified a combination of issues – system conditions, operations processes, the contemporaneous level of EIM participating resources, timeliness and accurate transmission of information regarding manual balancing authority actions, and the new operating environment – that affected market outcomes and limited or affected the timing and amount of resource capability and flexibility that PacifiCorp could provide to the Energy Imbalance Market. These factors were particularly significant because, unlike some of the data or software concerns identified in other instances, these types of circumstances were less likely to be subject to the CAISO’s normal price correction procedures. These factors together resulted in a lack of sufficient effective bids in the real-time market, thereby triggering the need for the CAISO to relax the power balance and transmission constraints in the EIM areas. This unnecessarily triggered the pricing mechanisms in tariff sections 27.4.3.2 and 27.4.3.4, causing prices to be set by bid caps even though actual conditions on the system did not warrant such high prices because there was no actual scarcity condition.

To address the anomalous effect on prices resulting from these issues, the CAISO filed a petition for a limited tariff waiver on November 13, 2014. The CAISO requested that the Commission grant a limited waiver of tariff sections 27.4.3.2 and 27.4.3.4 so the CAISO would retain the ability to relax the constraints described in those sections, but would not apply the pricing parameter that is the basis on which the CAISO establishes the market clearing price for that interval. Instead, the CAISO proposed to use the pricing mechanism that applies when effective economic bids are sufficient to allow a feasible market solution, *i.e.*, market participants would pay or receive the applicable fifteen-minute market or real-time dispatch locational marginal prices (“LMPs”), consistent with tariff sections 27 and 34 and tariff appendix C. On December 1, 2014, the Commission granted the petition for a limited tariff waiver, effective from November 14, 2014, through February 12, 2015, as requested by the CAISO. The Commission also directed the CAISO to file informational reports on the performance of the Energy Imbalance Market every 30 days during the 90-day waiver period. On February 12, 2015, the Commission granted an extension of this waiver until the earlier of March 16 or the date on which the Commission issued a subsequent order.

B. March 16 Order and Technical Conference Process

To prevent the transitional conditions observed in the PacifiCorp balancing authority areas from causing price spikes after the integration of a new EIM entity, the CAISO filed a tariff amendment in this proceeding on January 15, 2015, in which the CAISO proposed a 12-month transition period to allow the new EIM entity to transition into operating its balancing authority area in concert with its participation in the Energy Imbalance Market. During the transition period, energy in the new EIM entity’s balancing authority area would not be

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subject to the pricing parameters that normally apply under the tariff when the market optimization relaxes a transmission constraint or the system energy-balance constraint (sometimes called the power balance constraint) in clearing the real-time market. Instead, the pricing would be based on the last economic bid, as is the case under the tariff waiver current in effect, as discussed above.⁹

On March 16, 2015, the Commission issued an order that: (1) rejected the CAISO's proposed tariff revisions; (2) granted a limited extension of a previously granted waiver of tariff provisions otherwise applicable to constraints that are within PacifiCorp's balancing authority areas or that affect EIM transfers between those balancing authority areas; (3) directed the CAISO to submit a compliance filing that includes tariff revisions to implement readiness requirements applicable to new EIM entities prior to their commencement of Energy Imbalance Market operations; (4) accepted the CAISO's offer to continue to submit monthly informational reports on the performance of the Energy Imbalance Market; and (5) "institute[d] an investigation [and associated technical conference] under section 206 of the Federal Power Act in Docket No. EL15-53-000 to develop a record upon which the Commission may address issues related to the imbalance energy price spikes in PacifiCorp's BAAs [balancing authority areas]."¹⁰ The Commission explained that it expected that the technical conference would "help identify the underlying issues and thereby help ensure development of an appropriate solution."¹¹ Thus, the Commission established the technical conference in this proceeding solely to develop a record for addressing issues related to the imbalance energy price spikes in the PacifiCorp balancing authority areas, with a view toward developing an appropriate, long-term solution to those issues.

The technical conference directed by the March 16 Order was held on April 9, 2015. At the conference, representatives from the CAISO and PacifiCorp provided the Commission with additional information regarding the EIM price excursions. The CAISO and PacifiCorp explained that although PacifiCorp has, at all times, been resource sufficient and maintained reliability in its balancing authority areas, a number of issues had led to the EIM perceiving an insufficient amount of effective bids to clear the fifteen-minute and five-minute markets. The

⁹ See 151 FERC ¶ 61,247, at P 18 (granting CAISO request for limited extension of previously granted waiver of pricing parameters set forth in existing tariff sections 27.4.3.2 and 27.4.3.4 until the date of implementation of the directives in a Commission order addressing the CAISO's April 23, 2015, comments and proposal in this proceeding).

¹⁰ *Cal. Indep. Sys. Operator Corp.*, 150 FERC ¶ 61,191, at PP 29-34, 36-38 (2015) ("March 16 Order"). The Commission also stated that the CAISO could propose to revise its tariff in the future to include a transitional period similar to its proposal in the January 15 filing if it could demonstrate that the new proposal was commensurate with the need to address a new EIM entity's post-operation "learning curve." *Id.* at P 35. The refund effective date for the FPA 206 proceeding is August 24, 2015. 151 FERC ¶ 61,247, at P 17.

¹¹ March 16 Order at P 32.

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CAISO explained that these issues could be grouped into two broad categories: (1) transitional issues related to the learning curve associated with integrating the different operational paradigms of the CAISO and PacifiCorp; and (2) a structural limitation in the Energy Imbalance Market that limits the visibility to the Energy Imbalance Market of capacity that is available to PacifiCorp to meet load in its balancing authority areas. Subsequently, the CAISO and other participants filed comments and then reply comments on the technical conference.

In its April 23, 2015, comments (“CAISO Initial Comments”), the CAISO provided its proposed long-term solution to the issues related to the imbalance energy price spikes in the PacifiCorp balancing authority areas. First, the CAISO explained that lessons learned over the previous six months had revealed the need for automatic recognition of all capacity – defined in this filing as “EIM available balancing capacity” – that is available to an EIM entity to ensure reliability on its system.¹² The CAISO went on to describe its proposed functionality to automatically recognize available balancing capacity and to deploy such capacity.¹³ Each of those components of the CAISO’s explanation is provided below.

C. The July 20 Order

In the July 20 Order, the Commission found that the CAISO had presented conceptual ideas in its April 23 comments “that may address in whole or in part the concerns giving rise to the FPA section 206 investigation in this proceeding.” The Commission stated, however, that it was unable to review the justness and reasonableness of that conceptual proposal, and that it “would only be able to determine whether CAISO’s proposal is just and reasonable after reviewing, allowing comment on, the detailed tariff provisions through which the CAISO would seek to implement this proposal.”

The Commission directed the CAISO to file its proposed tariff revisions within 30 days (*i.e.*, by August 19, 2015) and to “include in its filing an explanation of how each of the underlying causes of the price spikes is addressed by its proposed tariff revisions and/or by other actions taken by CAISO and PacifiCorp, as well as whether there are any underlying issues that remain unaddressed.”

The Commission found that addressing the concerns raised by commenters regarding the CAISO’s conceptual proposal is premature prior to reviewing the proposed tariff revisions. The Commission stated that it “expect[ed] CAISO to consider the concerns raised by commenters in developing

¹² CAISO Initial Comments at 7-11.

¹³ *Id.* at 11-23. The CAISO also explained that its proposed solution follows mechanisms adopted by other ISOs and RTOs to avoid potential market infeasibilities. *Id.* at 23-27.

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its proposed detailed tariff language, and to ensure that commenters' concerns are addressed, as appropriate, in either the proposed tariff language itself or the accompanying transmittal letter.”

D. CAISO Stakeholder Process to Comply with the July 20 Order

To comply with the July 20 Order, the CAISO prepared draft tariff revisions and posted them on its website on August 10, 2015, for discussion as part of the existing CAISO stakeholder process regarding EIM year 1 enhancements. The CAISO held a conference call to discuss the draft tariff revisions with stakeholders on August 13, 2015. The CAISO took verbal comments and questions during the August 13 call and has attempted to address stakeholder concerns in this filing to lessen issues raised due to misunderstandings in this proceeding.

E. The Need for Automatic Recognition of All Capacity Available to EIM Entities

The CAISO and PacifiCorp conducted a rigorous and intensive investigation into the source of the issues causing the price excursions in PacifiCorp's balancing authority areas and determined that these events have not occurred as the result of any actual capacity insufficiencies in the PacifiCorp balancing areas. As PacifiCorp reported at the April 9 technical conference, since it joined EIM, it has been resource-sufficient and has maintained reliability in its balancing authority areas at all times. Also, in accordance with the Commission's directive in the March 16 Order, the CAISO began including, in its monthly informational reports on the performance of the EIM, data regarding whether price infeasibilities experienced in the EIM were caused by transitional issues or were due to an insufficient supply of resources bid into the EIM. The CAISO evaluated each interval in which an infeasibility occurred and compared the difference between PacifiCorp's "excess reserves" and the amount of the infeasibility. In the majority of intervals, PacifiCorp's excess reserves exceeded the amount of the infeasibility. Moreover, the CAISO and PacifiCorp evaluated market and reliability conditions during all of the intervals in which there were not excess reserves and determined that at all times during these intervals based on the area control error and available balancing capacity, PacifiCorp's balancing authority areas were operated reliably, and the infeasibilities were due to lack of visibility to the EIM of the capacity available to PacifiCorp.¹⁴

¹⁴ See, e.g., June 2015 Informational Report, Docket No. ER15-402-000 (Aug. 6, 2015).

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The CAISO's and PacifiCorp's investigation revealed a number of root issues underlying the price excursions.¹⁵ These root causes resulted in infeasibilities in the Energy Imbalance Market due to: (1) transitional challenges that occurred as a result of the "learning curve" experienced by operations personnel of the CAISO and PacifiCorp in coordinating balancing authority operations with new market systems; and (2) a structural market issue, namely, the fact that capacity available to PacifiCorp to ensure the reliability of its balancing authority areas is not visible to and accounted for in the operation of the Energy Imbalance Market.

The CAISO and PacifiCorp have made significant progress moving along the learning curve and reducing constraint relaxation infeasibilities by closely coordinating their analysis of the root causes of infeasibilities and deploying numerous system and process improvements. At the technical conference, the CAISO explained that numerous remedial actions had already been taken to address these learning curve issues, including enhancements to market systems visibility for PacifiCorp, extensive training, and numerous operational and process improvements adopted by PacifiCorp.

These improvements, however, do not address the basic structural issue associated with the lack of recognition in the Energy Imbalance Market of the capacity available to PacifiCorp to ensure reliability in its balancing authority areas. Although the Energy Imbalance Market is an extension of the CAISO's real-time market, it is unique in several significant respects. First, under the Energy Imbalance Market construct, EIM entities retain all of their balancing authority responsibilities and must perform their balancing functions in concert with the Energy Imbalance Market in real-time. Second, the CAISO does not co-optimize the use of energy and ancillary services through the Energy Imbalance Market for balancing authority areas other than its own. Therefore, in fulfilling its balancing functions, the EIM entity must maintain a certain amount of capacity within its balancing authority area – the amount of capacity the EIM entity deems necessary to reliably operate its system within the confines of the existing transfer capability limitations. It would be counterproductive for the EIM entity to bid this capacity into the Energy Imbalance market because there is no assurance that this capacity would be retained for use within the EIM entity's balancing authority area. This "retained" capacity could, if bid into the Energy Imbalance Market, be used to facilitate a transfer to another balancing authority area within the EIM operational footprint, thereby defeating the point of retaining it for purposes of satisfying balancing area obligations. As such, it is entirely consistent with the design of the Energy Imbalance Market that an EIM entity

¹⁵ The CAISO and PacifiCorp identified seven types of root issues: (1) renewable deviations, (2) load changes, (3) import/export changes, (4) resource outages, (5) manual dispatches, (6) resource data alignment, and (7) transfer/congestion constraints. See *id.* at attachment A.

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would retain capacity outside of the Energy Imbalance Market to ensure the reliable operation of its own balancing authority area(s), and doing so does not in any way suggest that an EIM entity is resource insufficient.

With PacifiCorp, the post-go-live experience demonstrated that although PacifiCorp has successfully been able to manually dispatch this capacity outside of the Energy Imbalance Market to address infeasibilities, the Energy Imbalance Market has not always been able to recognize the dispatch of this capacity. To obtain robust market solutions under the Energy Imbalance Market paradigm, it is imperative that information exchanges between the EIM entity and the CAISO as the market operator timely and accurately account for both balancing authority actions and market operations. If balancing authority actions are not incorporated timely and accurately in the market optimization, false scarcity will occur because the market optimization will not consider this available capacity in determining if the balancing authority has sufficient supply to meet demand.¹⁶

To achieve this goal, the CAISO must enhance the functionality of the Energy Imbalance Market systems to ensure that the market is automatically informed of and accounts for the full scope of capacity available to EIM entities to ensure reliability in their balancing authority areas. It is important that this process be automated for two reasons. First, the current procedures for recognizing EIM operator actions are largely manual and require timely and accurate responses, which leaves the final outcome susceptible to human error and process breakdowns. Second, although it is possible for the EIM entity to speculate and account for the infeasibilities in the fifteen- and five-minute markets, it is not possible to definitely know them at the time that the EIM entity and EIM participants are required to submit their bids and base schedules. Therefore, under the current functionality, the EIM entity must estimate what these infeasibilities may be and incorporate the needed capacity in its base schedules and bids. Although this is not impossible, it requires the EIM entity to quickly and accurately estimate the potential infeasibilities and convey the release of capacity to the market systems. This practice is risky for two reasons. First, the EIM entity may estimate the infeasibility incorrectly, which could trigger other problems. Second, if the EIM entity deploys the capacity into the Energy Imbalance Market, there is no guarantee that the energy will not be sold to serve load in California, which may pose a problem for the balancing authority if an actual reliability issue materializes, and the balancing authority is dependent on that capacity.¹⁷

¹⁶ CAISO Initial Comments at 8-9.

¹⁷ *Id.* at 9-10.

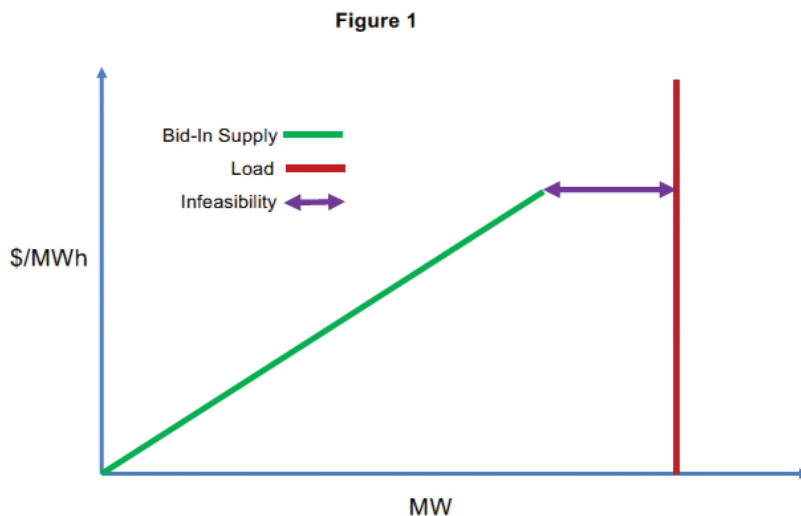
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III. THE CAISO'S PROPOSED EIM ENHANCEMENT

A. Overview of Proposed Enhancement

To avoid power balance constraint infeasibilities that result from the false scarcity conditions that can occur when the EIM fails to account for capacity available to EIM entities to ensure reliability, the CAISO proposes an enhancement to the EIM functionality to automatically account for such capacity.

Under the current CAISO market design, if there is a lack of effective economic energy bids to clear demand, the market software will observe a gap and not reach a feasible solution unless it relaxes the power balance constraint. Similarly, it can need to relax a transmission constraint to resolve a transmission infeasibility. Figure 1 below illustrates the potential gap between load and the bid-in supply capable of serving that load in an EIM entity balancing authority area. The purple line illustrates the degree of the infeasibility in serving the load represented by the red line.¹⁸



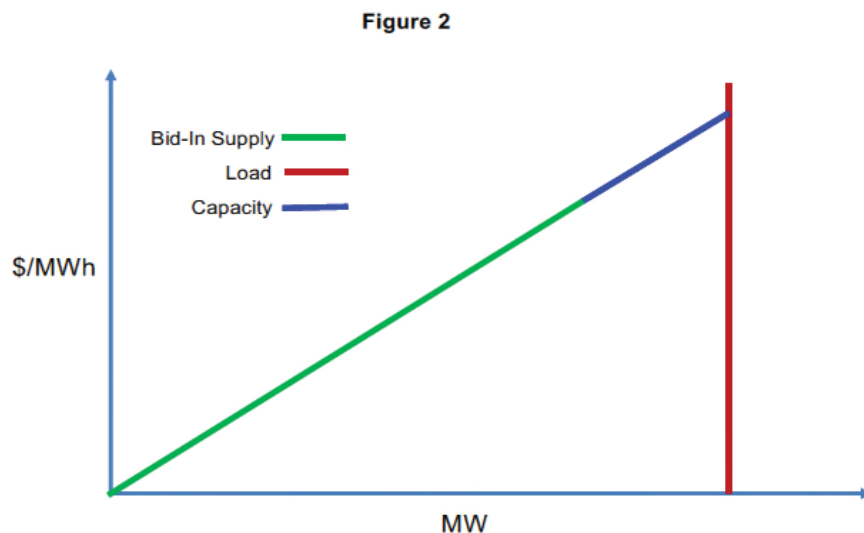
Under the CAISO's proposed enhancement, the EIM optimization process will automatically recognize and account for available balancing capacity identified by the EIM entity of the balancing authority area, which could be in the form of regulation and load-following capacity, or other capacity that the balancing authority has determined is necessary for reliable operations.¹⁹ Once

¹⁸ Prepared Testimony of Donald Tretheway (Attachment C to this filing) at p 5 ("Tretheway testimony").

¹⁹ The CAISO proposes to define this available capacity in appendix A to its tariff as "EIM Available Balancing Capacity" and to specify that there are two types of such capacity – "EIM

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recognized and incorporated in the CAISO market, this available balancing capacity will be available to be used if a potential power balance constraint infeasibility occurs in the EIM entity's balancing authority area. Under such conditions, the available balancing capacity will be simultaneously available for congestion management, and could also address a potential transmission constraint violation. Figure 2 illustrates the use of the available balancing capacity to bridge the gap and eliminate the infeasibility.²⁰



A key element of this proposal is that the EIM entity will be able to ensure it continues to have access to capacity it deems necessary to operate its systems consistent with good utility practice and NERC requirements, but deploy such capacity through the EIM to reflect the actions it would take to resolve any operational infeasibility in its system. This is possible because, with the improved functionality, the CAISO's market optimization will only deploy the available balancing capacity if a potential power balance infeasibility occurs within an EIM entity's balancing authority area, while simultaneously using that capacity for general congestion management. This is an important principle because the EIM entity uses the available balancing capacity to meet balancing authority area

Upward Available Balancing Capacity" and "EIM Downward Available Balancing Capacity." The CAISO proposes to define EIM upward available balancing capacity in appendix A to the tariff as any upward capacity from an EIM participating resource or a non-participating resource that an EIM entity scheduling coordinator has identified in the EIM resource plan as available to address power balance constraint violations in the EIM balancing authority area. Similarly, the CAISO proposes to define EIM downward available balancing capacity in appendix A to the tariff as any downward capacity from an EIM participating resource or a non-participating resource that an EIM entity scheduling coordinator has identified in the EIM resource plan as available to address power balance constraint violations in the EIM balancing authority area.

²⁰ Tretheway testimony at pp 7-9.

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reliability requirements and it requires assurances that the available balancing capacity is not dispatched to meet such infeasibilities elsewhere, thereby eroding its ability to deploy such capacity in its balancing authority area should the need arise.

The proposal provides the EIM the ability to rely on the dispatch of such capacity physically being feasible because the available balancing capacity is included in the market optimization process, which accounts for resource characteristics, actual telemetry, system conditions, and congestion. This allows the CAISO to produce feasible solutions and ensure prices reflect the true nature of the deployed capacity.²¹

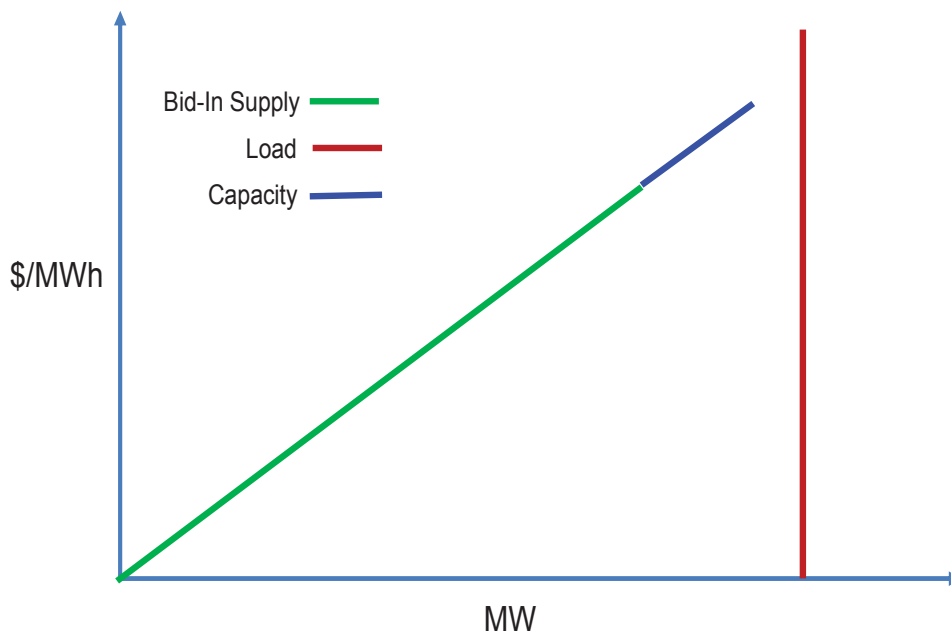
Under the CAISO's proposal, if after deploying the available balancing capacity the EIM entity still has insufficient participating resource energy bids and available balancing capacity to clear the gap and resolve the infeasibility, the market software will power balance constraint at the relaxation parameter values, i.e., the \$1000/MWh bid cap. Figure 3 below illustrates that a gap between load and total capacity will still exist if the available balancing capacity retained by the EIM entity is either not fully deployed to resolve the infeasibility or is not available.²²

²¹ *Id.* at 8-9.

²² *Id.* at 9-10.

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Figure 3



B. Designation of EIM Available Balancing Capacity by EIM Entity Scheduling Coordinators and EIM Participating Resource Scheduling Coordinators

Under the proposed enhancement, EIM available balancing capacity would automatically be deployed in the CAISO markets to resolve infeasible power balance conditions in the EIM balancing authority area, as follows. First, by 75 minutes prior to the trading hour, the EIM entity scheduling coordinator would identify the available balancing capacity from each of its EIM participating and non-participating resources.²³ If the EIM entity scheduling coordinator elects to identify this for the CAISO, it will include this capacity in the currently labeled “regulation up” and “regulation down” fields of the EIM resource plan.²⁴ This

²³ Under the existing tariff there are two types of scheduling coordinators for purposes of the Energy Imbalance Market: EIM entity scheduling coordinators and EIM participating resource scheduling coordinators. See existing tariff sections 29.4(c), -(e); tariff appendix A, existing definitions of “EIM Entity Scheduling Coordinator” and “EIM Participating Resource Scheduling Coordinator.”

²⁴ The CAISO recognizes that the full scope of the available capacity may be comprised of load following and actual automatic generation control (AGC) available capacity, which is different from the CAISO’s own definition of regulation up and down. But the existing category functionality can be used for conveying this information in the CAISO systems.

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responsibility is reflected in proposed Sections 29.34(e)(3)(C) and (D), which provide that EIM scheduling coordinators may submit EIM resource plans that include EIM upward available balancing capacity and EIM downward available balancing capacity.²⁵

As required by existing tariff requirements, the EIM entity will validate and finalize each EIM resource plan by 40 minutes prior to the trading hour, reflecting any changes the EIM entity has made based upon the outcome of the resource sufficiency evaluation.²⁶ The CAISO will not consider the available balancing capacity identified by the EIM entity scheduling coordinator when performing the sufficiency evaluation test, because this test is designed to evaluate whether the EIM entity has offered sufficient capacity to meet forecast load and its ramping requirements so as to avoid leaning on other balancing authority areas. In contrast, the purpose of the available balancing capacity is for the EIM balancing authority can operate its own system reliably. Therefore, enhancing the EIM to avoid false scarcity by accounting for EIM available balancing capacity does not affect the resource sufficiency evaluation. The CAISO proposes to make this explicit in proposed section 29.34(r)(2).

EIM participating resource scheduling coordinators will continue to submit energy bids for EIM participating resources, and the CAISO proposes to make clear in revised section 29.30 that such bids can support the EIM available balancing capacity included in the resource plans submitted by EIM entity scheduling coordinators. To the extent that EIM participating resources are utilized to support EIM available balancing capacity, the bids from such resources will include a bid curve that spans the range of any EIM available balancing capacity the EIM entity wants to make available to relieve potential power balance infeasibilities in the EIM balancing authority areas. The CAISO will validate these bids and apply the real-time local market power mitigation procedures under the existing tariff-based rules.²⁷

The CAISO proposes to reflect this process in a new section 29.30(e), which states that for each trading hour the CAISO will allocate the EIM upward available balancing capacity and the EIM downward available balancing capacity specified in the EIM resource plan as described below. This process will ensure

²⁵ This filing includes proposed revisions to a number of subsections of section 29.34. On June 15, 2015, in Docket ER15-1919-000, the CAISO proposed revisions to another subsection of section 29.34, to be effective October 1, 2015, and those proposed revisions are still pending an order by the Commission. The eTariff tariff record for section 29.34 accompanying this filing includes that pending proposed language. Should the Commission not accept that language as proposed by the time this filing is acted upon, the CAISO will submit a compliance filing as necessary to conform the section 29.34 tariff record consistent with the Commission's orders in both proceedings.

²⁶ See existing tariff section 29.34(l)(1).

²⁷ See Tretheway Testimony at p. 15.

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that the energy bid curves for EIM available balancing capacity align with the various types of uses identified in the EIM resource plan for the resource and the resource's characteristics.

With respect to upward capacity above the EIM base schedule, the CAISO will first allocate the spinning and non-spinning reserves down from the upper regulating limit as registered in the Master File, which if there is no regulating limit will be the resource's maximum normal capability (PMax). In allocating the resource's upward capacity, the CAISO will take into account any PMax derates the resource might have experienced since the resource plan was submitted and in so doing will apply the same priorities in allocating the remaining capacity. The CAISO will then allocate the EIM upward available balancing capacity to the energy bid curve starting at the highest value of the energy bid curve that does not overlap with spinning or non-spinning reserves.²⁸ This allocation of the capacity and energy bid curve to the resource's identified categories of uses for the capacity is necessary to ensure that the spinning and non-spinning reserve capacity is not made available to the market and ensures that, in the event of a PMax derate, the EIM upward available balancing capacity is reduced only after all of the resource's participating capacity is reduced. This higher protection to the EIM upward available balancing capacity and to spinning and non-spinning reserves is necessary because the EIM entity needs this capacity to operate its system reliably. This is similar to the same higher protection the CAISO provides its ancillary services in its own balancing authority area.

For downward capacity below the EIM base schedule, recognizing that there are no spinning and non-spinning downward categories of uses, the CAISO will allocate EIM downward available balancing capacity to the energy bid curve starting at its lowest value. The CAISO will take into consideration the resource's minimum normal capability (PMin) rerates.²⁹ The CAISO will use any remaining portion of the energy bid curve, after the allocations for upward capacity and downward capacity described above, for dispatch under any condition, except that for non-participating resources the CAISO will adjust the EIM upward available balancing capacity and the EIM downward available balancing capacity toward the EIM base schedule so there will be no remaining capacity for dispatch.³⁰

These new tariff provisions will also account for the EIM available balancing capacity from non-participating resources. It is just and reasonable for

²⁸ Proposed tariff section 29.30(e)(1).

²⁹ Proposed tariff section 29.30(e)(2).

³⁰ Proposed tariff section 29.30(e)(3); see *a/so* Tretheway testimony at pp 15-20.

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the CAISO to include EIM available balancing capacity from non-participating resources to the extent that the EIM entity scheduling coordinator plans to use such resources to address power balance infeasibilities in its balancing authority area, because the EIM entity may have that capacity at its disposal for reliability purposes and would actually deploy that energy if needed to avoid an actual shortage or surplus condition. From the perspective of avoiding false scarcity conditions in the EIM, there is no difference between available balancing capacity from participating and non-participating resources. However, the CAISO must implement a separate and distinct mechanism to account for EIM available balancing capacity from non-participating resources because such resources, by definition, do not submit energy bids in the Energy Imbalance Market. The CAISO proposes to use its existing default energy bid mechanism for this purpose, as follows. First, the CAISO proposes to require that EIM entity scheduling coordinators register with the CAISO, in accordance with the applicable business practice manual process, all non-participating resources that the EIM entity scheduling coordinator may designate as EIM available balancing capacity in its EIM resource plan.³¹ Second, the CAISO will then create a default energy bid for each such non-participating resource based on the EIM entity scheduling coordinator's choice of default energy bid calculation methodology, pursuant to the existing process set forth in section 39.7.1 of the CAISO tariff.³² Once the resource is listed as available balancing capacity and the default energy bid is created, the CAISO will similarly allocate the default energy bid to the identified capacity.

Utilizing the existing default energy bid process for this purpose ensures that the EIM reflects the capacity from non-participating resources that is available to EIM entities to balance their systems and avoid false infeasibilities. However, consistent with the existing structure of the EIM, it does not require that the resource actually participate in the EIM for economic dispatch. The proposed enhancement will ensure that the identified available balancing capacity is deployed to avoid a power balance infeasibility in the EIM balancing authority area for which the capacity is designated, and will be simultaneously used for general congestion management. Given that this capacity is likely to be deployed by the EIM balancing authority area anyway to address conditions on its system, there is no reason to force the EIM entity to keep this capacity out of the market clearing process and prevent it from being able to address a false scarcity condition in the market systems.

³¹ Proposed tariff section 29.4(c)(4)(J).

³² Proposed tariff sections 29.4(c)(4)(K) and 29.30(d). Because these default energy bids are not used for purposes of mitigation, but rather merely to establish the costs associated with dispatching non-participating resources for purposes of running the Energy Imbalance Market, Section 39.7.1.3.4 will not apply to the use of default energy bids for this purpose.

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Using default energy bids for this purpose is just and reasonable for several other reasons. The use of the default energy bid enables the CAISO to consider the resource in economic merit order based on a just and reasonable measure of the resource's costs. This allows the CAISO to ensure that the available balancing capacity is optimized through the same market clearing process the CAISO uses for all dispatch purposes, and thereby dispatched as part of the least-cost, most feasible and effective solution for the system. Moreover, the default energy bids are a well-understood and Commission-approved means of determining a unit's actual marginal costs of operation, not just in the CAISO's market, but in other ISO/RTO markets as well.³³ It is therefore appropriate to consider EIM available balancing capacity from non-participating resource based on their marginal costs, as reflected through default energy bids, in order to avoid potential infeasibilities.

Some stakeholders have expressed concern that using default energy bids may not be the most appropriate approach in these circumstances because they may not reflect the actual costs incurred by an EIM entity to dispatch non-participating resources. The CAISO believes this concern is addressed by the fact that by definition the non-participating resource does not have a market bid. Therefore, there is no market bid by which to judge whether the resource is not recovering its actual costs. Such concerns also overlook the fact the Commission has already determined that the CAISO default energy bid procedures are a just and reasonable assessment of a resource's marginal costs. There is no reason to believe these procedures are appropriate for participating resources but not for non-participating resources. Moreover, to the extent a non-participating resource is dispatched as EIM available balancing capacity, its market settlements will be based on the market-cleared locational marginal price, which could be higher than the resource's default energy bid. This is consistent with existing CAISO market rules.

³³ See, e.g., *Cal. Indep. Sys. Operator Corp.*, 119 FERC ¶ 61,076, at PP 497, 501, 508 (2007); *Cal. Indep. Sys. Operator Corp.*, 147 FERC ¶ 61,231, at PP 221, 224 (2014).

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C. Use of EIM Available Balancing Capacity in the Energy Imbalance Market

1. Treatment of EIM Available Balancing Capacity in Scheduling and Pricing Runs

The Energy Imbalance Market will use EIM available balancing capacity identified in the EIM resource plan to relieve power balance constraint infeasibilities that occur in the EIM balancing authority area for which the EIM available balancing capacity is designated, per the designation procedures described above.

The CAISO's market clearing software calculates the optimal dispatch in two passes – the scheduling and pricing runs. The scheduling run is a full optimization run where constraints may be relaxed at penalty prices to avoid infeasibilities.³⁴ The scheduling run is executed to establish the scheduling priorities in the optimization but does not establish the financially binding schedules and prices. The pricing run is a simple economic dispatch, in which the CAISO establishes the financially binding schedules and prices. The pricing run is initialized from the scheduling run solution, where the penalty prices are set to administrative prices used for pricing, and any infeasibility is constrained so the ultimate dispatch solution does not significantly vary from the solution of the scheduling run. New section 29.34(r) sets forth the process for utilizing EIM available balancing capacity in the real-time market's scheduling and pricing runs for both the fifteen-minute market and real-time dispatch optimization processes.

In each interval of the real-time market, the CAISO will use the EIM available balancing capacity from participating and non-participating resources to resolve any potential power balance infeasibility, while simultaneously performing congestion management, based on the economic merit order of the energy bids corresponding to such capacity.³⁵ The CAISO will adjust energy bid prices for resources providing EIM available balancing capacity in the scheduling run by a factor that effectively increases the bid price to ensure effective economic bids are exhausted prior to utilizing EIM available balancing capacity to resolve potential infeasibilities.³⁶ This is just and reasonable because it means that capacity that is not actually bid into the Energy Imbalance Market will not be eligible to set the clearing price, unless using that capacity is needed to resolve a potential power balance infeasibility. If such capacity is needed to resolve a

³⁴ See existing tariff section 27.4.3.

³⁵ Proposed Tariff Section 39.4(r)(3)(A).

³⁶ Proposed Tariff Section 39.4(r)(3)(B).

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potential power balance infeasibility, it will be applied in economic merit order to reach a feasible market solution.³⁷

The CAISO will also add a constraint to the scheduling run to ensure that the amount of EIM available balancing capacity released cannot exceed the supply and demand infeasibility within the balancing authority area. This will prevent the use of available balancing capacity to support EIM transfers, thereby ensuring that the energy dispatched from this available balancing capacity will not be transferred to other balancing authority areas in the EIM.³⁸ This will ensure that capacity retained by an EIM entity to ensure the reliability of its system is not used to facilitate a transfer to another balancing authority area.

Finally, to the extent the EIM available balancing capacity released by the real-time market cannot solve a particular infeasibility, the constraint will be relaxed in accordance with existing constraint relaxation penalty prices to allow the market to reach a feasible solution and the constraint relaxation penalty prices will be incorporated into market prices.³⁹

In the pricing run, the dispatch of EIM available balancing capacity will be limited to the dispatch scheduled in the scheduling run solution.⁴⁰ To the extent the scheduling run needs to deploy EIM available balancing capacity to avoid a potential infeasibility, the pricing run will utilize the bid prices from participating and non-participating resources designated as available balancing capacity without the factor added in the scheduling run. There is no also need to add a constraint to prevent EIM transfers in the pricing run because available balancing capacity released in the pricing run is limited to the available balancing capacity dispatched in the scheduling run. The pricing run will change the load forecast for the balancing authority area by a small tolerance to allow for price determination.⁴¹ This is necessary to allow the supply and demand curves to intersect to establish the market price.

If the amount of available balancing capacity is sufficient to address the infeasibility, the market will clear with the benefit of the additional bids for the amount of the deployed capacity, obviating the need to relax the power balance constraint, and instead setting prices consistent with the pricing principles already contained in the tariff. If, on the other hand, the deployed capacity

³⁷ This is consistent with the principles of the CAISO's existing market design. See, e.g., *Cal. Indep. Sys. Operator Corp.*, 116 FERC ¶ 61,274, at PP 5, 10 (2006).

³⁸ Proposed Tariff Section 39.4(r)(3)(C).

³⁹ Proposed Tariff Section 39.4(r)(3)(D).

⁴⁰ Proposed Tariff Section 39.4(r)(4)(A).

⁴¹ Proposed Tariff Section 39.4(r)(4)(B); see Tretheway testimony at pp 28-29.

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cannot resolve a potential power balance infeasibility, then the penalty price associated with the parameter relaxations will apply in the pricing run.⁴²

2. Dispatch and Settlement of EIM Available Balancing Capacity

When the market optimization dispatches EIM available balancing capacity through the fifteen-minute market and five-minute market to resolve an infeasibility within an EIM entity's balancing authority area, the CAISO will send a new dispatch operating target to the scheduling coordinator representing the resource. The CAISO recognizes that the EIM entity retains dispatch authority over the resources providing available balancing capacity. However, as discussed above, the proposed enhancement provides the EIM entity with a reliable feasible dispatch solution that it can use to operate its system reliably.

This new operating target will be the basis for that resource's imbalance energy settlement for the interval. The CAISO will settle EIM available balancing capacity utilized by the EIM for both participating and non-participating resources in same manner it settles energy dispatched from such resources. For an EIM participating resource, the CAISO will settle the energy used to resolve a potential power balance infeasibility in an identical manner to energy dispatched from the range of the resource that would have been available to the market regardless of any infeasibility.⁴³ The CAISO will settle energy dispatched from non-participating resources to resolve a potential power imbalance infeasibility based on the settlement rules that would apply as of November 1, 2015. Subject to the Commission's approval of the new settlement provisions, the CAISO anticipates to be settling non-participating resources as follows. If the resource is dispatched to resolve a constraint in the fifteen-minute market, it will be settled as instructed imbalance energy at the relevant fifteen-minute price; if the resource is dispatched to resolve a constraint in the five-minute real-time dispatch, it will be settled as instructed imbalance energy at the five-minute price.⁴⁴ If the Commission does not accept these proposed revisions, the resources will be settled in the same manner non-participating resources are settled today. That is, if the resource is dispatched to resolve a constraint in the fifteen-minute

⁴² Proposed Tariff Section 39.4(r)(4)(C).

⁴³ CAISO Initial Comments at 21.

⁴⁴ See CAISO tariff amendment to implement EIM year one enhancements, Docket No. ER15-1919-000 (June 15, 2015); CAISO Initial comments at 21-22. The current tariff provisions require that the CAISO settle deviations from fifteen-minute market schedules for non-participating resources as uninstructed imbalance energy. In its proposed EIM year one enhancements filing, which is pending before the Commission, the CAISO proposed to modify this settlement to recognize instructed imbalance energy in the five-minute dispatch in the same manner as CAISO resources that do not re-bid their day-ahead schedules into the real-time market. *Id.* at 22 n.11.

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market, it will be settled as instructed imbalance energy at the fifteen-minute price. If the resource is dispatched to resolve a constraint in the five-minute real-time dispatch it will be settled as uninstructed imbalance energy at the five-minute price.

IV. THE CAISO'S PROPOSAL IS A KEY COMPONENT IN ADDRESSING THE UNDERLYING CAUSES OF THE PRICE SPIKES

The July 20 Order directed the CAISO to explain in its filing how each of the underlying causes of the price spikes is addressed by its proposed tariff revisions and/or by other actions taken by the CAISO and PacifiCorp, as well as whether there are any underlying issues that remain unaddressed.⁴⁵

The CAISO's and PacifiCorp's investigations have revealed that the infeasibilities observed in the Energy Imbalance Market have not been caused by a lack of resource sufficiency on the part of PacifiCorp, as demonstrated by the CAISO's and PacifiCorp's analysis showing that PacifiCorp has been sufficiently resourced to balance its system and meet load consistent with NERC requirements during the entire period of its participation in the Energy Imbalance Market. The CAISO and PacifiCorp have, instead, identified seven discrete root causes of the higher-than-expected number of infeasibilities occurring in the EIM since implementation. These root causes are discussed in the informational reports submitted by the CAISO.⁴⁶ At the technical conference held on April 9 and in the comments submitted subsequent thereto, the CAISO explained that the reason many of these underlying issues resulted in market infeasibilities was due to the "learning curve" associated with integrating and coordinating PacifiCorp operations with the EIM, which has sometimes caused the EIM to operate based on imperfect information regarding actual imbalance conditions. However, in addition to these "learning curve" issues, the CAISO also pointed out that the current structure of the Energy Imbalance Market also contributed to the occurrence of market infeasibilities because there is no mechanism by which PacifiCorp could inform the market of capacity that it retains and has available in order meet load in its balancing area. Thus, even with ideal coordination and communication between the CAISO and PacifiCorp, the Energy Imbalance Market has the potential to result in an infeasibility based on a false impression of scarcity.

The CAISO and PacifiCorp have made substantial strides in moving along the "learning curve" by improving coordination and deploying numerous system and process improvements. These improvements have resulted in the substantial reduction in the percentage of intervals in which the Energy

⁴⁵ *Id.* at P 25.

⁴⁶ See the informational reports the CAISO submitted in Docket No. ER15-402-000 on April 24, June 3, July 14, and August 6, 2015.

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Imbalance Market had arrived at an infeasible solution. This is borne out in the reports prepared by the CAISO's Department of Market of Monitoring regarding the Energy Imbalance Market performance informational reports, which show a substantial overall reduction in infeasible intervals during the course of the first seven months after implementation in PacifiCorp's balancing authority areas.

In conjunction with these improvements, the CAISO is confident that the implementation of this proposal will substantially ameliorate the remaining infeasibilities encountered in the PacifiCorp balancing authority areas, such that the percentage of remaining infeasible intervals in the Energy Imbalance Market will not be excessive. This conclusion is supported by data presented in attachment C to the CAISO's informational reports on waiver performance for the months of March through June 2015. For these months, the CAISO evaluated each interval of infeasibility to determine whether it was infeasible due to actual supply insufficiency by calculating the degree to which the infeasibility was in excess of PacifiCorp's available capacity to balance its system. The CAISO's analysis indicates that only a few of the infeasible intervals in the fifteen-minute and five-minute markets did the infeasibility exceeded PacifiCorp's available capacity – 4.5 percent of the infeasible intervals in the fifteen-minute market and 3.8 percent of intervals in the five-minute market. Using this metric, during the four-month analysis period, only 0.04 percent of all fifteen-minute market intervals had an infeasibility in which the reserves available to PacifiCorp were less than the amount of the infeasibility, while only 0.08 percent of all five-minute market intervals had an infeasibility in which the reserves available to PacifiCorp were less than the amount of the infeasibility. These are well within the range of normal market operations as observed in the CAISO's own internal markets as well as those of other ISOs and RTOs.⁴⁷

⁴⁷ See New York Independent System Operator, Enhanced Shortage Pricing, Market Issues Working Group (June 21, 2010) NYISO at 30 (showing the activation of shortage pricing as a percentage of day-ahead and real-time market intervals in NYISO zones) available at http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_miwg/meeting_materials/2010-06-21/Enhanced_Shortage_Pricing.pdf; Ramp Capability in MISO Markets, Midwest Independent System Operator Stakeholder 5th Technical Workshop (April 14, 2012) at 47 (indicating that price spike events had occurred in 1.6% of intervals during the March 1, 2010 to December 8, 2011), available at <https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/Workshop%20Materials/Ramp%20Management%20Workshop/20120419/20120419%20Ramp%20Workshop%205%20Presentation.pdf>; Spinning Reserve Demand Curve Construct, Midwest Independent System Operator Market Subcommittee (January 6, 2012) (analysis of spinning reserve shortages indicating that the spinning reserve constraint was relaxed in 915 out of 113,863(.8%).8% intervals over the period August 1, 2010 to August 31, 2011, which in most cases was likely the result of ramp constraints creating potential load balance violations), available at <https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/MSO/2012/20120106/20120106%20MSO%20Item%2006c%20Spinning%20Reserve%20Demand%20Curve%20Proposal.pdf>.

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This measure was determined by calculating the difference between the total amount of reserves carried and the minimum amount of reserves required by NERC. The CAISO then subtracted the amount of the infeasibility in MW from that amount to determine the amount of available capacity above the magnitude of each infeasibility. If that value was zero or negative, the CAISO considered that interval as infeasible due to an insufficiency of supply. Otherwise, the CAISO concluded that the EIM entity had enough capacity available to dispatch as needed to address the infeasibility observed in the market systems. Because this analysis does not account for ramping characteristics, it cannot perfectly predict whether an infeasibility would have occurred, but it is nevertheless a useful proxy for assessing whether the Energy Imbalance Market would have been able to avoid an infeasible result by recognizing the capacity available to PacifiCorp to balance its system. The very few instances in which PacifiCorp's available capacity was less than the size of the infeasibility suggests that accounting for this available capacity in the Energy Imbalance Market will resolve the vast majority of remaining infeasibilities, resulting in market outcomes that are well within the range of expected operations and just and reasonable results.

The CAISO does not represent the enhancement proposed herein as the sole solution to the issues that led to the Commission's investigation, but rather a critical component thereof. The CAISO believes that it is equally important to adopt robust readiness criteria as well as a revised transition proposal that accounts for the inevitable learning curve issues that will arise when integrating a new EIM entity. With respect to the former, the CAISO is currently in the process of preparing its compliance filing in response to the Commission's July 21, 2015 order addressing readiness issues,⁴⁸ and expects to make that filing within the next several weeks. The CAISO also plans to file within this same approximate timeframe a revised transition period proposal. Nevertheless, even when learning curve issues do arise, the enhancement proposed herein will allow the new EIM entity to reflect in the Energy Imbalance Market solution the deployment of capacity that it uses to reliably balance its system. Therefore, the CAISO is confident that the Energy Imbalance Market enhancement proposed herein, operating in conjunction with enhanced readiness criteria and a revised transition period process, will be an important tool in helping to reduce the impact of any "learning curve" issues that may arise during the early months of Energy Imbalance Market implementation in new balancing authority areas.

⁴⁸ *Cal. Indep. Sys. Operator Corp.*, 152 FERC ¶ 61,063 (2015).

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V. RESPONSES TO COMMENTS RAISED BY PARTIES FOLLOWING TECHNICAL CONFERENCE

In the July 20 Order, the Commission stated that it expects the CAISO to “consider the concerns raised by commenters in developing its proposed detailed tariff language, and to ensure that commenters’ concerns are addressed, as appropriate, in either the proposed tariff language itself or the accompanying transmittal letter.” In response to this directive, the CAISO responds below to those comments filed by parties subsequent to the technical conference that it has not addressed above.⁴⁹

A. Comments Regarding PacifiCorp’s Resource Sufficiency and Scarcity Reflect a Misunderstanding of the EIM and Are Not Relevant to the CAISO’s Proposal

Powerex contends that the occasional infeasibilities and resulting high prices have been caused by a lack of sufficient bids through the EIM to meet imbalance energy needs in the PacifiCorp balancing authority areas, and that this is “not how the CAISO EIM was intended or expected to function.”⁵⁰ Powerex asserts that the CAISO’s proposal seeks to suppress the application of penalty prices by treating reserves held outside of the EIM as “simply additional supply bids.”⁵¹ WPTF similarly argues that by recognizing an EIM entity’s available

⁴⁹ Comments on the CAISO Initial Comments were submitted by Truckee Donner Public Utility District (“Truckee”), Southern California Edison Company (“SCE”), NV Energy Inc., on behalf of its utility subsidiaries Nevada Power Company d/b/a NV Energy and Sierra Pacific Power Company d/b/a NV Energy (collectively “NV Energy”), Pacific Gas and Electric Company (“PG&E”), Iberdrola Renewables, LLC (“Iberdrola”), the Cities of Anaheim, Azusa, Banning, Colton, Pasadena, and Riverside, California (“Six Cities”), Deseret Generation & Transmission Co-operative, Inc., (“Deseret”), PacifiCorp, Western Power Trading Forum (“WPTF”), Powerex Corp. (“Powerex”), Bonneville Power Administration (“BPA”), and Puget Sound Energy, Inc., (“Puget”). NV Energy, Iberdrola, and PacifiCorp supported accepting the CAISO’s April 23 proposal without delay or substantial modification as an improvement to Energy Imbalance Market operations and an appropriate response to the imbalance energy price spikes. Truckee Donner, SCE, PG&E, Deseret, BPA, and Puget request various modifications and clarifications to the CAISO’s proposal, while Powerex and WPTF request that the Commission reject the CAISO’s proposed solutions. Reply comments were filed by PacifiCorp, SCE, Powerex, WPTF, and the Washington Utilities and Transportation Commission (“Washington Commission”), addressing many of the same issues discussed in the initial comments.

⁵⁰ Powerex Initial Comments at 13-16; Powerex Reply Comments at 2. In its reply comments, Powerex contends that the CAISO’s proposal undermines the ability of the Energy Imbalance Market to produce prices that accurately reflect the marginal costs of serving imbalances.

⁵¹ Powerex Initial Comments at 19; see also Powerex Reply Comments at 5 (“The sole purpose of CAISO’s proposal is to prevent the appropriate application of penalty pricing in those intervals in which there are insufficient resources offered into the EIM to meet imbalance needs.”).

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balancing capacity, “there will be no scarcity price signal known to the market place.”⁵² These arguments reflect a misunderstanding of the fundamental nature and design of the EIM and the CAISO proposed enhancement in this proceeding.

As designed and approved by the Commission, the EIM serves as one tool among many available to balancing authority areas other than the CAISO to utilize to meet their imbalance needs and for resources to compete to serve the balancing authority needs of all balancing authority areas in the EIM area.⁵³ The EIM does not co-optimize ancillary services and energy as the CAISO does in its own balancing authority area. Moreover, the CAISO does not, through the EIM, assume responsibility for ensuring that each EIM entity is adequately resourced to meet all imbalance energy balancing needs in its balancing authority area. Rather, the design of the EIM assumes that the CAISO and EIM entities will retain their respective resource adequacy programs after implementation of the EIM. Consistent with this principle, the sufficiency tests do not test for resource adequacy. They are solely designed to evaluate whether each EIM entity meets specific capacity tests and flexibility tests to ensure that it does not “lean” on the capacity of any other EIM entity.⁵⁴ The Commission accepted this design of the EIM, recognizing that “CAISO and the EIM Entities continue to operate under their separate respective tariffs, amended in part for EIM arrangements only.”⁵⁵ Hence, when an EIM entity fails these tests, the only consequence is that transfers between the balancing authorities are frozen to the levels prior to failing the test. The consequence of failure is not complete isolation of the entity from the EIM generally.

The CAISO’s proposed enhancement does not in any way change these existing rules. On the other hand, Powerex seeks to revamp the fundamental purpose and design of EIM by essentially treating it as a resource adequacy mechanism.

⁵² WPTF at 8; see also Powerex Post-Technical Conference Reply Comments at 5 (“If CAISO’s proposal is accepted, prices calculated through the EIM will no longer reflect PacifiCorp’s costs of serving imbalances, or even provide a reliable ‘proxy’ for such costs.”).

⁵³ Thus, WPTF’s concerns about how the proposal fits into the transition to full participation in the CAISO are misplaced. The CAISO and its stakeholders did not design and the Commission did not approve the Energy Imbalance Market to be a steppingstone towards full participation in the CAISO balancing authority area. While the CAISO does not object to exploring such transitions, the Energy Imbalance Market stands on its own.

⁵⁴ See 147 FERC ¶ 61,231, at P 122-23; 149 FERC ¶ 61,058, at P 55.

⁵⁵ 149 FERC ¶ 61,058, at P 54.

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B. Powerex's Request that the CAISO Revise the Resource Sufficiency Test is Without Merit

Powerex asks the Commission to “direct the CAISO to craft a proposed solution that includes measures that ensure that PacifiCorp is required to commit sufficient resources to the EIM in advance at a level that meets imbalance needs under a full range of operational conditions.”⁵⁶ Powerex repeats this request in its reply comments.

Powerex's requested modification is not consistent with the overall design of the EIM and not necessary to address the underlying causes of the price spikes and the CAISO's proposal under consideration in this proceeding. Powerex's request for a test that ensures that the EIM entity “meets imbalance needs under a full range of operational conditions” is based on the flawed premise that the CAISO's entire real-time market design, including the EIM, is unjust and unreasonable and requires complete overhaul. Powerex's recommendation is also based on the wrongful premise that, under the EIM, the CAISO *should* be ensuring there is sufficient flexibility to meet 100 percent of imbalance needs that under a “full range of operational conditions.” Powerex provides no evidence to suggest that the EIM is fundamentally flawed and cannot function without such a substantial overhaul of the design. In contrast, the CAISO has demonstrated that the bulk of the infeasibilities that continue to persist in the EIM are likely due to the lack of visibility to available balancing capacity that the EIM entity has at its disposal; they are not due to a fundamental flaw in the CAISO's overall design. Resolving these infeasibilities does not require transforming EIM into what would essentially be a mechanism for imposing unjustifiable, onerous imbalance reserves requirements on the EIM entity.

As the CAISO has stated previously, the EIM is based on the CAISO's pre-existing real-time market to provide participating balancing authorities the opportunity to voluntarily share capacity to meet their imbalances within the transfer constraints. The EIM as designed and approved by the Commission allows the EIM entity to operate as a separate balancing authority area and voluntarily participate in the EIM, while continuing to maintain system reliability when conditions fall outside of the expected range of conditions that EIM was intended to address.

The Section 206 proceeding established by the Commission was not intended to question the overall design and fundamental underpinnings of the EIM. Rather, its purpose was to “address issues related to the imbalance energy

⁵⁶ Powerex Initial Comments at 35.

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price spikes in PacifiCorp's BAAs." ⁵⁷ In particular, the instant filing responds to the Commission's express directive to file tariff revisions to address the imbalance energy price spike concerns that have been previously identified.⁵⁸ There is no connection between this issue and Powerex's overarching proposal to impose a sufficiency tests that requires resource sufficiency for a full range of operational outcomes, including circumstances outside of the scope of EIM and beyond the CAISO's responsibility.

The CAISO tariff applies three sufficiency tests as part of the operation of the EIM: (1) the EIM entity must present a balanced EIM resource plan; (2) the resource plan must have sufficient bids to meet for forecasted difference between base schedules and the load forecast; and (3) the EIM resource plan must meet flexible capacity requirements. The CAISO conducts these tests up to 40 minutes ahead of each operating hour to ensure the EIM entity has available resources and bid range to meet its load and the expected imbalances it will satisfy from EIM market, respectively. The EIM entity can fail the tests, and later, because of changed conditions, no infeasibilities may actually occur. Likewise, the EIM entity can pass the tests but infeasibilities may still result during the actual market runs because of changed conditions.

The CAISO cannot overemphasize that the purpose of these three tests is to ensure the EIM entity has sufficient capacity to cover the energy imbalances *it will cover from the EIM*. The EIM is an energy-only market. In those rare cases where, due to unexpected circumstances outside of an EIM entity's control, the EIM entity must get help from the rest of the market, the EIM provides the benefits of joint operation. The EIM entity, however, determines how much of unexpected system changes such as load forecast errors and variable energy resource deviations it will serve through the EIM. Once the EIM entity decides this, it is up to the CAISO as the market operator to ensure, using the sufficiency tests, that EIM entity has sufficient flexibility and capacity to meet those imbalances. It is then the responsibility of the EIM entity to inform the CAISO about other actions it uses to mitigate imbalances larger than what will be covered by the EIM. The CAISO's proposal merely streamlines the processing of these actions and ensures that the market is timely informed of those system changes.

The existing resource sufficiency evaluation, which the Commission has found to be just and reasonable, appropriately ensures that an EIM entity has sufficient flexible capacity to meet its imbalance needs based on the flexible ramping constraint requirements imposed on the EIM entity. These are the same requirements as the flexibility requirements that apply to the CAISO its balancing authority area in the real-time. As reflected in existing section 29.27 of the

⁵⁷ March 16 Order at P 31.

⁵⁸ July 20 Order at P 25.

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CAISO tariff, the requirements in section 27 that apply to the CAISO apply equally to the EIM. Section 27.10 contains the flexible ramping constraint requirement, which as required by section 29.27 also apply to the EIM balancing authority area. That section states that the “quantity of the flexible ramping capacity for each applicable CAISO Market run will be determined by CAISO operators using tools that estimate the: 1) expected level of imbalance variability; 2) uncertainty due to forecast error; and 3) differences between the hourly, fifteen (15) minute average and historical five (5) minute Demand levels.” In establishing the flexible ramping requirement for the CAISO areas, the CAISO analyzes the distribution of changes in five-minute net load and identifies the +/- X% confidence level of the distribution to capture a reasonable range of scenarios to be covered by the amount of flexible capacity procured. During the EIM stakeholder process, the CAISO proposed to use for the EIM the same 90%-95% confidence level as the appropriate level for establishing the flexible ramping requirement.⁵⁹ The CAISO has established 90%-95% confidence level and has implemented this requirement, which ensures the ramping requirements capture a reasonable range of operational scenarios and variability.

Section 29.34(m)(1) of the existing tariff language requires that each EIM balancing authority area is responsible for meeting its own portion of the flexible ramping constraint. This Commission-approved requirement was fully vetted with stakeholders and reflects the principle that balancing authority areas participating in EIM should not lean on each other’s available flexibility. The sufficiency determination specified in Section 29.34(m)(4), and further detailed in section 10.3.2 of the BPM for EIM, is designed to test whether the EIM has sufficient participating and scheduled resources to meet the flexible ramping requirements in the upcoming hour so that the EIM does not rely on the flexible capacity procured in that hour for the CAISO or other participating balancing authority areas.

The EIM sufficiency tests are targeted at evaluating how the EIM entity is poised to meet these requirements. Powerex is essentially asking the Commission to ignore the purpose of these tests and the established procedures for flexible ramping requirements and, instead, impose upon the EIM entity more onerous requirements, *i.e.*, that they be sufficiently resourced to meet a “full range of operational outcomes”. Powerex’s request is unjust and unreasonable because it imposes requirements on the EIM entity the EIM is not authorized to impose given its more narrow scope and mandate. Even more concerning, however, is the fact that if the Commission accepts Powerex’s proposal, the Commission would be imposing operational requirements on the EIM entity that go far beyond NERC reliability requirements because the EIM entity would be required to have sufficient capacity online to meet an unlimited and undefined

⁵⁹ See Energy Imbalance Market, Draft Final Proposal, issued September 23, 2013. <http://www.caiso.com/Documents/EnergyImbalanceMarket-DraftFinalProposal092313.pdf> .

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number of possible operational outcomes solely through the economic dispatch of resources.

For all these reasons, Powerex's request is outside the scope of this proceeding and constitutes a collateral attack on the Commission's orders approving the CAISO markets, including the EIM.⁶⁰

C. Powerex Misunderstands the Analogy Between the EIM and the NYISO and MISO Experiences

In its initial comments, the CAISO discussed the power balance constraint issues faced by the Midcontinent Independent System Operator ("MISO") and the New York Independent System Operator ("NYISO") and the fact that both use capacity that would otherwise provide regulation or spinning reserves to address these constraints.⁶¹ Powerex argues that the CAISO's "reliance" on these experiences is misplaced.⁶² This argument misrepresents the CAISO's comments. The CAISO did not indicate any "reliance" on MISO's or NYISO's experiences, or suggest that their experiences are identical to those facing the EIM. Rather, the CAISO presented these examples as instructive because both NYISO's and MISO's market designs account for the additional resources available to balancing authorities to balance load and generation when ramping constraints are binding, and neither employs a single high penalty tied to constraint relaxation such as the CAISO's \$1,000/MWh price when it is necessary to utilize such resources. In other words, MISO and NYISO employ Commission-approved design elements comparable in effect to what the CAISO is proposing.

Powerex's specific arguments on this issue fare no better. Powerex claims that the MISO and NYISO situations are not analogous to the EIM because the percentage of intervals in which the EIM has encountered infeasibilities (approximately 4 to 5 percent) is higher than those experienced by MISO and NYISO (approximately 0.5 to 1 percent).⁶³ Powerex provides no explanation, nor can it, as to why a purely quantitative difference in the range of 3-4 percent of infeasible intervals between the EIM and the MISO and NYISO markets invalidates outright any comparison between them. A difference in frequency of a few percentage points, devoid of any context, does not undermine

⁶⁰ See 147 FERC ¶ 61,231, at P 122 (accepting the CAISO's proposed Energy Imbalance Market resource sufficiency test, finding that it "allows EIM participants to gain the benefits of increased resource diversity, while preventing them from inappropriately leaning on other BAAs."); 149 FERC ¶ 61,058, at P 54 (denying Powerex's request for rehearing of the Commission's acceptance of the resource sufficiency test).

⁶¹ See CAISO Initial Comments at 23-27.

⁶² Powerex Initial Comments at 21.

⁶³ *Id.* at 21-22.

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the applicability to the EIM of lessons learned from market operators such as MISO and NYISO that employ similar constructs to what the CAISO is proposing. This is particularly true here because both the NYISO and MISO data reflect the full operation of their systems as integrated balancing authority areas in which they co-optimize energy and ancillary services. As discussed above, the EIM is different in that the EIM entity continues to operate as a separate balancing authority area, including with respect to meeting its reserve obligations.

Powerex also argues that the NYISO and MISO experiences are distinct from the EIM because both NYISO and MISO apply a series of penalty prices when they utilize reserves to resolve power balance constraints.⁶⁴ Although technically correct, Powerex's contention that this distinction represents a flaw in the CAISO's proposal is without merit. Both NYISO and MISO co-optimize ancillary services and energy within their markets, and therefore, the need to deploy reserves to avoid infeasibilities in their real-time energy markets can more fairly be characterized as representing at least some level of supply scarcity. The CAISO's proposal, on the other hand, is merely intended to reflect the presence and value of capacity already available to an EIM entity. By recognizing and accounting for this capacity in the pricing run, the CAISO's proposed automated feature relieves any scarcity identified in the scheduling run. As such, there is no reason to trigger a penalty price reflecting scarcity conditions when the EIM deploys such capacity because no scarcity exists. The key feature of the CAISO's proposal is that the EIM entity continues to have the flexibility, in its role as balancing authority, to use its contracted capacity as necessary to meet its needs, while ensuring that the EIM recognizes the deployment of such capacity so as not to incorrectly assume scarcity conditions when none exist, and set prices accordingly. In this respect, the CAISO's proposal simply incorporates into the market the actions that the EIM entity can already take to manage its imbalance energy requirements and reserves.

Powerex also contends that the CAISO's proposal violates "traditional pricing principles" because energy prices should increase above variable costs when the transmission provider is required to reduce reserves to meet real-time energy needs.⁶⁵ However, the CAISO's proposal in no way requires an EIM entity to reduce its reserves. Under the CAISO's proposal, the EIM entity manages its regulation and other available balancing capacity and is not required to deplete its reserves in order to make capacity available to the EIM. As such, utilizing the CAISO's proposed automated mechanism does not suggest that an EIM entity is depleting its reserves, or signal the need for scarcity pricing.

⁶⁴ *Id.* at 22-23.

⁶⁵ *Id.* at 23-25; see also Powerex Reply Comments at 5-6.

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D. Powerex's Arguments Regarding PacifiCorp's Emergency E-Tags are Without Merit

In its comments, Powerex alleges that the lack of EIM bids has forced PacifiCorp to rely on out-of-market procurement to balance its system in certain intervals. Powerex acknowledges that it does not take issue with PacifiCorp's ability to purchase energy from third parties, but contends that, following implementation of the EIM, PacifiCorp dramatically increased intra-hour purchases using emergency e-tags after finalization of PacifiCorp's base schedules and resource plan (*i.e.*, after T-40).⁶⁶ Powerex argues that the CAISO must address this practice because it is being used to mask supply infeasibility in the EIM and distort prices.⁶⁷ It contends that such purchases should trigger penalty pricing and that the Commission should require PacifiCorp to report them.⁶⁸

This issue is beyond the scope of this proceeding. Like many of Powerex's other contentions, it reflects a misunderstanding of the role of the EIM. The EIM is not a power pool operated as a single balancing authority area; the CAISO does not control how PacifiCorp manages all of its resources.⁶⁹ It is entirely within PacifiCorp's discretion to use emergency e-tags to make out-of-market purchases to manage its system reliably. The EIM specifically recognizes such manual dispatches and allows the market to take those into consideration in clearing the market. Indeed, one of the major benefits of the EIM is that it provides advisory information to the EIM entity, both within the operating hour and preceding the operating hour, which allows the EIM entity to better decide which actions to take through the bilateral market or through manual dispatch. It is fully expected under the EIM that an EIM entity will utilize these and other available tools as necessary to meet its balancing authority area obligations.

PacifiCorp also explained the use of the emergency e-tags at the technical conference. In brief, PacifiCorp noted that the intra-hour e-tags are a tool familiar to its operators, the use of which is explained in PacifiCorp's business practices. During the early stages of the EIMs, when operators were unclear how to address infeasibilities, they would turn to the familiar tool. This caused an

⁶⁶ Powerex Initial Comments at 26.

⁶⁷ WPTF also expressed concern that there the CAISO has provided insufficient information to address whether the CAISO's proposal will distort the energy market through the inclusion of non-bid-in resources into the energy market. WPTF Answer at 6 (May 21, 2015).

⁶⁸ Powerex Initial Comments at 26.

⁶⁹ Indeed, it would be inappropriate for the CAISO to dictate in its tariff the resources that PacifiCorp or another EIM entity may utilize to address a wide range of imbalance conditions in their own balancing authority areas, including those that might lead to potential market infeasibilities.

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increase in the use of emergency e-tags. Recently, however, the use of these e-tags has returned to the levels that occurred prior to the implementation of the EIM.⁷⁰

In addition, Powerex's example of emergency e-tags distorting prices is flawed. Powerex states the following:

[C]onsider an operating interval in which demand is expected to be 1,000 MW but effective EIM bids total only 800 MW. If the market is run with an accurate load forecast of 1,000 MW, all EIM supply bids will be exhausted and the EIM price will be based on penalty prices, which would currently be \$1,000/MWh. The EIM [balancing authority] would then be required to procure the remaining 200 MW through other means, including out-of-market purchases. If, however, the EIM [balancing authority] proactively engaged in an out-of-market purchase of 300 MW and communicated this information to CAISO, the EIM would only need to meet 700 MW of real-time imbalance needs – not 1,000 MW. The out-of-market purchase effectively reduces the load that must be met in the EIM, and distorts prices in two fundamental ways: (1) it permits PacifiCorp to sidestep the application of the constraint relaxation prices contained in the CAISO tariff; and (2) it gives PacifiCorp unfettered discretion in all intervals to pick and choose how much real-time imbalance energy it purchases outside of the EIM on a “pay as bid” basis and how much is procured through the EIM, at a clearing price that is suppressed by PacifiCorp's out-of-market actions.⁷¹

Powerex contends that the CAISO's proposal would support such problematic outcomes. In fact, however, the use of emergency e-tags is irrelevant to the market outcome under the CAISO's proposal. Powerex also contends that it is untenable to afford the EIM entity complete latitude whether or not to meet any of its real-time imbalance obligations in the EIM, while simultaneously forcing the EIM entity's transmission customers to settle all of the imbalances at EIM prices. This contention too is baseless. As Powerex notes, PacifiCorp has the discretion to decide how much real-time imbalance energy it wishes to serve through the EIM. This is a fundamental design characteristic of the EIM, and is in no way unique to the CAISO's proposal.⁷² The CAISO's proposed enhancement merely makes visible to the EIM capacity that the EIM entity has designated as necessary to operate its system reliably.

⁷⁰ Transcript of April 9, 2015, Technical Conference (“Tr.”) at 76-77.

⁷¹ Powerex Initial Comments at 28.

⁷² See 147 FERC ¶ 61,231, at P 224.

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Powerex provides no evidence that the ability of PacifiCorp to use emergency e-tags to make out-of-market purchases would interfere with the operation of the EIM under the CAISO's proposal. There is no reason for the Commission to go beyond the scope of the proceeding to revise the market as recommended by Powerex.

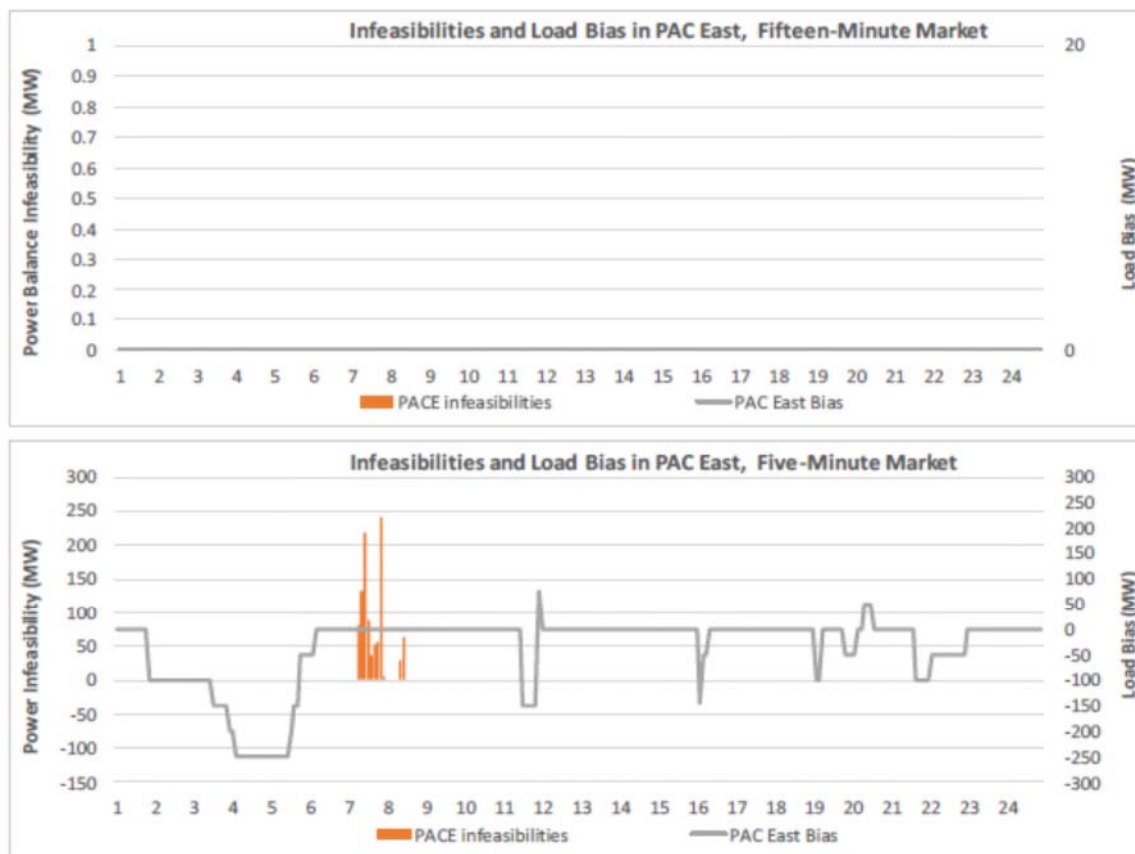
E. Powerex's Concerns about Load Biasing are Not Related to the CAISO Proposal and are Misplaced

During the technical conference, the CAISO explained that it allows EIM entities to adjust load forecasts, known as load biasing, to address changes in operating conditions. The CAISO does the same in its operations.⁷³ As the balancing authority, the EIM entity, not the CAISO, is best equipped to determine the need for a load adjustment.

The CAISO forecasts PacifiCorp demand for imbalance energy through the EIM. The CAISO has achieved an accuracy of 0.7 to 1.12 mean absolute percent error at approximately T-40, which equates to about 50-100 MW of forecast error. Also, PacifiCorp has approximately 400 MW of non-conforming load over which the CAISO has no visibility, and some of that load acts as demand response pursuant to PacifiCorp's instructions. Thus, although the CAISO's forecasts have been accurate to a significant degree, there are times when PacifiCorp, as the balancing authority, may need to make adjustments to account for actual conditions that could not otherwise have been forecasted by the CAISO. These are usually in the range of plus or minus 200 MW. The following is an illustrative example of a load biasing profile in the PacifiCorp East balancing authority area.

⁷³ See Tr. at 80.

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As this load biasing profile shows, the EIM entity normally biases load in the five-minute market and not the fifteen-minute market.

Powerex also raises the issue of the CAISO's application of the "load-bias limiter" functionality to the EIM. The load-bias limiter is an existing feature in the CAISO markets meant to ensure that any operator adjustments to the load forecast are consistent with actual system conditions. The feature operates to prevent load adjustments from creating an infeasibility when such adjustments are inconsistent with the capabilities of the system at the time. This limitation is necessary because operator adjustments to load forecasts tend to be coarse adjustments, *i.e.*, in increments of 10 to 50 MW, because the operator cannot precisely predict real-time system conditions.⁷⁴ Such adjustments may exceed the ability of the market to respond.⁷⁵ For example, an adjustment of 50-100 MW could exhaust five-minute ramping capability. Therefore, coarse adjustments that are more than necessary to address actual system conditions, can result in infeasible market solutions. To prevent such over-adjustments and any

⁷⁴ Tr. at 86.

⁷⁵ *Id.* at 84.

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infeasibilities they may potentially cause, the CAISO employs a load bias limiter in the CAISO balancing authority area, which automatically limits the course operator adjustment to actual capability as long as the quantify of the infeasibility is less than the operator adjustment and is in the same direction as the operator adjustment.⁷⁶ This limiter as applied in the CAISO balancing authority area has worked well to prevent such artificial constraints and infeasibilities.

The CAISO intends to expand the use of the load bias limiter to include the balancing authority areas of EIM entities when the waiver period expires.⁷⁷ At the start of the EIM, this feature was not in place for purposes of that market. Having recognized that the feature would benefit the EIM as well, the CAISO made it available to the EIM area starting on March 20, 2015. However, because the waiver pricing currently in effect does not permit the infeasibility to set the price, it has not been necessary for the CAISO to apply the load bias limiter feature during this period.⁷⁸

Powerex expresses concern that the CAISO is using the load bias limiter to prevent load adjustments from triggering constraint relaxation and that EIM entities could use load adjustments to mask scarcity or control prices.⁷⁹ The CAISO, however, has explained that it only limits load adjustments to reflect system capability; the adjustment may avoid a constraint relaxation, but the avoided constraint relaxation is one that would have been triggered by the coarse biasing of load and not because there is true scarcity.⁸⁰ The feature ensures that the bias is not limited if the quantity of the infeasibility is greater than the load bias and if the bias is in the opposite direction of the infeasibility. These measures limit the possibility that if there was a true infeasibility that needs to be addressed and the operator's bias was refined enough to target that infeasibility, the prices will reflect that need. While Powerex questions the appropriateness of allowing the operator to bias the forecast, it also casts judgment of the CAISO's use of the tool to ensure the bias does not cause meaningless price spikes.

⁷⁶ *Id.* at 82.

⁷⁷ The CAISO has not expanded this functionality during the term of the waiver because a load forecast adjustment-related infeasibility could not set the price when the waiver is in place, because under the waiver the marginal bid always sets the price. *Id.*

⁷⁸ The CAISO has not expanded this functionality during the term of the waiver because a load forecast adjustment-related infeasibility could not set the price when the waiver is in place, because under the waiver the marginal bid always sets the price. *Id.* The adjustment to the bias is only made after the CAISO has determined in the scheduling run that the bias exceeds the available ramping capability and ensures that in the pricing run the infeasibility does not constrain the system.

⁷⁹ Powerex Initial Comments at 32.

⁸⁰ Tr. at 188-89.

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Powerex's arguments are contradictory, and Powerex present no evidence that PacifiCorp is using load adjustments to control prices.

Powerex contends that any load biasing should only be done where necessary to ensure a more accurate forecast and only by the CAISO in its role as market operator for the EIM.⁸¹ These comments, too, reflect Powerex's basic misunderstanding of the design of the EIM. The CAISO has not assumed the balancing authority functions for the EIM entity. As the entity responsible for balancing supply and demand within its balancing authority area, the EIM entity is far better equipped than the CAISO to identify the need for load adjustments. Therefore, the EIM entity rightfully holds the final power to adjust the load forecast for its balancing authority area as it deems appropriate.

Powerex also asks that instances in which load biasing is used for the purpose of running the EIM be publicly posted. Although the CAISO believes in the value of transparency in the EIM, that value must be balanced with the need to avoid overly burdensome reporting requirements. The Department of Market Monitoring recommended that the CAISO begin to report on the portion of intervals in which power balance relaxations would be mitigated by the load bias limiter feature after expiration of the price discovery measures currently in place.⁸² The CAISO began including this in its EIM monthly reports submitted with the Commission in June 2015, for its report covering the month of April 2015.⁸³

F. Powerex's Interim Solution is Unnecessary

Powerex contends that in order to ensure that transmission customers are protected in the interim before a meaningful solution is implemented, FERC should consider directing PacifiCorp, on an interim basis, to revert to pricing imbalance energy under Schedules 4 and 9 of its OATT based on the regional pricing proxy it maintained before the implementation of the EIM. Powerex claims that adopting such an interim solution would be consistent with the terms of Attachment T to the PacifiCorp OATT, which contemplates reverting to the use of an hourly pricing proxy in the event operations of the EIM have been suspended.⁸⁴

⁸¹ Powerex Initial Comments at 34.

⁸² Department of Market Monitoring Report on Performance of Energy Imbalance Market at 34, Docket No. ER15-402-000 (Apr. 2, 2015).

⁸³ See Energy Imbalance Market, Pricing Waiver Report, April 1 – April 30, 2015. http://www.caiso.com/Documents/Jun3_2015_April2015_EnergyImbalanceMarketPriceWaiverReport_ER15-402.pdf.

⁸⁴ Powerex Initial Comments at 38-39.

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There is no need for such a radical solution. The Commission has already concluded that the waiver of the CAISO's pricing parameters currently in place is sufficient to ensure the protection of PacifiCorp customers pending the implementation of the tariff modifications proposed herein.⁸⁵ Powerex's recommendation regarding interim measures essentially constitutes a collateral attack on that decision and is beyond the scope of the specific focus of this proceeding, *i.e.*, a longer-term solution.

G. The CAISO's Proposed EIM Enhancement Will Not Automate Exceptional Dispatches in PacifiCorp's Balancing Authority Area

WPTF contends that the CAISO's proposal would simply "automate exceptional dispatches in the EIM area."⁸⁶ This statement reflects a misunderstanding of the differences between exceptional dispatch, a CAISO-specific practice, and general manual dispatches performed by PacifiCorp. The CAISO market optimizes ancillary services and energy and aims, to the greatest extent possible, to rely on the market processes for all energy and ancillary service needs. In addition, the CAISO has specific provisions regarding the deployment of operating reserves as energy via the market processes through a real-time contingency dispatch process.⁸⁷ Exceptional dispatches are permissible for only twelve specific functions that the market cannot perform, including responses to system emergencies. These are set forth in existing tariff sections 34.11.1 and 34.11.2. Because exceptional dispatches are outside the market and paid as bid, their bids are subject to mitigation.⁸⁸ Further, in fairness to generators subject to certain exceptional dispatches, the exceptional dispatch may also result in supplemental revenues or a "capacity procurement designation."⁸⁹ Because of the exceptional nature and consequences of exceptional dispatch, the Commission requires that the CAISO report them on a 60-day basis.⁹⁰

In contrast, PacifiCorp retains full control and responsibility over operating its balancing authority area, including managing its ancillary services and contingency reserves. Participating in EIM does not require an EIM entity to procure its ancillary services and all of its energy through market processes. Manual dispatches are therefore part of PacifiCorp's normal course of managing its system. They do not necessarily involve exceptional actions or

⁸⁵ 151 FERC ¶ 61,247, at PP 18-19.

⁸⁶ WPTF Initial Comments at 9.

⁸⁷ Existing tariff section 34.5.2.1.

⁸⁸ Existing tariff section 11.5.6.1.

⁸⁹ Existing tariff section 43.2.5.

⁹⁰ See *Cal. Indep. Sys. Operator Corp.*, 126 FERC ¶ 61,150, at P 263 (2009).

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consequences, and therefore, there is no reason to require PacifiCorp to engage in reporting akin to the requirements relating to exceptional dispatch. Moreover, the purpose of the CAISO's proposed EIM enhancement is not to automate the process of PacifiCorp *performing* manual dispatches, but rather, to improve and streamline the process by which PacifiCorp *communicates* such actions to the market operator in order to ensure the EIM dispatches and prices reflect actual system conditions.

H. Deseret's Questions Regarding the Completeness of the CAISO's Solution are Unfounded

Deseret contends that although the CAISO's proposed automated process is a step in the right direction, the proposal is an incomplete solution that foreshadows continued EIM market problems. Deseret is concerned that the improving market metrics may not tell the whole story. Deseret states that some causes of false scarcity may be mitigated, but suggests that others may not have manifested themselves yet.⁹¹

Deseret also questions whether there is a real and meaningful reduction in price excursions and hours of infeasibility or whether it merely reflects the fact that PacifiCorp is now in an off-peak shoulder month where fewer transactions occur and less load requires balancing. PacifiCorp typically experiences a distinct summer and winter peak on its system, and the CAISO's annual peak occurs in the summer.⁹² The EIM monthly reports data show that the decline in potential price excursions has continued past the spring months.

I. Deseret's Comments Regarding Third Party Participation are Beyond the Scope of this Proceeding

In its initial comments, Deseret acknowledged that the CAISO's proposal is a "step in the right direction."⁹³ Nevertheless, Deseret requests that the Commission direct the CAISO to "immediately remove the barriers which prevent third party resources from offering energy into the Energy Imbalance Market and restore the portfolio of resources available for managing energy imbalance within the PacifiCorp BAAs to pre-EIM levels."⁹⁴ Deseret also urges that the CAISO

⁹¹ Deseret Initial Comments at 3-4.

⁹² *Id.* at 4-5.

⁹³ *Id.* at 3.

⁹⁴ *Id.* at 5; see also Powerex Reply Comments at 6 ("CAISO and PacifiCorp could also work to eliminate barriers to the participation of third-party resources, including the arbitrary limitation on participation in the EIM intertie resources.").

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expedite the consideration of implementing intertie bidding.⁹⁵

The CAISO generally supports including additional economic bidding and exploring other mechanisms that facilitate the ability of third-party resources to participate in the EIM. However, under the current design, the participation rules remain subject to the discretion of the EIM entities. Changes to the fundamental EIM rules of participation are beyond the scope of this proceeding. Any proposed changes to these rules should be deferred to an appropriate stakeholder process so that the alternatives and various party positions can be fully vetted and considered.⁹⁶

Deseret also asks the Commission to direct the CAISO to provide a “comprehensive list of all the impediments to third party generation’s full participation in the EIM, and a timetable for eliminating a portion of those impediments prior to the summer peak periods, and thereafter all remaining impediments.”⁹⁷ Again, although the CAISO supports reducing barriers to EIM participation, the focus of this proceeding is limited to addressing the specific pricing anomalies observed in the EIM. Broader issues regarding third-party participation should be considered in an appropriate stakeholder process.⁹⁸ Moreover, this specific request is not feasible from the CAISO’s perspective because only an EIM entity has full knowledge of which resources in its balancing authority area are or are not participating resources.

Finally, Deseret requests that the Commission direct the CAISO and/or PacifiCorp to address whether including non-participating resources in the CAISO’s proposed solution would create a duplicate revenue stream in terms of cost-based PacifiCorp ancillary services charges and EIM-imposed charges. If so, Deseret submits that the revenue stream deriving from PacifiCorp’s non-participating resources being deployed to solve an infeasibility should result in either (i) a revenue credit to the transmission customers taking ancillary services under the PacifiCorp OATT, or (ii) a reduction in the ancillary service rates themselves. To clarify, the CAISO’s proposal will not -- and cannot -- create any duplicate revenue streams. The CAISO’s proposal will merely enhance the ability of the EIM to account for capacity available to PacifiCorp, and establish

⁹⁵ Deseret Initial Comments at 9-11.

⁹⁶ The CAISO plans to address with stakeholders the topic of whether intertie virtual bidding should remain discretionary as part of the upcoming Phase 2 portion of the Energy Imbalance Market year one enhancement stakeholder process.

⁹⁷ Deseret Initial Comments at 11.

⁹⁸ As the Commission stated in the July 20 Order, “we direct the CAISO to file . . . proposed tariff provisions to address the imbalance energy price spike concerns identified in the March 16 Order” and “to include in its filing an explanation of how each of the underlying causes of the price spikes is addressed by its proposed tariff revisions and/or by other taken by the CAISO and PacifiCorp.” July 20 Order at P 25. The issues raised by Deseret go beyond this.

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prices accordingly. It does not change the underlying distinction between participating and non-participating resources or the manner in which imbalance energy of those resources are settled.

J. Issues Relating to Readiness Criteria and the Transition Process for New EIM Participants Are Outside of the Scope of the Technical Conference, and the CAISO is Addressing Such Issues in Separate Filings

Some parties argue that the CAISO's proposed automated solution does not go far enough to address the issues that prompted the CAISO to request a tariff waiver and subsequently to submit the January 15, 2015, tariff amendment to establish a transition period for relaxing the pricing parameters set forth in the tariff.⁹⁹ For example, BPA recommends creating a rigorous standard for new EIM entities to demonstrate their readiness to join the EIM, and NV Energy contends that adoption of the CAISO's proposal does not eliminate the need for a transition period. Truckee also proposes a number of what it terms "additional steps," including ensuring there is sufficient time for parties to implement and test the CAISO's proposed EIM enhancement before allowing price waivers to lapse, and requiring that future EIM entities demonstrate that their processes work with the CAISO's proposed enhancement.¹⁰⁰ The Washington Commission contends that readiness alone does not establish market efficiency or effectiveness for assuring that prices in the EIM's wholesale market are just and reasonable.¹⁰¹

Such issues are beyond the scope of this tariff amendment, which solely concerns the implementation of the CAISO's automated enhancement to ensure that the EIM considers and accounts for EIM entities' available balancing capacity. With respect to the readiness requirements, on May 6, 2015, the CAISO submitted its filing to comply with the directives in the March 16 Order regarding readiness requirements for new EIM entities, and the CAISO is currently in the process of preparing its compliance filing in response to the Commission's July 21 order approving in part and rejecting in part the CAISO's May 6 filing.¹⁰² Comments regarding readiness issues for new EIM entities are appropriately addressed in the context of these filings, rather than the instant tariff amendment.

⁹⁹ BPA Initial Comments at 2-3; Deseret Initial Comments at 11-12; NV Energy Initial Comments at 7-9; Truckee Initial Comments at 3-7.

¹⁰⁰ Although the CAISO believes that these issues are better addressed in a separate proceeding specific to transition issues, the CAISO agrees with the substance of Truckee's comments that robust testing of the enhancement should precede any expiration of the existing pricing waiver.

¹⁰¹ Washington Commission Initial Comments at 3-4.

¹⁰² 152 FERC ¶ 61,063.

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Regarding transition issues, as discussed above, the CAISO is confident that the implementation of the automated solution proposed herein will result in a significant reduction in the number of infeasibilities experienced in the EIM, such that the percentage of infeasible intervals will correspond with those experienced in the CAISO's internal markets and the markets operated by other ISOs and RTOs. Nevertheless, the CAISO and current and prospective EIM entities still believe there is value in having an explicit transition period during which they can address issues that arise after implementation that could not be addressed by readiness requirements and create infeasibilities beyond what can be addressed by the proposal in this filing. The CAISO is currently developing a new tariff amendment to address transitional issues that new EIM entities may experience following the start of their participation in the EIM, consistent with the directive in the March 16 Order that the CAISO could propose a future tariff amendment to include a transitional period similar to its proposal in the January 15 filing if it could demonstrate that the new proposal was commensurate with the need to address a new EIM entity's post-operation learning curve.

K. BPA's Pricing Arguments Do Not Undermine the Merits of the CAISO's Proposal

BPA raises a number of arguments regarding "pricing principles." First, BPA contends that the CAISO's proposal conflicts with the Commission's Order No. 784. BPA claims that during intervals the Energy Imbalance Market is infeasible, the EIM entity "as the only supplier, now has captive customers," and therefore should not be able to recover rates that exceed its costs because the lack of market power presumed under Order No. 784 no longer exists.¹⁰³ BPA's argument is misplaced. First, BPA's characterization of the EIM entity as "the only supplier" is incorrect. The EIM entity is not a "supplier" at all, but a balancing authority that opts to participate in the EIM. The EIM entity, through its EIM entity scheduling coordinator, is responsible for *scheduling* all load and resources in its balancing authority area that do not participate in the real-time market and settling related charges and payments; however, *the EIM entity does not "supply" anything*.¹⁰⁴ The EIM entity does not have any customers in its role as the EIM entity. BPA also appears to misunderstand the CAISO's proposal. The CAISO's proposal does not change the underlying pricing and settlement mechanisms of the EIM, except insofar as it insures that capacity available to the EIM entity is accounted for to prevent triggering the \$1,000/MWh administrative price when there is not actually a lack of capacity available to resolve a potential infeasibility. Moreover, the CAISO's local market power mitigation provisions, which are applicable to the EIM, ensure that participants are not able to use

¹⁰³ BPA Initial Comments at 4.

¹⁰⁴ Tariff appendix A, existing definition of "EIM Entity." See also transmittal letter for CAISO tariff amendment to implement Energy Imbalance Market, Docket No. ER14-1386-000, at 14-15 (Feb. 28, 2014).

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market power to set the price for imbalance energy. In any event, to the extent that BPA's argument goes to the pre-existing operation of the EIM, or to the justness and reasonableness of the Commission's grant of market-based rate authority to particular suppliers or the EIM entity itself, such issues are beyond the scope of this proceeding.

BPA next contends that there is a "cost-shift flaw" in the CAISO's approach to infeasibility in that the CAISO's solution is to isolate the EIM entity and require customers in that EIM balancing authority area to bear the costs of solving the market infeasibility. BPA alleges that this results in a market that gives preference to its own balancing authority area.¹⁰⁵ It is not entirely clear if BPA intends this argument as a critique of the CAISO's proposal or of the underlying EIM design. Regardless, BPA is mistaken. The EIM uses resources within the CAISO balancing authority area to balance load and generation to the extent there are available EIM transfers. However, the EIM does not "isolate" EIM entities when infeasibilities occur. EIM transfers are frozen only when an EIM entity fails the resource sufficiency test. The CAISO's proposed enhancement impacts this only in terms of preventing available balancing capacity being used to support additional transfers beyond the level of the potential infeasibility.

BPA also criticizes the EIM design for discouraging steps to minimize the amount of imbalance service required, based on the timing of the EIM relative to the EIM entity scheduling windows under the tariff and the pricing differential between scheduled imports and load. BPA contends that these factors remove the ability of a transmission customer to truly hedge against congestion when minimizing the amount of its imbalance.¹⁰⁶ BPA recommends that the CAISO incorporate mechanisms to "encourage parties to decrease the amount of imbalance that the EIM must resolve." BPA contends this would decrease the likelihood of the EIM encountering infeasibilities. To this end, BPA suggests that the CAISO should harmonize the load aggregation point price and the locational marginal price for transmission customers that import generation to the EIM to serve load.

These suggestions go well beyond the scope of the current proceeding into the realm of the fundamental design of the Energy Imbalance Market. In particular, the suggestions cut against the notion of voluntary participation in the Energy Imbalance Market by EIM entities. BPA also fails to appreciate the changing nature of the energy marketplace. The deployment of variable resources has increased and will continue to increase imbalance energy needs, which in turn will increase the appeal of imbalance energy markets with a broader footprint, such as the Energy Imbalance Market. With respect to BPA's

¹⁰⁵ BPA Initial Comments at 4-5.

¹⁰⁶ *Id.* at 5.

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suggestion to “harmonize” the load aggregation point price and the locational marginal price, this is in effect a request to do away with the effects of imbalance energy settlements. In its order authorizing NV Energy to join the Energy Imbalance Market, the Commission made clear that it is appropriate to settle imports and exports at the locational marginal price of the applicable intertie scheduling point.¹⁰⁷ BPA’s propose harmonization would effectively erode the locational marginal price signals.

With respect to the CAISO’s proposal to calculate default energy bids for non-participating resources, BPA maintains that whether the CAISO uses existing or new default energy bid provisions for this purpose, the Commission should ensure that this default pricing does not create a windfall for EIM entities.¹⁰⁸ As explained above, the CAISO’s proposal is to use its existing rules for formulating default energy bids. Those rules, which the Commission has reviewed and found just and reasonable, are sufficiently robust to ensure that their application will not result in a windfall.¹⁰⁹ It is also important to understand that the purpose of constructing such default energy bids is to ensure that the Energy Imbalance Market accounts for resources available to the EIM entity, so that the Energy Imbalance Market price is appropriately set by the marginal resource. Regardless, the Energy Imbalance Market enhancement proposed in this filing does not in any way change the manner in which imbalance energy is settled.

BPA also requests two clarifications regarding the CAISO’s proposal. First, BPA requests that the CAISO clarify that the pricing and utilization of non-participating resources under its proposal applies only to resources that the EIM entity owns or operates, not to any non-participating resource within the EIM balancing authority area.¹¹⁰ The CAISO confirms that this interpretation is correct, with two caveats: (1) the “EIM entity” refers to PacifiCorp in its role as the balancing authority, not its merchant functions, and thus the “EIM entity” does not own any resources; and (2) the CAISO’s proposal is not limited to resources “owned” by PacifiCorp, but includes any resources with which PacifiCorp has contractual arrangements. Second, BPA asks the CAISO to clarify that its proposal for use of non-participating resources does not apply to an EIM entity’s contingency reserves needed to satisfy that entity’s contingency reserve obligation. BPA states that it assumes that the CAISO is not proposing to use contingency reserves.¹¹¹ The CAISO cannot provide this clarification, because

¹⁰⁷ *Nevada Power Co.*, 151 FERC ¶ 61,131, at P 162 (2015).

¹⁰⁸ BPA Initial Comments at 7.

¹⁰⁹ Resources that are on automatic regulation already receive an imbalance settlement through the Energy Imbalance Market even when there is no infeasibility.

¹¹⁰ BPA Initial Comments at 8-9.

¹¹¹ *Id.* at 9-10.

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the manner in which an EIM entity utilizes its contingency reserves to meet its reliability requirements is within the discretion of the EIM entity. The CAISO has no oversight or input into this process.

L. The CAISO Provided Clarifications in Response to Concerns Expressed by PG&E and SCE Regarding Bid Cost Recovery Allocation

Both PG&E and SCE generally support the CAISO's proposal, but ask that the CAISO ensure that any bid cost recovery uplifts associated with resolving potential infeasibilities be borne by the relevant balancing authority.¹¹² SCE in particular expresses concern about the possibility that costs are shared among balancing authorities when energy from ancillary service providers can only be used locally, and cannot support additional EIM transfers.¹¹³

First, bid cost recovery payments to non-participating resources resulting from the CAISO's proposal should be extremely rare because all participating resource bids will be utilized before releasing available balancing capacity. The participating resource bids will serve as a floor for the marginal price. If a non-participating resource is dispatched from available balancing capacity, the derived cost can establish the marginal price. However, there are no start-up or minimum load costs for non-participating resources; therefore, only energy revenue shortfalls can give rise to bid cost recovery. Because non-participating resources can set the price only if their costs exceed the last participating resource bid, the market will set a marginal price at least equal to the non-participating resource's costs. Therefore, only in the event of price corrections outside of the market could the potential for bid cost recovery payments exist.

Also, uplift costs are allocated to other EIM balancing authority areas only when there is an EIM transfer out during a five-minute settlement interval. All uplift costs associated with an EIM transfer out are allocated to the balancing authority area receiving the EIM transfer in, so the potential impact of uplift costs would only occur during intervals where an EIM balancing authority area is short on supply to meet demand. However, if the EIM balancing authority area is short in meeting its internal demand, there will not be EIM transfers out of that balancing authority. In fact, the EIM transfer constraint will be binding because EIM transfers from other EIM balancing authority areas are insufficient to resolve the power balance infeasibility. When there are no EIM transfers out of the EIM balancing authority area, all uplift costs incurred in that balancing authority area remain in that balancing authority area. There can be a scenario where the fifteen-minute market supports an EIM transfer out, but an infeasibility occurs in the five-minute real-time dispatch, which cannot completely change the direction

¹¹² PG&E Initial Comments at 3; SCE Initial Comments at 2-3.

¹¹³ SCE Initial Comments at 3.

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of the EIM transfer. This occurs today with PacifiCorp under the five-minute rate of change constraint required by BPA. This could result in uplift costs that are transferred to another EIM balancing authority area if available balancing capacity is used to address the infeasibility. However, this cost allocation is appropriate because it recognizes the cost of maintaining the beneficial fifteen-minute market transfers even though the balancing authority is short of five-minute energy. The CAISO's proposal will reduce the real-time imbalance energy offset because the locational marginal prices at which uninstructed imbalance energy will be settled will be based on the marginal resource price and not the \$1,000/MWh relaxation parameter.

PG&E recommends that the CAISO consider system losses when calculating the constraint for the amount of available balancing capacity to release, to ensure the quantity is adequate to avoid a power balance violation when system losses change from the re-dispatch of resources internal to the EIM area.¹¹⁴ The CAISO clarifies that it will consider system losses when performing this calculation.

M. The CAISO and Stakeholders Can Examine the Issue of Possibly Reducing the Price Cap in an Upcoming Stakeholder Initiative

Iberdrola and NV Energy request that the CAISO further examine the issue of reducing the \$1,000/MWh price cap set forth in its tariff¹¹⁵. The CAISO and stakeholders can examine this issue as part of the planned Stepped Transmission Constraint initiative, which is expected to begin in the second half of 2015.¹¹⁶ That stakeholder initiative will consider whether the performance of the transmission constraint parameter could be improved if the CAISO were to calibrate it at different levels depending on either the level of constraint relaxation, the voltage level of the constraint, or the system impact of the constraint.¹¹⁷ As part of that discussion, the CAISO and stakeholders can also consider the potential advantages and disadvantages of reducing the price cap.

¹¹⁴ PG&E Initial Comments at 2.

¹¹⁵ Iberdrola Initial Comments at 3-4; NV Energy Initial Comments at 9-10.

¹¹⁶ See Briefing on 2015 Policy Development Roadmap at slide 4. This briefing is available on the CAISO website at <http://www.caiso.com/informed/Pages/StakeholderProcesses/StakeholderInitiativesCatalogProcess.aspx>.

¹¹⁷ See Final 2015 Stakeholder Initiatives Catalog, § 3.9 (Jan. 23, 2015), available on the CAISO website cited in the footnote immediately above.

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N. The CAISO Agrees to Report on the Performance of the Proposed Automated Enhancement

PG&E recommends that the CAISO report on the performance of its proposed solution quarterly for the first year after it goes into effect.¹¹⁸ The CAISO agrees that it is appropriate to report on the performance of the proposed automated solution for the first four quarters after it is implemented.

Further, once the proposed solution goes into effect, it will no longer be necessary for the CAISO to continue to submit the monthly informational reports as directed in the March 16 Order.¹¹⁹ The quarterly reports will provide sufficient information about the performance of the proposed solution in resolving the price excursions that have affected the performance of the Energy Imbalance Market. Therefore, the Commission should allow the CAISO to cease providing the monthly informational reports once the proposed solution is implemented.

O. The CAISO Addressed Puget's Request for Additional Information

Puget supports the CAISO's proposal, but requests that the CAISO provide "numerical examples and more detailed information" on its proposal to assist market participants in evaluating the pricing impacts thereof.¹²⁰ The CAISO notes that its initial comments contained a number of graphical figures illustrating how its proposal would operate. The attached testimony of Mr. Trethewey includes additional, detailed examples of the operation of the CAISO's proposal.

Puget also requests that the CAISO clarify several aspects of its proposal. First, Puget asks the CAISO to clarify that the pricing resulting from its proposal does not require escalation from the last economic bid up to the \$1,000/MWh bid cap during conditions when "available balancing capacity" resources have been fully deployed, and contingency reserves not visible to the Energy Imbalance Market must be used.¹²¹ This is not correct. If the capacity available to the EIM entity is fully committed and an infeasibility still exists, then the power balance constraint will bind and the \$1,000/MWh penalty price will apply.¹²² Moreover, if

¹¹⁸ PG&E Initial Comments at 1.

¹¹⁹ See March 16 Order at P 38.

¹²⁰ Puget Initial Comments at 4.

¹²¹ *Id.* at 5.

¹²² In the case of an infeasibility involving over-generation, the minimum energy bid price of negative \$150 price will apply. See existing tariff section 39.6.1.4. Also, in the case of a potential

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the marginal economic bid is \$1,000, then that bid will set the price.

In addition, Puget requests that the CAISO clarify that non-participating resources that receive dispatch operating targets into the “available balancing capacity” region of the bid curve will follow the EIM entity balancing authority area’s dispatch instructions, not the CAISO’s dispatch instructions.¹²³ The CAISO clarifies that its proposal does not change the underlying operation of the Energy Imbalance Market in terms of dispatch instructions: the CAISO will continue to provide automatic dispatch instructions to EIM scheduling coordinators, which will be passed through to specific resources by the relevant EIM entity balancing authority.

Finally, Puget requests that the CAISO make clear how its proposed tariff changes would treat the EIM entity balancing authority area’s access to shared contingency reserves that can only be deployed in certain qualifying events.¹²⁴ To reiterate, the CAISO’s proposal is merely a mechanism to ensure that the Energy Imbalance Market is informed of capacity available for use by the balancing authority to address potential infeasibilities. The CAISO’s proposed enhancement will not automate the communication of reserve deployment by the EIM entity. Also, the CAISO does not propose to adopt or usurp any of the balancing authority’s responsibilities. Thus, it is up to the balancing authority as to what, if any, contingency reserves it chooses to deploy manually.

P. The CAISO Does Not Anticipate that Its Proposed Enhancements Will Create New Impacts for Market Participants Within the CAISO Balancing Authority Areas

Six Cities states that the CAISO’s initial comments do not include any analysis of the effects of the proposed Energy Imbalance Market enhancement on market participants located within the CAISO balancing authority area. Six Cities suggests that the proposed enhancement “will result in different optimization methods being used for the EIM in the CAISO BAA versus EIM entity BAAs.” Six Cities also requests that the CAISO evaluate potential impacts of the proposed modification on the CAISO balancing authority area and share that analysis with stakeholders.¹²⁵

The CAISO does not anticipate that its proposed enhancement will create any new impacts specific to market participants within the CAISO’s balancing

infeasibility involving over-generation where there are self-schedules from EIM participating resources, such self-schedules will be cut and the negative \$150 price will apply.

¹²³ Puget Initial Comments at 6.

¹²⁴ *Id.* at 6-7.

¹²⁵ Six Cities Reply Comments at 2.

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authority area. As described above, the CAISO's proposal merely ensures that information regarding capacity available to an EIM entity is accounted for in the Energy Imbalance Market and priced appropriately. It does not fundamentally change the underlying operation of the Energy Imbalance Market or impose an optimization method that varies based on EIM balancing authority areas.

Q. The CAISO Has Addressed WPTF's Request for Additional Information

WPTF contends that despite receiving some additional details through comments, the majority of its questions remain unanswered. WPTF contends that the record is incomplete and therefore the CAISO's proposal for expanding the EIM energy bid pool cannot be fully assessed. WPTF states that in order to assure reasonably comparable treatment across EIM entities, the CAISO tariff should contain the majority of the details surrounding which resources can be used in the expanded pool and how such resources will be counted.¹²⁶ WPTF contends that PacifiCorp and the CAISO fail to answer several questions, including those listed below. All of these questions have been answered, either in the CAISO's explanation of the proposal and associated tariff revisions in Section III above, or in the CAISO's response to other parties' comments in this Section. The CAISO provides further responses below.

- What capacity will be counted (information regarding categories of available balancing capacity also requested by Puget)

As discussed above and in Mr. Tretheway's testimony, the CAISO is not proposing that any specific type of capacity be counted as EIM available balancing capacity, nor will the CAISO verify that the identified capacity is able to meet the operational infeasibility it is procured to address. The proposed enhancement provides the EIM entity an additional tool to use and does not mandate that it actually use the tool. WPTF's question suggests that the CAISO should be developing counting rules, as it has done in its own resource adequacy proposal. As a preliminary matter, as discussed above, the available balancing capacity is not a resource adequacy program. More importantly, however, were the EIM entity to identify capacity that does not meet the operational requirements the feature is intended to address, the EIM entity scheduling coordinator or participating resource scheduling coordinator will be subject to the imbalance energy implications of its inability to move consistent with the dispatched available balance capacity. The CAISO has not identified what

¹²⁶ WPTF Answer at 3; see *also* Washington Commission Reply Comments at 4 ("the record does not establish the specific class of resources that CAISO and PacifiCorp propose to use to resolve market infeasibility. The [Washington Commission] requests that the Commission require CAISO and PacifiCorp to describe precisely what resource types they will use to resolve infeasibilities."). The Washington Commission also cautions against using resources available from the power pool sharing agreement to solve infeasibilities. *Id.*

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incentives the EIM entity might have to populate the available balancing capacity with capacity it could not actually rely on to balance its system in real-time.

- Under what OATT provisions the capacity will be procured;

The CAISO understands that through the EIM entity's pro-forma Open Access Transmission Tariffs or procurement contracts, there already exist provisions for the procurement of imbalance energy and ancillary services. These requirements are necessary to ensure that balancing authorities provide reliable services on their respective systems.

- How the capacity will be compensated for those reliability services; and

WPTF misunderstands the purpose of the proposed enhancement. The CAISO is not proposing the EIM entity procure additional capacity it already has available. The purpose of the proposed enhancement is to provide the EIM entity with a tool to reflect capacity it already has available in the CAISO market systems so it can be optimized in the CAISO markets, and, if sufficient, address any power balance constraints if it were made visible to the market systems.

- Whether the compensation will change once the CAISO proposal is implemented.¹²⁷

The CAISO has explained above, that the compensation for energy dispatched from available balancing capacity will be compensated under the same rules that apply to imbalance energy in the EIM. Because the CAISO is not actually proposing the procurement of a new form of capacity, there is no need for capacity compensation.

VI. EFFECTIVE DATE

The CAISO respectfully requests an effective date of November 1, 2015, for the proposed tariff provisions included in this filing. The CAISO recognizes its prior commitment to implement this proposal on August 24, 2015. However, because of the need for this compliance filing, the CAISO has modified its implementation schedule to provide sufficient time for parties and the Commission to evaluate these proposed tariff provisions. This delay is not harmful to ratepayers given the Commission's prior extension of the pricing waivers, which the Commission has ruled will remain in effect until the date the CAISO implements the proposal to address the issues identified in this proceeding.¹²⁸ Moreover, although the Commission has established a refund

¹²⁷ *Id.* at 4.

¹²⁸ See 151 FERC ¶ 61,247, at P 18.

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effective date of August 24, 2015 per the requirement in Section 206 of the Federal Power Act, the CAISO submits that there is no reason for the Commission to order refunds in this proceeding for the same reason, *i.e.*, because the pricing waivers are preventing any adverse impact to ratepayers as a result of any remaining infeasibilities. In addition, it would be practically impossible for the CAISO to attempt to re-settle its market assuming the application of the enhancements proposed herein on a retroactive basis.

The CAISO respectfully requests that the Commission issue an order regarding the proposal by October 20, 2015, so that the CAISO and EIM participants have sufficient time to evaluate the impact of the order on implementation of the proposed enhancement on November 1, 2015.

VII. COMMUNICATIONS

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

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VIII. SERVICE

The CAISO has served copies of this filing on the CPUC, 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.

IX. CONTENTS OF FILING

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

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Attachment A	Clean CAISO tariff sheets incorporating this tariff amendment
Attachment B	Red-lined document showing the revisions contained in this tariff amendment
Attachment C	Testimony of Donald Tretheway

X. CONCLUSION

For the reasons set forth in this filing, the CAISO respectfully requests that the Commission issue an order by October 20, 2015, that accepts the tariff revisions proposed in the filing effective as of November 1, 2015.

Respectfully submitted,

By: /s/ Anna McKenna

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Attachment A – Clean Tariff Records

Compliance Filing – Available Balancing Capacity For Energy Imbalance Market

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California Independent System Operator Corporation

29.4 Roles And Responsibilities.

* * *

(c) EIM Entity Scheduling Coordinator.

* * *

(4) Obligations. An EIM Entity Scheduling Coordinator shall–

- (A) perform the obligations of an EIM Entity Scheduling Coordinator under the EIM Entity Scheduling Coordinator Agreement and Section 29;
- (B) perform the obligations of a Scheduling Coordinator under provisions of the CAISO Tariff described in Section 29.1(b);
- (C) register in the manner set forth in the Business Practice Manual for the Energy Imbalance Market all non-participating resources in the Balancing Authority Area of each EIM Entity that it represents and update such information in a timely manner;
- (D) verify in the manner set forth in the Business Practice Manual for the Energy Imbalance Market that all EIM Resources within the Balancing Authority Area of each EIM Entity represented by the EIM Entity Scheduling Coordinator have been registered with the CAISO;
- (E) submit the Interchange schedules with other Balancing Authorities at the defined Interchange scheduling locations, including creating and processing E-Tags in accordance with NERC, North American Energy Standards Board, and WECC standards and business practices for bilateral schedules between Balancing Authority Areas that are arranged no less than 20 minutes in advance of the Dispatch Interval of the Real-Time Market in which the Interchange will occur and that are included in an EIM Resource Plan;
- (F) match E-Tags and manage schedule curtailments at the defined Interchange scheduling locations with other Balancing Authorities;
- (G) provide EIM Transmission Service Information in accordance with Section 29.17;

- (H) settle all financial obligations arising out of the Real-Time Market for the EIM Entity, including financial settlement with non-participating resources and non-participating load within the EIM Entity Balancing Authority Area;
- (I) submit EIM Base Schedules, EIM Resource Plans and other required information on behalf of the EIM Entity;
- (J) register with the CAISO, consistent with the provisions in the Business Practice Manual for the Energy Imbalance Market, all non-participating resources that the EIM Entity Scheduling Coordinator may designate as EIM Available Balancing Capacity in its EIM Resource Plan; and
- (K) create with the CAISO a Default Energy Bid consistent with the rules specified in Section 39.7.1 for all non-participating resources that the EIM Entity Scheduling Coordinator may designate as EIM Available Balancing Capacity in the EIM Resource Plan.

* * *

29.30 Bid and Self-Schedule Submission For CAISO Markets.

- (a) **In General.** The provisions of Section 30 that are applicable to the Real-Time Market, as supplemented by Section 29.30, shall apply to EIM Market Participants.
- (b) **Transition Cost Multiplier.** EIM Participating Resources that are also Multi-Stage Generating Resources may negotiate a Transition Cost multiplier with the CAISO, in consultation with Department of Market Monitoring, consistent with the procedures in Section 39.7.1.3 in the event that the monthly Thousand British Thermal Units (MMBtu) Gas Price Index used in Section 30.4.2 does not account for the fuel source of the Generating Unit.
- (c) **EIM Available Balancing Capacity Energy Bid Curve for EIM Participating Resources.** For each Trading Hour, the CAISO will apply Energy Bids submitted for EIM Participating Resources, which may be subject to mitigation pursuant to Section 29.39, towards the EIM Available Balancing Capacity as provided in Section 29.30(e).

- (d) **EIM Available Balancing Capacity Bids Used for EIM Available Balancing Capacity Served by Non-Participating Resources.** The CAISO will create an Energy Bid Curve based on the Default Energy Bid established by the EIM Entity Scheduling Coordinator and the CAISO pursuant to Section 29.4(c)(4)(K) for all non-participating resources that the EIM Entity Scheduling Coordinator may identify as EIM Available Balancing Capacity, and will apply such bids to the EIM Available Balancing Capacity as provided in Section 29.30(e).
- (e) **Treatment of Energy Bid Curves for EIM Available Balancing Capacity.** For each Trading Hour the CAISO will allocate the categories of the EIM Resource Plan specified in Sections 29.34(e)(3)(C) and (D) as follows.
- (1) **Upward Capacity.** For upward capacity above the EIM Base Schedule, the CAISO will—
- (A) allocate the Spinning and Non-Spinning Reserves down from the upper regulating limit as registered in the Master File, taking into account any PMax rerates; and then
 - (B) allocate EIM Upward Available Balancing Capacity to the Energy Bid Curve starting at the highest value of the Energy Bid Curve that does not overlap with Spinning or Non-Spinning Reserves.
- (2) **Downward Capacity.** For downward capacity below the EIM Base Schedule, the CAISO will allocate EIM Downward Available Balancing Capacity to the Energy Bid Curve starting at its lowest value, taking into account any PMin rerates.
- (3) **Remaining Capacity.** The CAISO will use any remaining portion of the Energy Bid Curve after the allocations in Section 29.30(e)(1) and 29.30(e)(2) for Dispatch under any condition, except that for non-participating resources the CAISO will adjust the EIM Upward Available Balancing Capacity and EIM Downward Available Balancing Capacity towards the EIM Base Schedule so that there will not be any remaining capacity for Dispatch.

* * *

29.34 EIM Operations

* * *

(e) EIM Resource Plan.

- (1) **In General.** By 10:00 a.m. of the day preceding the Operating Day, the EIM Entity Scheduling Coordinators on behalf of non-participating resources and EIM Participating Resource Scheduling Coordinators on behalf of EIM Participating Resources, must submit all applicable components of the EIM Resource Plan as set forth in Section 29.34(e)(3).
- (2) **Scope.** The EIM Resource Plan components must cover a seven day horizon (with hourly detail for each resource) beginning with the Operating Day.
- (3) **Contents.** The EIM Resource Plan shall comprise—
 - (A) EIM Base Schedules of EIM Entities and EIM Participating Resources;
 - (B) Energy Bids (applicable to EIM Participating Resources only);
 - (C) EIM Upward Available Balancing Capacity;
 - (D) EIM Downward Available Balancing Capacity;
 - (E) Spinning Reserves in MW;
 - (F) Non-Spinning Reserves in MW; and
 - (G) if the EIM Entity Scheduling Coordinator is not relying on the CAISO's Demand Forecast, a Demand Forecast.
- (4) **Contents of EIM Base Schedules.** EIM Base Schedules of EIM Entities must include hourly-level Demand Forecasts for EIM Demand, hourly-level schedules for resources, and hourly-level scheduled Interchanges.
- (5) **Adjustment Prior to Submission of Real-Time EIM Base Schedules.** The EIM Entity Scheduling Coordinator may adjust the components of the EIM Resource Plan prior to the submission of Real-Time EIM Base Schedules up to 75 minutes before the Operating Hour.

* * *

- (q) **Variable Energy Resources.** Provisions of Section 34 specifically applicable to Variable Energy Resources and Eligible Intermittent Resources appear in Sections 34.1.3, 34.1.6, 34.2.2, 34.5.1. 34.13.2.
- (r) **Use of EIM Available Balancing Capacity.**
- (1) **In General.** The CAISO will use EIM Available Balancing Capacity identified in the EIM Resource Plan to address power balance constraint infeasibilities in the EIM Balancing Authority Area for which the EIM Available Balancing Capacity is designated by the responsible EIM Entity Scheduling Coordinator, while simultaneously participating in Congestion Management.
- (2) **Resource Sufficiency Evaluations.** The CAISO will not apply the EIM Available Balancing Capacity towards its evaluation of the resource sufficiency tests specified in Section 29.34(k), (l), and (m).
- (3) **Real-Time Market Scheduling Run.** In each interval of the Real-Time Market, the CAISO will use the EIM Available Balancing Capacity in the run of the market optimization used to establish scheduling priorities by-
- (A) adding a penalty price factor to EIM Available Balancing Capacity Energy Bid prices so that the EIM Available Balancing Capacity is dispatched to address power balance violations, after Effective Economic Bids submitted for EIM Participating Resources in the respective EIM Balancing Authority Area not associated with the EIM Available Balancing Capacity have cleared, while respecting the economic merit order of the EIM Available Balancing Capacity Energy Bid prices;
- (B) enforce a constraint that prevents the release of EIM Upward Available Balancing Capacity in excess of the difference between the EIM Entity's demand and the supply of Effective Economic Bids cleared within the applicable EIM Balancing Authority Area, minus the import transfer into that EIM Balancing Authority Area; and

- (C) enforce a constraint that prevents the release of EIM Downward Available Balancing Capacity in excess of the difference between the supply of Effective Economic Bids cleared within the applicable EIM Balancing Authority Area and the EIM Entity's demand, minus the export transfer out of that EIM Balancing Authority Area.
- (4) **Real-Time Market Pricing Run.** For each interval of the Real-Time Market, in the run of the market optimization used to set binding schedules and prices, the CAISO will—
 - (A) use the EIM Available Balancing Capacity released in the run of the market optimization to establish scheduling priorities based on the Energy Bid Curves for EIM Participating Resources and non-participating resources created pursuant to Sections 29.30(c) and (d), respectively;
 - (B) change the load forecast for the EIM Balancing Authority Area by a small tolerance to allow for price determination;
 - (C) clear the Real-Time Market and establish prices based on the pricing parameters in Sections 27.4.3.2 and 27.4.3.4, if the amount of EIM Available Balancing Capacity released in the scheduling run is not sufficient to clear the potential infeasibility identified in the scheduling run.

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Appendix A

Master Definition Supplement

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EIM Available Balancing Capacity.

Any EIM Upward Available Balancing Capacity or EIM Downward Available Balancing Capacity.

* * *

EIM Downward Available Balancing Capacity.

Any downward capacity from an EIM Participating Resources or a non-participating resource that an EIM Entity Scheduling Coordinator has identified in the EIM Resource Plan as available to address power balance and transmission constraint violations in the EIM Balancing Authority Area.

* * *

EIM Upward Available Balancing Capacity.

Any upward capacity from an EIM Participating Resources or a non-participating resource that an EIM Entity Scheduling Coordinator has identified in the EIM Resource Plan as available to address power balance and transmission violations in the EIM Balancing Authority Area.

Attachment B – Marked Tariff Records

Compliance Filing – Available Balancing Capacity For Energy Imbalance Market

August 19, 2015

California Independent System Operator Corporation

29.4 Roles And Responsibilities.

* * *

(c) EIM Entity Scheduling Coordinator.

* * *

(4) Obligations. An EIM Entity Scheduling Coordinator shall–

- (A) perform the obligations of an EIM Entity Scheduling Coordinator under the EIM Entity Scheduling Coordinator Agreement and Section 29;
- (B) perform the obligations of a Scheduling Coordinator under provisions of the CAISO Tariff described in Section 29.1(b);
- (C) register in the manner set forth in the Business Practice Manual for the Energy Imbalance Market all non-participating resources in the Balancing Authority Area of each EIM Entity that it represents and update such information in a timely manner;
- (D) verify in the manner set forth in the Business Practice Manual for the Energy Imbalance Market that all EIM Resources within the Balancing Authority Area of each EIM Entity represented by the EIM Entity Scheduling Coordinator have been registered with the CAISO;
- (E) submit the Interchange schedules with other Balancing Authorities at the defined Interchange scheduling locations, including creating and processing E-Tags in accordance with NERC, North American Energy Standards Board, and WECC standards and business practices for bilateral schedules between Balancing Authority Areas that are arranged no less than 20 minutes in advance of the Dispatch Interval of the Real-Time Market in which the Interchange will occur and that are included in an EIM Resource Plan;
- (F) match E-Tags and manage schedule curtailments at the defined Interchange scheduling locations with other Balancing Authorities;
- (G) provide EIM Transmission Service Information in accordance with Section 29.17;

- (H) settle all financial obligations arising out of the Real-Time Market for the EIM Entity, including financial settlement with non-participating resources and non-participating load within the EIM Entity Balancing Authority Area; ~~and~~
- (I) submit EIM Base Schedules, EIM Resource Plans and other required information on behalf of the EIM Entity;
- (J) register with the CAISO, consistent with the provisions in the Business Practice Manual for the Energy Imbalance Market, all non-participating resources that the EIM Entity Scheduling Coordinator may designate as EIM Available Balancing Capacity in its EIM Resource Plan; and
- (K) create with the CAISO a Default Energy Bid consistent with the rules specified in Section 39.7.1 for all non-participating resources that the EIM Entity Scheduling Coordinator may designate as EIM Available Balancing Capacity in the EIM Resource Plan.

* * *

29.30 Bid and Self-Schedule Submission For CAISO Markets.

- (a) In General. The provisions of Section 30 that are applicable to the Real-Time Market, as supplemented by Section 29.30, shall apply to EIM Market Participants.
- (b) Transition Cost Multiplier. ~~except that~~ EIM Participating Resources that are also Multi-Stage Generating Resources may negotiate a Transition Cost multiplier with the CAISO, in consultation with Department of Market Monitoring, consistent with the procedures in Section 39.7.1.3 in the event that the monthly Thousand British Thermal Units (MMBtu) Gas Price Index used in Section 30.4.2 does not account for the fuel source of the Generating Unit.
- (c) EIM Available Balancing Capacity Energy Bid Curve for EIM Participating Resources. For each Trading Hour, the CAISO will apply Energy Bids submitted for EIM

Participating Resources, which may be subject to mitigation pursuant to Section 29.39, towards the EIM Available Balancing Capacity as provided in Section 29.30(e).

(d) EIM Available Balancing Capacity Bids Used for EIM Available Balancing Capacity

Served by Non-Participating Resources. The CAISO will create an Energy Bid Curve based on the Default Energy Bid established by the EIM Entity Scheduling Coordinator and the CAISO pursuant to Section 29.4(c)(4)(K) for all non-participating resources that the EIM Entity Scheduling Coordinator may identify as EIM Available Balancing Capacity, and will apply such bids to the EIM Available Balancing Capacity as provided in Section 29.30(e).

(e) Treatment of Energy Bid Curves for EIM Available Balancing Capacity. For each Trading Hour the CAISO will allocate the categories of the EIM Resource Plan specified in Sections 29.34(e)(3)(C) and (D) as follows.

(1) Upward Capacity. For upward capacity above the EIM Base Schedule, the CAISO will—

(A) allocate the Spinning and Non-Spinning Reserves down from the upper regulating limit as registered in the Master File, taking into account any PMax rerates; and then

(B) allocate EIM Upward Available Balancing Capacity to the Energy Bid Curve starting at the highest value of the Energy Bid Curve that does not overlap with Spinning or Non-Spinning Reserves.

(2)- Downward Capacity. —For downward capacity below the EIM Base Schedule, the CAISO will allocate EIM Downward Available Balancing Capacity to the Energy Bid Curve starting at its lowest value, taking into account any PMin rerates.

(3) Remaining Capacity. The CAISO will use any remaining portion of the Energy Bid Curve after the allocations in Section 29.30(e)(1) and 29.30(e)(2) for Dispatch under any condition, except that for non-participating resources the CAISO will adjust the EIM Upward Available Balancing Capacity and EIM

Downward Available Balancing Capacity towards the EIM Base Schedule so that there will not be any remaining capacity for Dispatch.

* * *

29.34 EIM Operations

* * *

(e) EIM Resource Plan.

- (1) **In General.** By 10:00 a.m. of the day preceding the Operating Day, the EIM Entity Scheduling Coordinators on behalf of non-participating resources and EIM Participating Resource Scheduling Coordinators on behalf of EIM Participating Resources, must submit all applicable components of the EIM Resource Plan as set forth in Section 29.34(e)(3).
- (2) **Scope.** The EIM Resource Plan components must cover a seven day horizon (with hourly detail for each resource) beginning with the Operating Day.
- (3) **Contents.** The EIM Resource Plan shall comprise—
 - (A) EIM Base Schedules of EIM Entities and EIM Participating Resources;
 - (B) Energy Bids (applicable to EIM Participating Resources only);
 - (C) EIM Upward Available Balancing Capacity~~Reserve capacity meeting the WECC requirements for regulating reserves, in incremental MW (applicable to resources only);~~
 - (D) EIM Downward Available Balancing Capacity~~Reserve capacity meeting the WECC requirements for regulating reserves, in decremental MW (applicable to resources only);~~
 - (E) Spinning Reserves in MW;
 - (F) Non-Spinning Reserves in MW; and
 - (G) if the EIM Entity Scheduling Coordinator is not relying on the CAISO's Demand Forecast, a Demand Forecast.
- (4) **Contents of EIM Base Schedules.** EIM Base Schedules of EIM Entities must

include hourly-level Demand Forecasts for EIM Demand, hourly-level schedules for resources, and hourly-level scheduled Interchanges.

- (5) **Adjustment Prior to Submission of Real-Time EIM Base Schedules.** The EIM Entity Scheduling Coordinator may adjust the components of the EIM Resource Plan prior to the submission of Real-Time EIM Base Schedules up to 75 minutes before the Operating Hour.

* * *

- (q) **Variable Energy Resources.** Provisions of Section 34 specifically applicable to Variable Energy Resources and Eligible Intermittent Resources appear in Sections 34.1.3, 34.1.6, 34.2.2, 34.5.1, 34.13.2.

(r) **Use of EIM Available Balancing Capacity.**

- (1) **In General.** The CAISO will use EIM Available Balancing Capacity identified in the EIM Resource Plan to address power balance constraint infeasibilities in the EIM Balancing Authority Area for which the EIM Available Balancing Capacity is designated by the responsible EIM Entity Scheduling Coordinator, while simultaneously participating in Congestion Management.
- (2) **Resource Sufficiency Evaluations.** The CAISO will not apply the EIM Available Balancing Capacity towards its evaluation of the resource sufficiency tests specified in Section 29.34(k), (l), and (m).
- (3) **Real-Time Market Scheduling Run.** In each interval of the Real-Time Market, the CAISO will use the EIM Available Balancing Capacity in the run of the market optimization used to establish scheduling priorities by-
- (A) adding a penalty price factor to EIM Available Balancing Capacity Energy Bid prices so that the EIM Available Balancing Capacity is dispatched to address power balance violations, after Effective Economic Bids submitted for EIM Participating Resources in the respective EIM Balancing Authority Area not associated with the EIM Available

- Balancing Capacity have cleared, while respecting the economic merit order of the EIM Available Balancing Capacity Energy Bid prices;
- (B) enforce a constraint that prevents the release of EIM Upward Available Balancing Capacity in excess of the difference between the EIM Entity's demand and the supply of Effective Economic Bids cleared within the applicable EIM Balancing Authority Area, minus the import transfer into that EIM Balancing Authority Area; and
- (C) enforce a constraint that prevents the release of EIM Downward Available Balancing Capacity in excess of the difference between the supply of Effective Economic Bids cleared within the applicable EIM Balancing Authority Area and the EIM Entity's demand, minus the export transfer out of that EIM Balancing Authority Area.
- (4) **Real-Time Market Pricing Run.** For each interval of the Real-Time Market, in the run of the market optimization used to set binding schedules and prices, the CAISO will—
- (A) use the EIM Available Balancing Capacity released in the run of the market optimization to establish scheduling priorities based on the Energy Bid Curves for EIM Participating Resources and non-participating resources created pursuant to Sections 29.30(c) and (d), respectively;
- (B) change the load forecast for the EIM Balancing Authority Area by a small tolerance to allow for price determination;
- (C) clear the Real-Time Market and establish prices based on the pricing parameters in Sections 27.4.3.2 and 27.4.3.4, if the amount of EIM Available Balancing Capacity released in the scheduling run is not sufficient to clear the potential infeasibility identified in the scheduling run.

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Appendix A

Master Definition Supplement

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EIM Available Balancing Capacity.

Any EIM Upward Available Balancing Capacity or EIM Downward Available Balancing Capacity.

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Any downward capacity from an EIM Participating Resources or a non-participating resource that an EIM Entity Scheduling Coordinator has identified in the EIM Resource Plan as available to address power balance and transmission constraint violations in the EIM Balancing Authority Area.

* * *

EIM Upward Available Balancing Capacity.

Any upward capacity from an EIM Participating Resources or a non-participating resource that an EIM Entity Scheduling Coordinator has identified in the EIM Resource Plan as available to address power balance and transmission violations in the EIM Balancing Authority Area.

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

California Independent System Operator Corporation))	Docket Nos. ER15-861-000 EL15-53-000
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**PREPARED TESTIMONY OF DONALD TRETHERWAY ON BEHALF OF
CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION**

Q. Please state your name, title, and business address.

A. My name is Donald Tretheway. I am employed as Senior Advisor, Market Design and Regulatory Policy for the California Independent System Operator Corporation (“CAISO”). My business address is 250 Outcropping Way, Folsom, CA 95630.

Q. Please describe your educational and professional background.

A. I have a Bachelor of Arts in Economics, with a specialization in Computing, from the University of California, Los Angeles and a Masters of Business Administration, Finance & Technology Management, from the University of California, Davis - Graduate School of Management. I began working at the ISO in June 2009 and have worked on a number of significant market design issues.

Q. What are your duties and responsibilities at the CAISO?

A. I am responsible for the development of enhancements to the wholesale electricity markets administered by the ISO with an objective of improving the efficiency of those markets and facilitating the realization of regulatory and public policy objectives in the region. I was the policy lead on the stakeholder process used by

the CAISO to develop its proposal to implement fifteen-minute scheduling and settlement and related market design enhancements that will satisfy the intra-hour scheduling requirements established by the FERC in Order No. 764 and that will allow the ISO's real-time market to more efficiently integrate a large amount of renewable variable energy resources into the fleet of resources serving customers in the CAISO's balancing authority area. Since early 2013, I have been the CAISO's policy lead on the development and implementation of the Energy Imbalance Market, which is an extension of its real-time market to accommodate participation by balancing authority areas other than the ISO's balancing authority area. The CAISO tariff refers to the other balancing authority areas who participate in the Energy Imbalance Market as "EIM Entities."

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to explain the CAISO's proposal to enhance its Energy Imbalance Market by implementing an automated feature that will ensure that the Energy Imbalance Market systems accurately and timely reflect and account for capacity that is available to balancing authorities that participate in the Energy Imbalance Market (known as "EIM entities") to operate their systems reliably. This enhancement is designed to address the higher-than-anticipated number of price excursions experienced in the Energy Imbalance Market after implementing the Energy Imbalance Market in PacifiCorp's balancing authority areas. I will begin by providing a summary of these price excursions and explain some of the fundamental aspects of the CAISO's proposed Energy Imbalance Market enhancement. I will follow that with a detailed discussion of the CAISO's

proposal, including how EIM entities will designate available capacity to be recognized in the Imbalance Energy Market, and how the Imbalance Energy Market will, if necessary, utilize that capacity to resolve a potential power balance constraint infeasibility. I will then provide some discrete numerical examples of how the automated solution would operate in practice.

I. ENERGY IMBALANCE MARKET PRICE EXCURSIONS AND THE NEED FOR EIM ENTITIES TO RETAIN CAPACITY

Q. Please explain the issues occurring in the Energy Imbalance Market that led to the development of the CAISO's current proposal.

A. Following implementation of the Energy Imbalance Market for PacifiCorp's two balancing authority areas on November 1, 2014, certain transitional conditions arose that restricted the timing and accuracy regarding the amount of capacity available to the market clearing process. These conditions caused the transmission and power balance constraints set forth in 27.4.3.2 and 27.4.3.4 of the CAISO tariff to bind more frequently than expected, producing atypically high prices in the fifteen-minute and five-minute markets that did not reflect actual imbalance system conditions in the balancing authority areas of PacifiCorp.

After an extensive investigation of the root causes of these price excursions, the CAISO and PacifiCorp determined that they were not the product of actual capacity insufficiencies in the PacifiCorp balancing areas during the affected intervals, but rather two types of issues: (1) the Energy Imbalance Market operating based on information regarding imbalance conditions that did not reflect

actual system conditions because of a lack of timely information provided to the Energy Imbalance Market due to “learning curve” issues with PacifiCorp operating under a market paradigm; and (2) a structural limitation in the visibility to the Energy Imbalance Market of capacity that PacifiCorp retains outside of the Energy Imbalance Market to reliably meet load in its balancing areas. These findings have been set forth in the CAISO’s monthly informational reports on EIM performance and the impact of the price waiver granted by the Commission, the CAISO’s and PacifiCorp’s presentations at the April 9 technical conference hosted by the Commission in this proceeding, and in the CAISO’s comments on the technical conference.

Q. Do you believe that it is appropriate for PacifiCorp, or other EIM Entities, to not include all of the available capacity in their balancing authority areas in the Energy Imbalance Market?

A. Yes. To appreciate this concept, however, it is important to first understand one of the fundamental principles of the Energy Imbalance Market. The EIM entities retain all of their balancing authority responsibilities and must perform their balancing functions in concert with the Energy Imbalance Market in real-time. As a result, the Energy Imbalance Market does not co-optimize energy and ancillary services in balancing authority areas of EIM entities. In fulfilling the balancing function, the EIM entity must maintain a certain amount of capacity within its balancing authority area that it deems necessary to operate its system reliability through its instructions outside of the Energy Imbalance Market. The EIM entity cannot bid this capacity into the Energy Imbalance Market because the resources

providing this capacity would then be available to be dispatched in the Energy Imbalance Market to support an EIM transfer. This would make the capacity unavailable to meet balancing authority responsibilities after the market dispatch.

With PacifiCorp, the actual operational experience demonstrates that although PacifiCorp has successfully been able to dispatch this capacity manually outside of the Energy Imbalance Market to address infeasibilities, the Energy Imbalance Market does not recognize the future dispatch of this capacity because it occurs after the market run is completed. This creates the false appearance of scarcity because the current market optimization does not consider the capacity held to meet balancing authority area responsibilities by EIM entities in determining if the balancing authority area is actually infeasible.

II. THE CAISO'S PROPOSED ENERGY IMBALANCE MARKET ENHANCEMENT

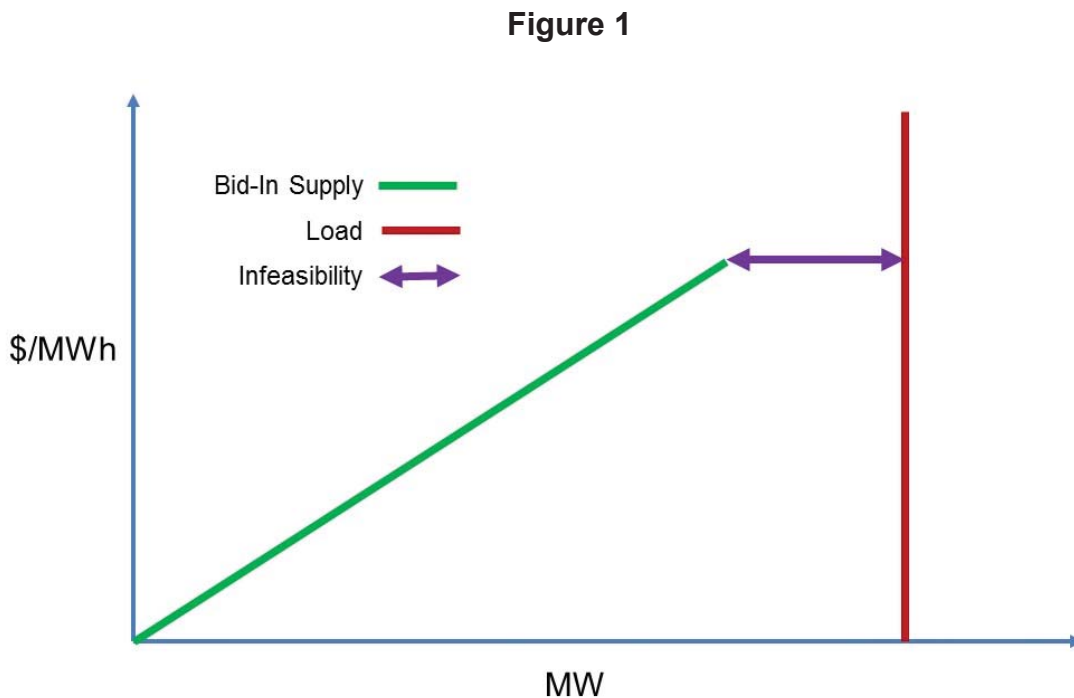
A. Overview of Proposed Enhancement

Q. Please provide an overview of the CAISO's Proposal.

A. The CAISO is proposing an enhancement to the Energy Imbalance Market that would allow it to address power balance constraint infeasibilities identified in clearing the Energy Imbalance Market that result from apparent scarcity conditions, while simultaneously addressing congestion management. The proposal enables the CAISO to account for capacity retained by and available to EIM entities to ensure reliability in their balancing authority areas that would

otherwise go unrecognized, which the CAISO defines as “available balancing capacity.”

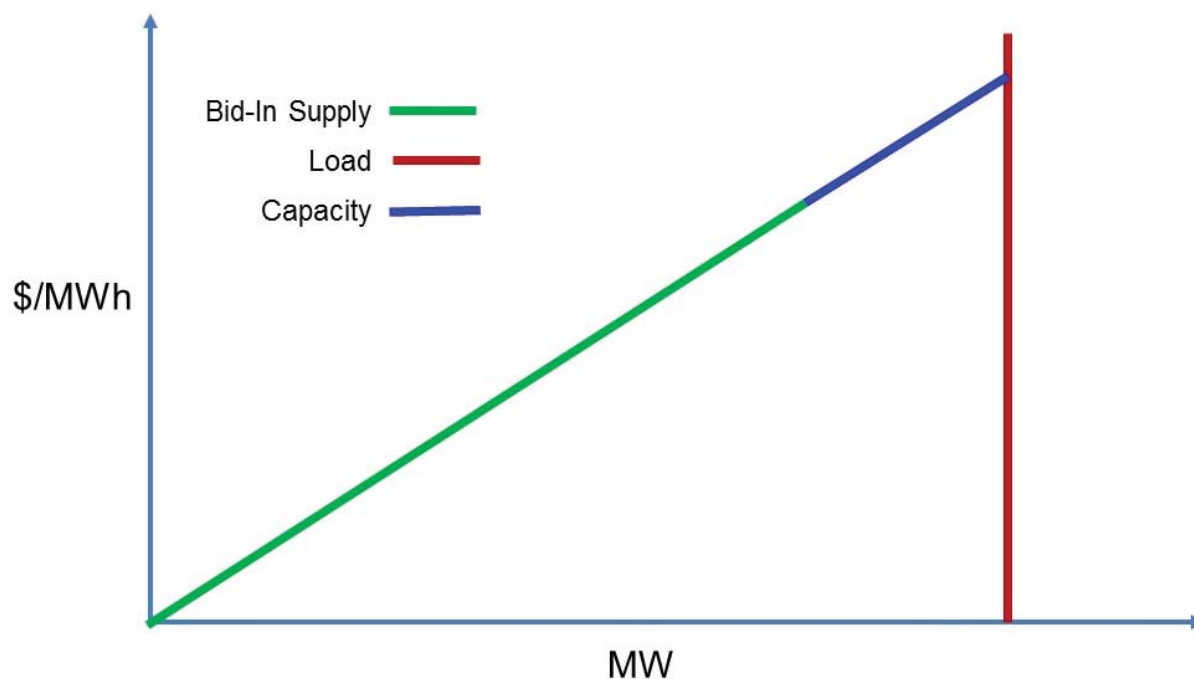
The CAISO’s real-time market is configured to relax the power balance constraint and transmission constraint when it observes an insufficient amount of effective economic ramp constrained bids to clear demand. This is true in the Energy Imbalance Market as well. Figure 1 below illustrates the potential gap between load and the bid-in supply capable of serving that load in an EIM entity balancing authority area. The purple line illustrates the degree of the infeasibility in serving the load represented by the red line.



Q. Will the CAISO's proposal eliminate this infeasibility gap?

A. The CAISO's proposed enhancement will enable the Energy Imbalance Market to automatically recognize and account for available balancing capacity identified by the EIM entity scheduling coordinator of the balancing authority area, which could be in the form of regulation and load-following capacity, or other capacity that the balancing authority has determined is necessary for reliable operations. Once recognized and incorporated in the CAISO market, this available balancing capacity will be included in the supply stack if a potential power balance constraint violation occurs in the EIM entity's balancing authority area. Figure 2 illustrates the use of the available capacity to extend the supply stack and eliminate the infeasibility. For illustrative simplicity, Figure 2 shows the available capacity being released to eliminate the infeasibility at the highest economic merit order. In reality, the economic merit order will vary depending on how the energy bids associated with available balancing capacity compare with the rest of the supply stack.

Figure 2



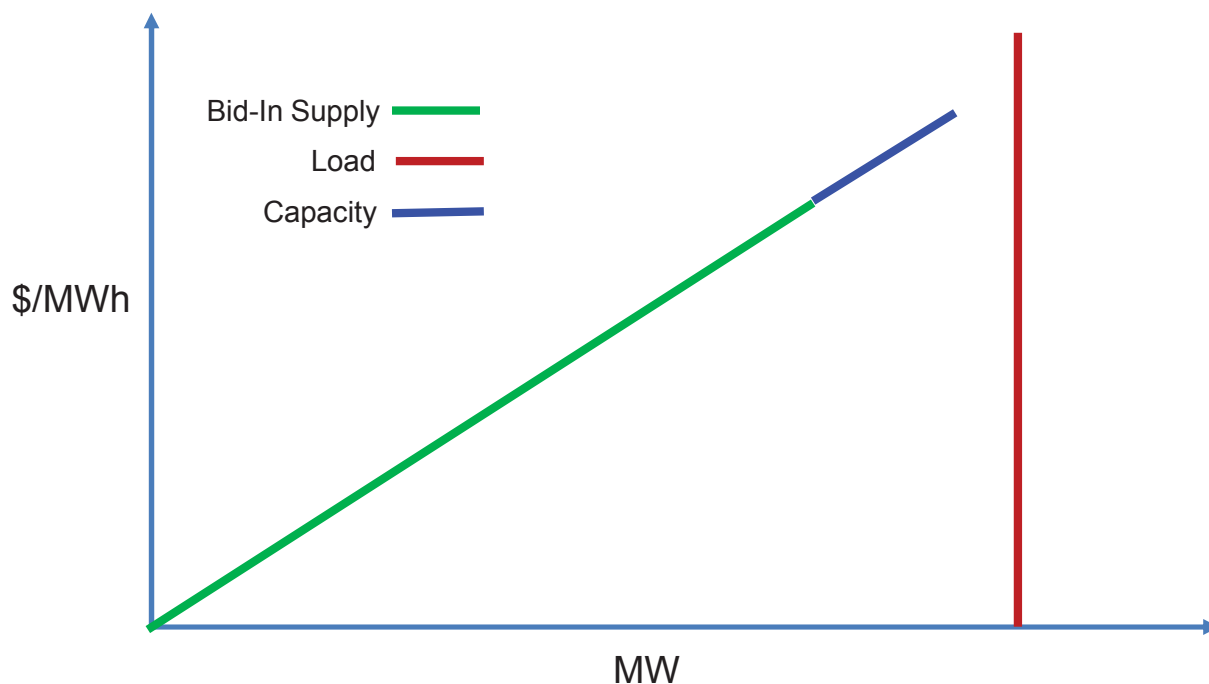
Q. Are there benefits to the EIM entity for allowing available balancing capacity to be considered in the Energy Imbalance Market?

A. Yes. In addition to ensuring the available balancing capacity is not used to support an EIM transfer, the proposed enhancement leverages the existing market optimization process, which ensures that any dispatch of this available balancing capacity will be at the resource level, and therefore will take into account actual telemetry, physical unit characteristics, and grid conditions including congestion. This allows the CAISO to produce feasible solutions and ensure prices reflect the true nature of the deployed capacity. The dispatch provides the EIM entity with an optimal solution for addressing the infeasibility with the available balancing capacity. Without this enhancement, the EIM

entity cannot be assured that a manual dispatch will result in the optimal release of available balancing capacity.

Q. Will the CAISO's proposal eliminate the possibility that the Energy Imbalance Market will encounter an infeasible solution?

A. No. Under the CAISO's proposal, if after deploying the available balancing capacity designated by an EIM entity the EIM entity's balancing authority area still has insufficient participating resource energy bids and available balancing capacity to clear the gap and resolve the infeasibility, the market software will relax the power balance or transmission constraint at the relevant relaxation parameter/MWh. Figure 3 below illustrates that a gap between load and total capacity will still exist if the available balancing capacity retained by the EIM entity is not sufficient to cover the difference between bid-in supply and load in its balancing authority area.

Figure 3

B. Designation of Available Capacity by EIM Entity Scheduling Coordinators and EIM Participating Resource Scheduling Coordinators

Q. Please explain how EIM Entities will designate available balancing capacity for use in the Energy Imbalance Market.

A. The EIM entity scheduling coordinator already provides information to the CAISO regarding how it plans to use the capacity of each participating and non-participating resource in its balancing authority area through the EIM resource plan, which the EIM entity scheduling coordinator approves and finalizes 40 minutes before the applicable trading hour. The EIM resource plan includes: 1) the EIM base schedules for non-participating and participating resources; 2) energy bids for EIM participating resources; 3) regulation reserves up; 4)

regulation reserves down; 5) spinning reserves; 6) non-spinning reserves; and 6) in cases where the EIM entity scheduling coordinator is not relying on the CAISO's forecast of their demand, a demand forecast. Under the CAISO's proposal, the EIM entity scheduling coordinator will also identify any available balancing capacity that it wishes the Energy Imbalance Market to utilize to address any infeasibilities in its balancing authority area in the fields currently labelled as "regulation up" and "regulation down" of its resource plans. Available balancing capacity may include regulation up and down capacity but may also include other forms of load following capacity that an EIM entity has at its disposal for meeting its obligations to balance supply and demand in its balancing authority area.

Q. Will available balancing capacity be considered in the EIM entity's resource sufficiency tests?

A. No. The purpose of the Energy Imbalance Market's resource sufficiency evaluation performed each hour is to ensure that each balancing authority area in the Energy Imbalance Market has sufficient bids from participating resources in its balancing authority area to meet the balance, capacity, and ramping tests. The flexibility sufficiency tests ensure that the EIM entity has sufficient flexibility in place to meet the flexibility requirements because otherwise the EIM entity could be leaning on the flexible ramping constraint capacity procured and allocated to the respective balancing authority area. Therefore, if a balancing authority area fails the resource sufficiency evaluation, it is prevented from possibly "leaning" on other Energy Imbalance Market balancing authority areas by using participating resources in other balancing authority areas to meet its imbalance needs.

Instead, it must utilize only the participating resources in its own balancing authority area to meet imbalance needs. It is important to differentiate between meeting imbalance requirements across the EIM area and meeting reliability requirements within a balancing authority area. The available balancing capacity proposal illustrates the need to separate capacity used to meet imbalance need in an EIM area from capacity used to meet reliability requirements in a balancing authority area. Available balancing capacity is used to meet the reliability requirements inside the same balancing authority area and not to support imbalance requirements in other balancing authority areas. As a result, available balancing capacity is not included in the resource sufficiency evaluation because it cannot be shared with other balancing authority areas to meet those other balancing authority areas' imbalance energy needs. If available balancing capacity were to be included in the sufficiency test, it would overstate the amount of resources a balancing authority area has available to share with other balancing authority areas.

Q. What types of capacity will an EIM entity be permitted to designate as available balancing capacity under the CAISO's proposal?

A. As I mentioned above, the source of available balancing capacity may include regulation up and down capacity available to an EIM entity, but an EIM entity may also designate as available balancing capacity other forms of capacity that it can call on to meet its balancing authority obligations for the binding market interval after the market has cleared. In comments on the technical conference, some

parties expressed concern that an EIM entity might designate capacity that is only available to be used under limited circumstances, such as shared contingency reserves. This proposal does not, however, modify the fundamental principle of the Energy Imbalance Market that EIM entities continue to retain their balancing authority responsibilities. As such, although the CAISO expects EIM entities to designate as available balancing capacity only that capacity that is actually available and able to meet its load within the binding market interval, the manner in which an EIM entity chooses to utilize its available balancing capacity to meet its reliability requirements, and the consequences thereof, remains the province of the EIM entity. The CAISO has no oversight or input into this process.

Q. Will an EIM entity be permitted to designate capacity from resources that do not participate in the Energy Imbalance Market as available balancing capacity?

A. Yes. The CAISO understands that the EIM entity, pursuant to its FERC-regulated tariff or contractual arrangements, may be able to use capacity for regulation or load-following purposes on its own system from resources that do not participate in the Energy Imbalance Market (known as “non-participating resources”). Under the current Energy Imbalance Market policy and design, the EIM entity should not bid that capacity into the Energy Imbalance Market because it could be dispatched to support the imbalance energy needs of another balancing authority area in the EIM, thereby making that capacity unavailable to meet its balancing requirements after the market optimization has run. The CAISO understands, however, that

should there be a reliability issue or balancing issue, the EIM entity could dispatch that capacity to meet its load. Therefore, it is appropriate that the CAISO permit the EIM entity scheduling coordinator to designate that capacity as available balancing capacity. I will discuss below the mechanism by which the CAISO proposes to reflect available balancing capacity from non-participating resources in the Energy Imbalance Market.

C. Reflecting Available Balancing Capacity in the Energy Imbalance Market

Q. How does that CAISO propose to reflect the available balancing capacity designated by an EIM entity scheduling coordinator in the Energy Imbalance Market?

A. In order for the Energy Imbalance Market to utilize available balancing capacity to resolve potential infeasibilities in the applicable EIM balancing authority area, that capacity will need to be reflected in the bid stack used to clear the market. Therefore, for both participating and non-participating resources identified as available balancing capacity, the market optimization will be able to consider this capacity in the market clearing processes if there is an energy bid curve associated with it. For EIM participating resources, the energy bid curves will be based on the bids submitted by an EIM participating resource scheduling coordinator. For non-participating resources designated to provide available balancing capacity, the energy bid curves will be based on default energy bids created by the CAISO.

1. Reflecting Available Balancing Capacity from EIM Participating Resources in the Energy Imbalance Market

Q. Please explain how the CAISO will incorporate available balancing capacity from participating resources into the Energy Imbalance Market.

A. For EIM participating resources, the EIM participating resource scheduling coordinator will submit bids into the Energy Imbalance Market in the same manner as they do under the current market structure. The CAISO is not developing a new bid type for bids associated with available balancing capacity. If the EIM participating resource scheduling coordinator has not submitted a sufficient bid range to cover its available balancing capacity for a particular participating resource, then the CAISO will not consider that capacity as available balancing capacity in the Energy Imbalance Market.

Q. Please explain how the CAISO will reconcile the submitted bids by a participating resource scheduling coordinator with the identified available balancing capacity.

A. The scheduling coordinator for an EIM participating resource must submit energy bids for the resource by seventy-five minutes prior to the trading hour. As I indicated earlier, an EIM entity scheduling coordinator can update its EIM resource plan up to forty minutes prior to the applicable trading hour. The CAISO must then match up the submitted bids with the capacity designations in the EIM resource plan and apportion the uses to the participating resource's energy bid curve according to the relative priority of uses.

Q. In allocating the uses of an EIM participating resource's capacity to its energy bid curve, how will the CAISO prioritize the use of a participating resource's capacity?

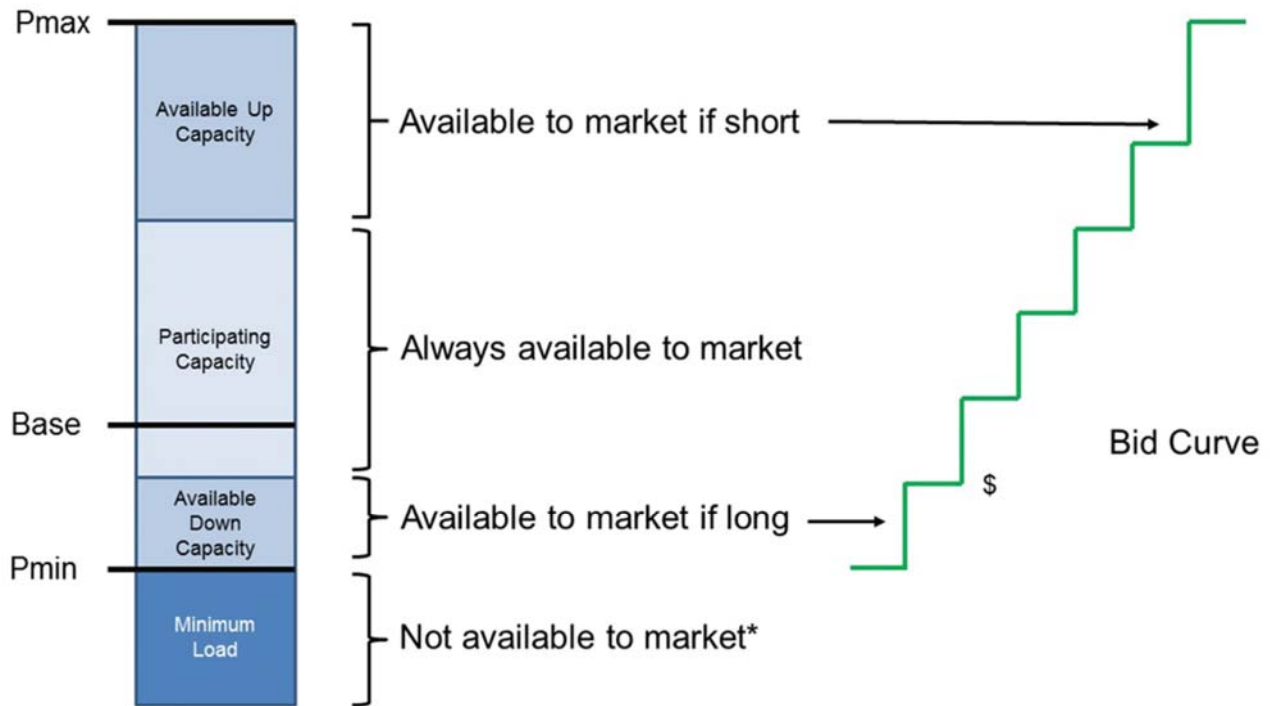
A. When evaluating the bid range relative to the capacity designations for the participating resource, the CAISO will prioritize spinning and non-spinning reserves first, then available balancing capacity (designated as "regulation up" or "regulation down," as described above), and finally capacity that is simply economically bid to provide imbalance service through the Energy Imbalance Market. Capacity from a resource will be allocated to provide imbalance service only to the extent the remaining capacity is sufficient to cover the designated available balancing capacity and any spinning and non-spinning reserves provided by the resource. The available balancing capacity provided by a resource will be reduced to the extent the bid range is not sufficient to cover the designated available balancing capacity and any spinning and non-spinning reserves provided by the resource.

Q. Please provide an example of how the CAISO will match up a submitted bid for an EIM participating resource with a designation of available balancing capacity for that resource.

A. Figure 4 below illustrates the allocation of available balancing capacity indicated in the EIM entity scheduling coordinator's resource plan to the economic bid submitted by the scheduling coordinator for the participating resource. In this example, the participating capacity is the portion of the resource's capacity that the CAISO market clearing process can use to meet imbalance energy requirements

across the entire EIM area, which includes the CAISO balancing authority area and the balancing authority areas of any EIM entities. In this scenario, the EIM entity scheduling coordinator has not identified any of the capacity to be spinning or non-spinning capacity. The portion of the capacity identified in Figure 4 as available up capacity is the available balancing capacity that the Energy Imbalance Market can use in the event of an infeasibility due to a perceived undersupply of imbalance energy bids in the EIM entity balancing authority area. Similarly, the CAISO can use the available down capacity to address an infeasibility due to perceived oversupply conditions. In Figure 4, both the bid curve range and the resource characteristics can support all of the available up capacity identified by the EIM entity scheduling coordinator.

Figure 4

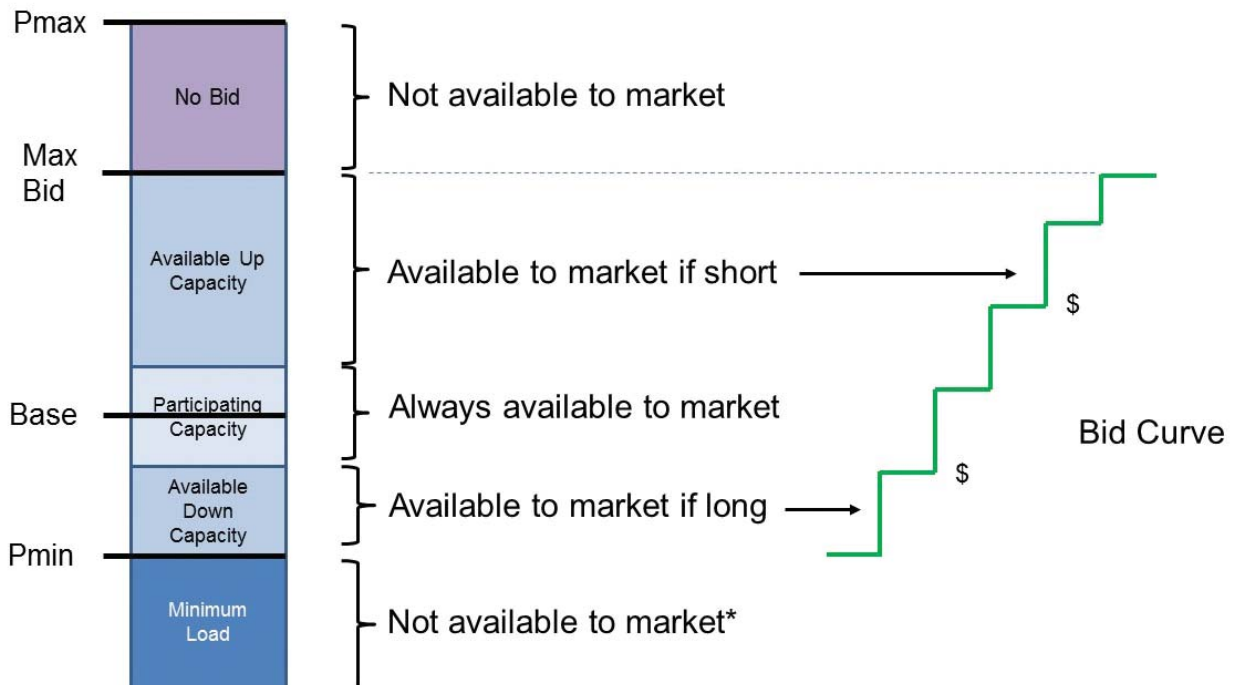


* Can't de-commit since the resource is providing regulation down

Q. How will the CAISO allocate the uses of an EIM participating resource’s capacity across its energy bid curve in the event that the participating resource scheduling coordinator submits a maximum economic bid quantity that is below the full output range of the resources?

A. Figure 5 illustrates how the capacity would be apportioned in such a situation. The CAISO will maintain the available up capacity by reducing the amount of participating capacity on the resource. This ensures that the Energy Imbalance Market will appropriately preserve the capacity identified by the EIM entity to meet its balancing authority responsibilities by reducing the capacity that can be dispatched by the market to meet imbalance requirements across the EIM area.

Figure 5

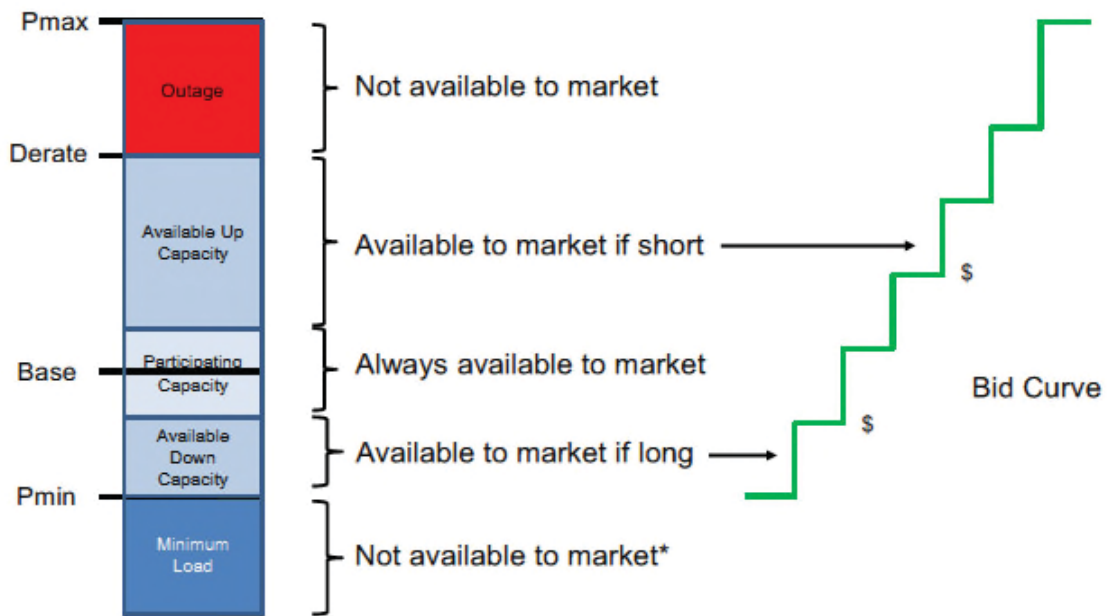


* Can't de-commit since the resource is providing regulation down

Q. Please describe how an EIM participating resource’s capacity will be allocated if the resource experiences an outage after the resource plans and bids are submitted.

A. As shown in Figure 6 below, if an outage occurs that affects a resource’s operational capability to provide EIM available balancing capacity, the outage will be reflected first as a reduction in the resource’s participating capacity, and then as a reduction to the available up/down capacity that the EIM entity scheduling coordinator has designated as available to address market infeasibilities.

Figure 6



* Can't de-commit since the resource is providing regulation down

Q. How would the CAISO allocate the uses of an EIM participating resource's capacity if the EIM entity scheduling coordinator also identified spinning and non-spinning reserves for that resource?

A. To simplify these examples, I have assumed that the EIM entity scheduling coordinator has not designated any of these participating resources as providing spinning or non-spinning reserves. Had the EIM entity scheduling coordinator identified the resource as providing spinning or non-spinning reserves, the CAISO would provide those segments of the resource plan with a higher priority than available up capacity. Therefore, if the resource were to experience an outage as illustrated in Figure 6, the available up capacity would be reduced after all participating capacity is eliminated in order to maintain any capacity identified for spinning reserves and non-spinning reserves.

2. Reflecting Available Balancing Capacity from Non-Participating Resources

Q. How will the CAISO reflect available balancing capacity designated from EIM non-participating resources in the Energy Imbalance Market?

A. As I explained above, in order to deploy resources providing available balancing capacity to resolve potential infeasibilities in an EIM entity's balancing authority area, that available balancing capacity must be reflected in energy bid curves. By definition, non-participating resources do not submit energy bids in the Energy Imbalance Market. Therefore, the CAISO must adopt some mechanism to reflect the cost of energy from non-participating resources when it uses such resources to

resolve potential infeasibilities in the Energy Imbalance Market. The CAISO proposes to use its existing default energy bid mechanism for this purpose.

Q. Does this mean that non-participating resources will, in effect, be participating in the Energy Imbalance Market?

A. No. This proposal does nothing to change the underlying relationship between non-participating resources and the Energy Imbalance Market. Creating default energy bids for such resources is merely a means to ensure that the CAISO can appropriately settle the Energy Imbalance Market based on the price of the marginal resource. As I discuss in greater detail below, in cases where the Energy Imbalance Market must utilize available balancing capacity to prevent a potential infeasibility, the market will use such capacity in economic merit order up to the amount necessary to address the potential infeasibility. This means that there must be a price associated with all available balancing capacity, including available balancing capacity designated from non-participating resources. The CAISO's proposal does not change the fact that non-participating resources do not submit bids into the Energy Imbalance Market, hence the need to create default energy bids. Moreover, the EIM entity scheduling coordinator will continue to have the responsibility for settling all obligations arising out of the Energy Imbalance Market with non-participating resources.

Q. Please explain the process for creating default energy bids for non-participating resources

A. First, EIM entity scheduling coordinators will be required to register with the CAISO, in accordance with the applicable business practice manual process, all non-participating resources which the EIM entity scheduling coordinator will designate as providing EIM available balancing capacity. The CAISO will then create a default energy bid for each such non-participating resource based on the EIM entity scheduling coordinator's choice of default energy bid calculation methodology, pursuant to the existing process set forth in Section 39.7.1 of the CAISO tariff. In particular, an EIM entity scheduling coordinator will be able to elect any of the options for calculating default energy bids specified in Section 39.7.1 for each non-participating resource.

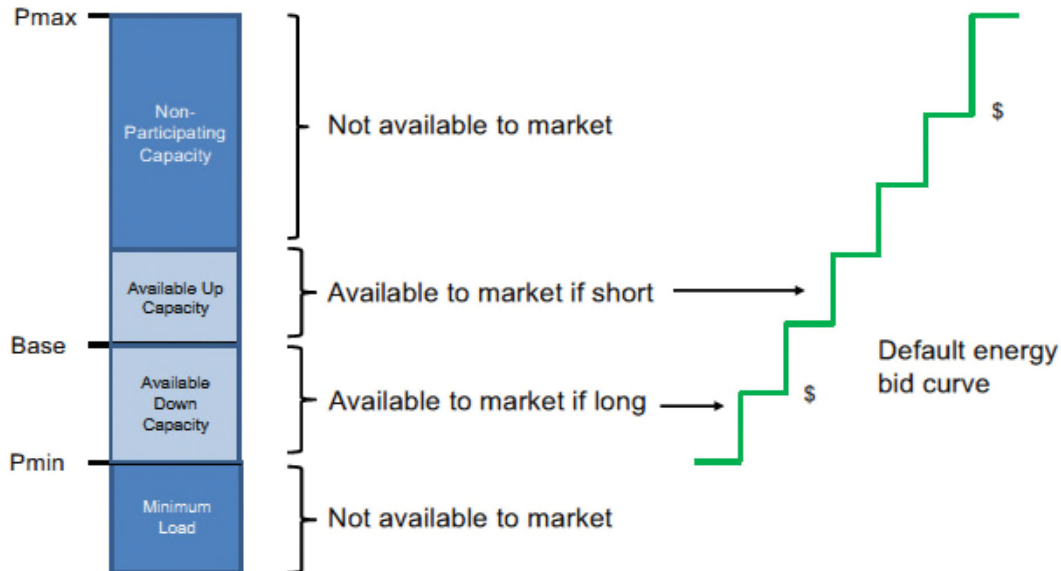
Q. Are there any provisions of the default energy bid determination process in Section 39.7.1 that will not apply to non-participating resources?

A. Yes. Because the purpose of calculating default energy bids for non-participating resources is limited to determining the cost of dispatching these resources to resolve infeasibilities, and not market mitigation, Section 39.7.1.4, which concerns frequently mitigated units and the option for such units to receive a bid adder to their default energy bid calculation, will not apply as non-participating resources will not be mitigated.

Q. How will the CAISO manage available balancing capacity provided by a non-participating resource?

A. Figure 7 below illustrates how the CAISO would manage available balancing capacity provided by a non-participating resource. Since the resource is non-participating, by definition it has no capacity above or below its base schedule to meet imbalance requirements across the EIM area, which includes the CAISO balancing authority area and all other balancing authority areas participating in the EIM. The CAISO will create a default energy bid curve for that resource in order to account for the resource's available balancing capacity in the Energy Imbalance Market. A default energy bid cost curve is necessary because for any given operating hour the non-participating resource's base schedule may change as well as the quantity designated for available balancing capacity. The available upward capacity will be the available balancing capacity directly above the base schedule and the available downward capacity will be the available balancing capacity directly below the base schedule. As with participating resources, the operating characteristics of a non-participating resource may reduce its available balancing capacity within the operating hour. For example, if an outage occurs that affects the resource's operational capacity, the available balancing capacity of the non-participating resource will be reduced.

Figure 7



D. Use of Available Balancing Capacity to Address Potential Infeasibilities in the Energy Imbalance Market

Q. Under the current Energy Imbalance Market design how does the real-time market address potential infeasibilities?

A. For each market interval of the real-time market, which includes the fifteen-minute market and the five-minute real-time dispatch, the real-time market executes two runs. These runs perform an optimization subject to various constraints, including power balance and transmission constraints. The power balance constraint ensures that supply equals demand and transmission constraints ensure that flows do not exceed applicable limits. The market enforces these constraints through parameters that can be relaxed at various prices to resolve infeasibilities in the event there are insufficient effective economic bids in the market.

The first real-time market run is referred to as the “scheduling run.” In this run, the power balance and transmission constraint relaxation parameters are set at values that reflect the relative priorities of relaxing those constraints. The second run, referred to as the “pricing run,” relaxes these constraints at administratively determined prices intended to reflect the value of relaxing a constraint. The pricing run re-clears supply and demand to incorporate these administrative prices into the calculation of locational marginal prices (“LMPs”). The pricing run produces both binding schedules and prices.

Q. At a high level, how does the recognition and deployment of available balancing capacity in the Energy Imbalance Market change the scheduling and pricing runs of the real-time market?

A. The constraint relaxation parameters used in the scheduling run and the pricing run are unchanged. Recognizing available balancing capacity simply means that the scheduling run does not need to relax these constraints to reach a feasible market solution if there is sufficient available balancing capacity to meet demand. In the pricing run, any available balancing capacity released in the scheduling run is included in the energy bids used to set prices within the balancing authority area. If there is sufficient available balancing capacity to meet demand, the energy bids will set the clearing price rather than the administratively determined prices that the CAISO applies when a constraint needs to be relaxed to reach a market solution.

Q. How does the CAISO include available balancing capacity in the scheduling run without changes to relaxation parameters or the economic bids from participating resources?

A. The CAISO will accomplish this goal by including the available balancing capacity in the scheduling run bid stack at prices outside of the bid cap (or bid floor), but below the power balance constraint relaxation parameter. For example, for potential infeasibilities due to bid-in supply shortfalls, the CAISO will include a factor in the price for available balancing capacity in the scheduling run to scale the bids in economic merit order between \$1025/MWh and \$1075/MWh. Because the bid cap is \$1000/MWh, effective economic bids from EIM participating resources will be used prior to deploying available balancing capacity. The relaxation parameter for the power balance constraint is \$1100/MWh and for a transmission constraint it is \$1500/MWh. Therefore, if needed, available balancing capacity will be dispatched prior to relaxing the power balance constraint in the event that there are insufficient effective economic bids from participating resources.

Q. What happens if the available balancing capacity is not sufficient to relieve an infeasibility in the scheduling run?

A. If there is insufficient available balancing capacity to relieve a potential infeasibility, the scheduling run will need to relax the relevant constraint to reach a market solution. Because a constraint was relaxed in the scheduling run, the pricing run

will clear the market using the existing pricing parameters set forth in Section 27.3.4 of the CAISO's tariff.

Q. How will the CAISO limit the release of available balancing capacity to address infeasibilities in the EIM balancing authority area from which the available balancing capacity was designated?

A. The CAISO will create and enforce an additional constraint in the scheduling run to mitigate the potential for available balancing capacity to be used to support an EIM transfer into/out of the balancing authority area affected by the potential infeasibility. Specifically, this constraint limits how much of the upward available balancing capacity the market can release to the difference between demand and effective supply from internal participating resources, less EIM transfers into the balancing authority area (*i.e.*, the amount of the upward power balance infeasibility that would result absent the available balancing capacity). A similar constraint limits the downward available balancing capacity that can be released to the difference between the effective supply from participating resources and demand, less the EIM transfers out of the balancing authority area (*i.e.*, the amount of the downward power balance infeasibility that would result absent the available balancing capacity).

Q. Under what circumstances will available balancing capacity be used by the CAISO to resolve transmission infeasibilities?

A. In the event that available balancing capacity is released in the scheduling run to resolve a power balance constraint as discussed in the previous question, the released capacity will participate in congestion management, and therefore it will be used simultaneously to address a transmission constraint. As discussed above, the relaxation parameter in the scheduling run for a transmission constraint is \$1500/MWh. This relaxation parameter is higher than the factor-adjusted bids from resources providing available balancing capacity. Because available balancing capacity is released at a price lower than the transmission constraint relaxation parameter, the CAISO's real-time market optimization software will dispatch available balancing capacity that is most effective at resolving a transmission constraint while simultaneously resolving a power balance constraint infeasibility.

Q. Given that the available balancing capacity released by the market is equal to the infeasibility identified in the scheduling run, how can the market determine a marginal price?

A. The market will be able to determine a marginal price because the CAISO will change the load forecast in the pricing run by a small tolerance to allow price discovery. Because the supply used in the pricing run is equal to what is cleared in the scheduling run, changing the load slightly in the pricing run will cause the supply and demand curves to intersect, thereby yielding the marginal price. The

marginal price is set by the highest price, considering both the economic bids submitted by EIM participating resources and the bids of available balancing capacity from EIM participating or non-participating resources deployed to resolve an infeasibility, based on the energy bid curves discussed above. Because the quantity of available balancing capacity is limited to the amount of the potential infeasibility identified in the scheduling run, the inclusion of available balancing capacity in the pricing run will not displace the last effective economic bid from EIM participating resources.

Q. How will EIM participating resources be dispatched by the CAISO to provide available balancing capacity?

A. Once the market optimization selects a participating resource to be dispatched for available balancing capacity in either the fifteen-minute market or the five-minute dispatch, the resource's scheduling coordinator will receive a dispatch operating point, which will determine its imbalance energy settlement from the CAISO market. This is no different than what the CAISO does under the existing market structure.

Q. How will non-participating resources be dispatched to provide available balancing capacity?

A. By definition, a non-participating resource is not itself participating in the Energy Imbalance Market. The EIM entity scheduling coordinator, however, can indicate through this process that a non-participating resource is available for dispatch or automated generation control, and can utilize the resource to balance its system.

Today, an EIM entity scheduling coordinator may include non-participating resources as part of its balanced load and supply schedules and will receive a dispatch operating point for such resources. Under the proposed procedure, the CAISO will continue to send a dispatch operating point to the EIM entity scheduling coordinator for non-participating resources, including for dispatches that utilize available balancing capacity from non-participating resources. Just like today, the EIM entity can override the dispatch and move the resource differently. However, the resource's imbalance energy settlement, which for a non-participating resource is conducted with the EIM entity scheduling coordinator, will be based on the dispatch operating point issued by the CAISO.

Q. How will the Energy Imbalance Market settle available balancing capacity from EIM participating resources?

A. Available balancing capacity provided by participating resources will be settled in the same manner as any imbalance energy dispatched through the Energy Imbalance Market. The participating resource will receive the full benefit of settlement including the energy settlement based on the locational marginal price and bid-cost recovery to ensure it recovers its costs.

Q. How will the Energy Imbalance Market settle available balancing capacity from non-participating resources?

A. As with participating resources, the CAISO's proposal does not change the manner in which non-participating resources are settled. The energy imbalance

for a non-participating resource representing the deployment of available balancing capacity from that resource will be settled identically to non-participating resources dispatched pursuant to the balanced schedules submitted by EIM entity scheduling coordinators. It should be noted that the CAISO is proposing that this proposal become effective on November 1, 2015, by which time, subject to FERC approval, the CAISO will have implemented new settlement provisions for non-participating resources generally, pursuant to its EIM year one enhancements tariff amendment. The settlement of any imbalance representing available balancing capacity will follow these revised settlement rules.

III. EXAMPLES OF THE OPERATION OF THE CAISO'S PROPOSED ENERGY IMBALANCE MARKET ENHANCEMENT

Q. Please provide a numerical example of how the CAISO will apply the available balancing capacity proposal that you describe above to resolve a potential power balance infeasibility in the Energy Imbalance Market.

A. I will provide examples under two different upward scenarios to illustrate how the CAISO will consider the available balancing capacity identified by the EIM entity scheduling coordinator and how it will treat the associated bids. Consider two separate balancing authority areas that share a 50 MW transfer limit and both participate in the EIM. For simplicity purposes, I will also assume that: (1) all resources have a minimum load (PMin) value of 0 megawatts (MW), (2) participating resources have submitted a single energy bid which covers the full output of the resource, (3) there is a single default energy bid price which covers

the full output of the resource, (4) there are no imports or exports in the base schedules, and (5) the system has no transmission losses to be considered. Also, I will assume that both balancing authority areas have entered the operating hour with balanced load and generation, and that the generation has sufficient bid range and ramping capability to pass the hourly resource sufficiency evaluation, thus allowing transfers between the two balancing authority areas to occur.

Table 1 below shows the initial conditions of the two balancing authority areas prior to running the market. “PR” refers to an EIM participating resource, while “NPR” refers to a non-participating resource.

Table 1

BAA#1: Load Base Schedule = 1000MW					
	<u>Pmax</u>	<u>Bid</u>	<u>DEB</u>	<u>AC</u>	<u>Base</u>
PR#1	500MW	\$40	\$30	0MW	400MW
PR#2	300MW	\$50	\$35	20MW	100MW
NPR#1	600MW	N/A	\$20	100MW	500MW
BAA #2: Load Base Schedule = 500MW					
	<u>Pmax</u>	<u>Bid</u>	<u>DEB</u>	<u>AC</u>	<u>Base</u>
PR#1	250MW	\$45	\$35	0MW	200MW
NPR#1	300MW	N/A	\$20	100MW	200MW
NPR#2	200MW	N/A	\$40	100MW	100MW

The available balancing capacity (referred to as “AC” in Table 1) designated for all of the non-participating resources is feasible because the sum of each resource’s base schedule and its upward available balancing capacity is less than or equal to the PMax of the resource. If, for example, in BAA#2, the EIM entity had identified

130 MW of available balancing capacity on NPR#1, the sum of the available balancing capacity and the 100 MW base schedule would be greater than the unit's Pmax. The CAISO would therefore have reduced the available balancing capacity from that resource to 100 MW.

In BAA#1, the EIM entity scheduling coordinator has designated available balancing capacity on a participating resource, PR#2. Designating available balancing capacity from a participating resource reduces the capacity of the resource that can be dispatched as imbalance energy through the Energy Imbalance Market. Consequently, the Energy Imbalance Market can only dispatch PR#2 between 0 MW and 280 MW for imbalance energy and PR#2's capacity between 280 MW and 300 MW is reserved as available balancing capacity to resolve a potential infeasibility in BAA#1.

Q. Please describe how the CAISO's proposal will treat the resources in the two balancing authority areas in the event BAA#1's actual load is 1000 MWs, which is the same as its base load, and BAA#2's actual load is 650 MWs, 150 MWs more than its base schedule. Refer to this as scenario 1.

A. In scenario 1, because BAA#2's actual load is 150 MWs greater than its base schedule there are insufficient effective energy bids from EIM participating resources to meet that total load. The only energy bids available from EIM participating resources are 50 MW from PR#1 in BAA#2 and those from the participating resources in BAA#1, which are limited by the 50 MW transfer limit.

The energy bids available from PR#1 in BAA#2 correspond to the 50 MWs between its 200 MW base schedule and its 250 MW Pmax.

All of the other capacity in BAA#2 has been designated as either the resource base schedules to meet BAA#2's load base schedule or as available balancing capacity.

The 150 MWs of load above the BAA#2's load base schedule will be partially served through a 50 MW transfer from BAA#1 to BAA#2 and an additional 50 MWs from PR#1 in BAA#2, both dispatched as imbalance energy through the Energy Imbalance Market. Without the available balancing capacity mechanism, the Energy Imbalance Market would encounter a power balance infeasibility in BAA#2 and apply the applicable CAISO tariff pricing parameter to resolve the power balance constraint. Under the available balancing capacity enhancement, when the scheduling run identifies this potential 50 MW power balance infeasibility in BAA#2, it will schedule an additional 50 MWs, designated as available balancing capacity, from NPR#1 in BAA#2. The scheduling run selects the available balancing capacity from NPR#1 because it is lower priced than the available balancing capacity from NPR#2 in BAA#2. This dispatch is summarized in Table 2 below.

Table 2¹

BAA#1		
	<u>Base</u>	<u>Dispatch</u>
PR#1	400MW	500MW
PR#2	100MW	50MW
NPR#1	500MW	500MW
BAA#2		
	<u>Base</u>	<u>Dispatch</u>
PR#1	200MW	250MW
NPR#1	200MW	250MW
NPR#2	100MW	100MW

Also, because the EIM transfer limit into BAA#2 is binding, local market power mitigation tests the EIM transfer limit for competitiveness in BAA#2. In this example, we assume that local market power mitigation determines the EIM transfer limit is non-competitive, which results in the energy bid for PR#1 in BAA#2 being mitigated from the \$45/MWh submitted to its \$35/MWh default energy bid.

Q. Please describe how the locational marginal prices will be determined in scenario 1.

A. The system marginal energy cost is set by the \$50/MWh energy bid for PR#2 in BAA#1. (This example assumes the reference bus for determining the system marginal energy cost is in BAA#1.) The binding 50 MW EIM transfer limit between BAA#1 and BAA#2 results in congestion between the two balancing authority areas. The marginal resource in BAA#2 as described above, is PR#1, which is

¹ In Table 2 and the following tables in this section, “Base” refers to the resource’s base schedule, while “Dispatch” refers to the amount of energy dispatched by the market.

mitigated to its default energy bid of \$35/MWh. This results in a marginal congestion cost in BAA#2 of \$15/MWh. Therefore, because we have assumed no losses in this scenario, the locational marginal price in BAA#1 is \$50/MWh (\$50/MWh energy component) and the locational marginal price in BAA#2 is \$35/MWh (\$50/MWh energy component and \$15/MWh congestion component).

Q. Please describe how these resources' energy schedules will be settled in scenario 1.

A. As described above, the CAISO has filed with the Commission proposed changes to the manner in which it settles imbalance energy through the Energy Imbalance Market in its Year 1 Enhancements filing. These changes, if approved by the Commission, will be in effect as of the proposed effective date of the available balancing capacity enhancement. Therefore, I will describe the settlement of the resources in this example based on the rules proposed in the Year 1 Enhancements filing. Under these rules, a resource's total energy settlement will be based on the resource's metered energy relative to the dispatch operating point for the resource. Table 3 below illustrates the resources' settlement based on their dispatch and metered energy. For simplicity purposes, the settlement outcomes below are described in megawatt amounts. However, in practice, energy settlements will be based on megawatt hours.

Table 3²

BAA#1					
	<u>Base</u>	<u>Dispatch</u>	<u>Meter</u>	<u>IIE</u>	<u>UIE</u>
PR#1	400MW	500MW	495MW	100MW	-5MW
PR#2	100MW	50MW	50MW	-50MW	0MW
NPR#1	500MW	500MW	503MW	0MW	3MW
BAA#2					
	<u>Base</u>	<u>Dispatch</u>	<u>Meter</u>	<u>IIE</u>	<u>UIE</u>
PR#1	200MW	250MW	250MW	50MW	0MW
NPR#1	200MW	250MW	255MW	100MW	5MW
NPR#2	100MW	150MW	150MW	50MW	0MW

The difference between the dispatch and the base schedule is instructed imbalance energy which is settled at the relevant fifteen-minute market and five-minute real-time dispatch locational marginal price. The difference between the dispatched energy and the metered energy is uninstructed imbalance energy which is settled at the five-minute real-time dispatch locational marginal price. It is important to note that in the event a non-participating resource receives a dispatch instruction for available balancing capacity, the available balancing capacity is settled as instructed imbalance energy and the threshold for calculating uninstructed imbalance energy is changed from the base schedule to the dispatch point of the available balancing capacity.

Q. Please describe how the CAISO’s proposal will treat the resources in the two balancing authority areas when BAA#1’s actual load is 1000 MWs, which is

² In Table 3 and the following tables in this section, “Meter” refers to the metered energy delivered by the resource, “IIE” refers to instructed imbalance energy and “UIE” refers to uninstructed imbalance energy.

the same as its base load, and BAA#2's actual load is 750 MWs, 250 MWs more than its base schedule. Refer to this as scenario 2.

- A.** In this second scenario, because the load in BAA#2 has increased by 250 MWs from its base schedule, the bids from EIM participating resources are inadequate to meet that total load. The additional 250 MWs of load is served through a 50 MW transfer from BAA#1 and BAA#2, which maximizes the economic EIM transfers between the balancing authority areas. An additional 50 MWs is scheduled in BAA#2 on PR#1, which dispatches the resource to its PMax and exhausts all available economic bids from participating resources. As a result, the scheduling run identifies a potential 150 MW infeasibility and deploys 100 MWs of available balancing capacity from NPR#1, which schedules the resource to its PMax. Since there is still a 50 MW potential infeasibility identified in the scheduling run, NPR#2 is scheduled to provide the remainder of the available balancing capacity necessary to resolve the infeasibility. Also, because the EIM transfer limit into BAA#2 is binding, local market power mitigation is tested for competitiveness. In this example, we assume that the EIM transfer limit is determined to be non-competitive which results in mitigation of PR#1 to its default energy bid (\$35/MWh). Table 4 below summarizes the dispatch

Table 4

BAA#1		
	<u>Base</u>	<u>Dispatch</u>
PR#1	400MW	500MW
PR#2	100MW	50MW
NPR#1	500MW	500MW
BAA#2		
	<u>Base</u>	<u>Dispatch</u>
PR#1	200MW	250MW
NPR#1	200MW	300MW
NPR#2	100MW	150MW

Q. Please describe how the LMPs will be determined in scenario 2.

A. In BAA#1, the marginal price is based upon PR#2 whose bid is \$50/MWh. This establishes the system marginal energy cost at \$50/MWh. Because the EIM transfer limit into BAA#2 is binding this results in congestion. In BAA#2, because we reduce the load in BAA#2 as described above, the marginal resource is NPR#2 with a default energy bid of \$40/MWh. This results in a marginal congestion cost in BAA#2 of \$10/MWh. Therefore, since we have assumed no losses in this scenario, the LMP in BAA#1 is \$50/MWh (\$50/MWh energy component) and the LMP in BAA#2 is \$40/MWh (\$40/MWh energy component and plus \$10/MWh congestion component). In this example it is important to note that the available balancing capacity released had a higher associated cost than the mitigated bids from PR#1, and therefore, the higher cost resources NPR#2 sets the marginal price.

Q. Please describe how these resources schedules for energy will be settled in scenario 2.

A. Table 5 below illustrates the resources' settlement based on their dispatch and metered energy. For simplicity purposes, the settlement outcomes below are described in megawatt amounts. However, energy settlements would be based on megawatt hours.

Table 5

BAA#1					
	<u>Base</u>	<u>Dispatch</u>	<u>Meter</u>	<u>IIE</u>	<u>UIE</u>
PR#1	400MW	500MW	495MW	100MW	-5MW
PR#2	100MW	50MW	50MW	-50MW	0MW
NPR#1	500MW	500MW	503MW	0MW	3MW
BAA#2					
	<u>Base</u>	<u>Dispatch</u>	<u>Meter</u>	<u>IIE</u>	<u>UIE</u>
PR#1	200MW	250MW	250MW	50MW	0MW
NPR#1	200MW	300MW	296MW	100MW	-4MW
NPR#2	100MW	150MW	151MW	50MW	1MW

The difference between the dispatch and the base schedule is instructed imbalance energy, which is settled at the relevant fifteen-minute market and real-time dispatch LMP. The difference between the dispatched energy and the metered energy is uninstructed imbalance energy, which is settled at the real-time dispatch LMP. As noted above, if a non-participating resource receives a dispatch for available balancing capacity, the available balancing capacity is settled as instructed imbalance energy and the threshold for calculating uninstructed imbalance energy is changed from the base schedule to the dispatch point of the available balancing capacity.

IV. CONCLUSION

Q. Does this conclude your testimony?

A. Yes it does.

I, Donald Tretheway, affirm under penalty of perjury that the statements in this testimony are true and correct to the best of my knowledge, information, and belief.


Donald Tretheway

Executed this 19th day of August, 2015

FERC rendition of the electronically filed tariff records in Docket No. ER15-00861-003

Filing Data:

CID: C001183

Filing Title: 2019-08-19 EIM Available Balancing Capacity Compliance

Company Filing Identifier: 438

Type of Filing Code: 80

Associated Filing Identifier: 11978

Tariff Title: CAISO eTariff

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29.4, Roles And Responsibilities., 2.0.0, A

Record Narrative Name:

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29.4 Roles And Responsibilities.

(a) CAISO Balancing Authority Obligations.

- (1) **Reliability Responsibilities.** Nothing in Section 29 shall alter the CAISO's responsibilities under the other sections of the CAISO Tariff, under any agreement not required by Section 29, or under NERC Reliability Standards or any other Applicable Reliability Criteria as the Balancing Authority for the CAISO Balancing Authority Area and the transmission operator for the CAISO Controlled Grid.
- (2) **Operating Responsibilities.** During any interruption of the normal operation of the Real-Time Market, the CAISO as Balancing Authority shall remain responsible for managing the resources in its Balancing Authority Area and the flows on transmission lines internal to the CAISO Balancing Authority Area, including imports and exports, for the duration of the interruption.

(b) EIM Entity.

- (1) **Balancing Authority Obligations.**
 - (A) **EIM Entity as Balancing Authority.** An EIM Entity must be a Balancing Authority registered and certified as such under the applicable authorities.
 - (B) **Reliability Responsibilities.** Nothing in Section 29 shall alter an EIM

Entity's responsibilities under NERC Reliability Standards as the Balancing Authority for the EIM Entity Balancing Authority Area and, to the extent applicable, as the transmission operator for transmission facilities within its Balancing Authority Area.

- (C) **Operating Responsibilities.** During any interruption of the normal operation of the Real-Time Market, the EIM Entity as Balancing Authority shall remain responsible in accordance with Section 29.7 for managing the resources in its Balancing Authority Area and the flows on internal transmission lines, including imports into and exports out of its Balancing Authority Area, for the duration of the interruption.
 - (D) **Inadvertent Energy.** An EIM Entity remains responsible for tracking inadvertent Energy and administering the payback of inadvertent Energy for its Balancing Authority Area through processes established by WECC.
- (2) **EIM Entity Agreement.** An EIM Entity must execute an EIM Entity Agreement no later than ninety (90) days before the EIM Entity Implementation Date.
- (3) **EIM Entity Obligations.** An EIM Entity shall-
- (A) perform the obligations of an EIM Entity in accordance with the EIM Entity Agreement, Section 29, and other provisions of the CAISO Tariff that by their terms apply to EIM Entities, subject to the limitations specified in Section 29.1(b)(2)(C);
 - (B) ensure that each EIM Transmission Service Provider in its Balancing Authority Area has provisions in effect in the EIM Transmission Service Provider's transmission tariff, as necessary or applicable, to enable operation of the Real-Time Market in its Balancing Authority Area;
 - (C) qualify as or secure representation by no more than one EIM Entity Scheduling Coordinator;
 - (D) review and validate information about available transmission capacity submitted to it by an EIM Transmission Service Provider and transmit

- such validated information to its EIM Entity Scheduling Coordinator;
- (E) provide the CAISO and its EIM Entity Scheduling Coordinator with information regarding the transmission capacity available to the Real-Time Market, including any information regarding Transmission Constraints of which it is aware;
- (F) define Load Aggregation Points in its Balancing Authority Area;
- (G) determine and inform the CAISO which resource types are eligible to participate in the Real-Time Market as resources and which transmission service providers or holders of transmission rights are EIM Transmission Service Providers; and
- (H) inform the CAISO whether or not the EIM Entity intends to utilize the CAISO's Demand Forecast consistent with Section 29.34(d).

(4) **EIM Entity Termination of EIM Participation.**

- (A) **EIM Entity Agreement.** An EIM Entity that wishes to terminate participation in the Real-Time Market must terminate the EIM Entity Agreement pursuant to its terms.
 - (B) **Notice.** Delivery to the CAISO of a written notice of termination pursuant to the terms of the EIM Entity Agreement shall represent the commitment by the EIM Entity to undertake all necessary preparations to disable the Real-Time Market within the EIM Entity Balancing Authority Area.
 - (C) **Actions Following Notice.** Upon receipt of such notice, the CAISO shall undertake all necessary preparations to disable the Real-Time Market within the EIM Entity Balancing Authority Area, as outlined in the Business Practice Manual for the Energy Imbalance Market, including issuance of a Market Notice within five Business Days after receipt of such notice.
- (5) **EIM Entity Corrective Actions.** If the EIM Entity takes corrective action, subject to the provisions of an open access transmission tariff, to address an

issue with EIM implementation or EIM operation, or the EIM Entity issues a notice of termination-

- (A) the EIM Entity shall take those actions provided in Section 29.1(d)(4) during the implementation of its corrective action; and
- (B) the CAISO shall issue a Market Notice in accordance with Section 29.1(d)(1) and take those actions provided in Section 29.1(d)(5) during the implementation of the EIM Entity corrective action.

(c) **EIM Entity Scheduling Coordinator.**

- (1) **Certification.** An EIM Entity Scheduling Coordinator must meet or have met the certification requirements in Section 4.5.1 for a Scheduling Coordinator.
- (2) **EIM Entity Scheduling Coordinator Agreement.** An EIM Entity Scheduling Coordinator must enter an EIM Entity Scheduling Coordinator Agreement with the CAISO, which shall satisfy the obligation to enter a Scheduling Coordinator Agreement under Section 4.5.1 with regard to its representation of the EIM Entity.
- (3) **Representation.** An EIM Entity Scheduling Coordinator-
 - (A) may represent a Market Participant other than an EIM Entity, but only if it enters a Scheduling Coordinator Agreement under Section 4.5.1 with regard to such Market Participant;
 - (B) may not also be an EIM Participating Resource Scheduling Coordinator or a Scheduling Coordinator for a Participating Generator, Participating Load, or Demand Resource Provider, unless the EIM Entity Scheduling Coordinator is a transmission provider subject to the standards of conduct set forth in 18 C.F.R. § 358; and
 - (C) may represent more than one EIM Entity if it has certified to the CAISO in the manner described in the Business Practice Manual for the Energy Imbalance Market that it has informed each EIM Entity of the multiple representation.
- (4) **Obligations.** An EIM Entity Scheduling Coordinator shall-

- (A) perform the obligations of an EIM Entity Scheduling Coordinator under the EIM Entity Scheduling Coordinator Agreement and Section 29;
- (B) perform the obligations of a Scheduling Coordinator under provisions of the CAISO Tariff described in Section 29.1(b);
- (C) register in the manner set forth in the Business Practice Manual for the Energy Imbalance Market all non-participating resources in the Balancing Authority Area of each EIM Entity that it represents and update such information in a timely manner;
- (D) verify in the manner set forth in the Business Practice Manual for the Energy Imbalance Market that all EIM Resources within the Balancing Authority Area of each EIM Entity represented by the EIM Entity Scheduling Coordinator have been registered with the CAISO;
- (E) submit the Interchange schedules with other Balancing Authorities at the defined Interchange scheduling locations, including creating and processing E-Tags in accordance with NERC, North American Energy Standards Board, and WECC standards and business practices for bilateral schedules between Balancing Authority Areas that are arranged no less than 20 minutes in advance of the Dispatch Interval of the Real-Time Market in which the Interchange will occur and that are included in an EIM Resource Plan;
- (F) match E-Tags and manage schedule curtailments at the defined Interchange scheduling locations with other Balancing Authorities;
- (G) provide EIM Transmission Service Information in accordance with Section 29.17;
- (H) settle all financial obligations arising out of the Real-Time Market for the EIM Entity, including financial settlement with non-participating resources and non-participating load within the EIM Entity Balancing Authority Area;
- (I) submit EIM Base Schedules, EIM Resource Plans and other required

information on behalf of the EIM Entity;

- (J) register with the CAISO, consistent with the provisions in the Business Practice Manual for the Energy Imbalance Market, all non-participating resources that the EIM Entity Scheduling Coordinator may designate as EIM Available Balancing Capacity in its EIM Resource Plan; and
- (K) create with the CAISO a Default Energy Bid consistent with the rules specified in Section 39.7.1 for all non-participating resources that the EIM Entity Scheduling Coordinator may designate as EIM Available Balancing Capacity in the EIM Resource Plan.

- (5) **Governmental Entities.** Notwithstanding Section 29.4(c)(3)(B), a governmental entity that is an EIM Entity Scheduling Coordinator may also be an EIM Participating Resource Scheduling Coordinator or a Scheduling Coordinator for resources participating in the CAISO Markets if it agrees to comply with standards of conduct equivalent to those set forth in 18 C.F.R. § 358.

(d) **EIM Participating Resources.**

- (1) **Eligibility.** The owner or operator of an EIM Resource is eligible to become an EIM Participating Resource if the EIM Resource-
 - (A) meets the eligibility requirements established by the EIM Entity in whose Balancing Authority Area the resource is located or scheduled or to which it may be dynamically transferred; and
 - (B) is capable of delivering Energy, Curtailable Demand, Demand Response Services, or similar services within the time specified by Section 29 for the Real-Time Market in which its EIM Participating Resource Scheduling Coordinator will submit Bids.
- (2) **EIM Participating Resource Agreement.** An EIM Participating Resource must execute an EIM Participating Resource Agreement.
- (3) **Obligations.** An EIM Participating Resource shall-
 - (A) perform the obligations of an EIM Participating Resource under the EIM

Participating Resource Agreement and Section 29;

- (B) perform the obligations applicable to Market Participants and resources under the provisions of the CAISO Tariff described in Section 29.1(b); and
- (C) if it represents a Generating Unit, Load of a Participating Load, Proxy Demand Resource, or other qualified resource, perform the obligations required for the resource under the provisions of the CAISO Tariff described in section 29.1(b).

(e) **EIM Participating Resource Scheduling Coordinator.**

- (1) **Certification.** An EIM Participating Resource Scheduling Coordinator must be either an existing Scheduling Coordinator or must meet or have met the certification requirements in Section 4.5.1 for a Scheduling Coordinator.
- (2) **EIM Participating Resource Scheduling Coordinator Agreement.** An EIM Participating Resource Scheduling Coordinator must enter an EIM Participating Resource Scheduling Coordinator Agreement with the CAISO, which shall satisfy the obligation to enter a Scheduling Coordinator Agreement under Section 4.5.1 with regard to its representation of the EIM Participating Resource.
- (3) **Representation.** An EIM Participating Resource Scheduling Coordinator-
 - (A) may represent a Market Participant other than an EIM Participating Resource, but only if it enters a Scheduling Coordinator Agreement under Section 4.5.1 with regard to such Market Participant;
 - (B) may not also be an EIM Entity Scheduling Coordinator unless the EIM Participating Resource Scheduling Coordinator is a transmission provider subject to the standards of conduct set forth in 18 C.F.R. § 358; and
 - (C) may represent more than one EIM Participating Resource.
- (4) **Obligations.** An EIM Participating Resource Scheduling Coordinator must-
 - (A) perform the obligations of an EIM Participating Resource Scheduling Coordinator under the EIM Participating Resource Scheduling Coordinator Agreement and Section 29;

- (B) perform the obligations of a Scheduling Coordinator under the provisions of the CAISO Tariff described in Section 29.1(b);
 - (C) ensure that the entity it represents has obtained any transmission service necessary to participate in the Energy Imbalance Market under the terms of the CAISO Tariff or the tariff of another transmission service provider, as applicable;
 - (D) register in the manner set forth in the Business Practice Manual for the Energy Imbalance Market all EIM Participating Resources that it represents, provide such information to the EIM Entity Scheduling Coordinator, and update such information in a timely manner.
- (5) **Governmental Entities.** Notwithstanding Section 29.4(e)(3)(B), a governmental entity that is an EIM Participating Resource Scheduling Coordinator may also be an EIM Entity Scheduling Coordinator if it agrees to comply with standards of conduct equivalent to those set forth in 18 C.F.R. § 358.

Record Content Description, Tariff Record Title, Record Version Number, Option Code:

29.30, Bid and Self-Schedule Submission For CAISO Markets., 2.0.0, A

Record Narrative Name:

Tariff Record ID: 9587

Tariff Record Collation Value: 592707037 Tariff Record Parent Identifier: 6478

Proposed Date: 2015-11-01

Priority Order: 500

Record Change Type: CHANGE

Record Content Type: 1

Associated Filing Identifier:

29.30 Bid and Self-Schedule Submission For CAISO Markets.

- (a) **In General.** The provisions of Section 30 that are applicable to the Real-Time Market, as supplemented by Section 29.30, shall apply to EIM Market Participants.
- (b) **Transition Cost Multiplier.** EIM Participating Resources that are also Multi-Stage Generating Resources may negotiate a Transition Cost multiplier with the CAISO, in consultation with Department of Market Monitoring, consistent with the procedures in Section 39.7.1.3 in the event that the monthly Thousand British Thermal Units (MMBtu) Gas Price Index used in Section 30.4.2 does not account for the fuel source of the Generating Unit.

- (c) **EIM Available Balancing Capacity Energy Bid Curve for EIM Participating Resources.** For each Trading Hour, the CAISO will apply Energy Bids submitted for EIM Participating Resources, which may be subject to mitigation pursuant to Section 29.39, towards the EIM Available Balancing Capacity as provided in Section 29.30(e).
- (d) **EIM Available Balancing Capacity Bids Used for EIM Available Balancing Capacity Served by Non-Participating Resources.** The CAISO will create an Energy Bid Curve based on the Default Energy Bid established by the EIM Entity Scheduling Coordinator and the CAISO pursuant to Section 29.4(c)(4)(K) for all non-participating resources that the EIM Entity Scheduling Coordinator may identify as EIM Available Balancing Capacity, and will apply such bids to the EIM Available Balancing Capacity as provided in Section 29.30(e).
- (e) **Treatment of Energy Bid Curves for EIM Available Balancing Capacity.** For each Trading Hour the CAISO will allocate the categories of the EIM Resource Plan specified in Section 29.34(e)(3)(C) and (D) as follows.
- (1) **Upward Capacity.** For upward capacity above the EIM Base Schedule, the CAISO will—
- (A) allocate the Spinning and Non-Spinning Reserves down from the upper regulating limit as registered in the Master File, taking into account any PMax rerates; and then
- (B) allocate EIM Upward Available Balancing Capacity to the Energy Bid Curve starting at the highest value of the Energy Bid Curve that does not overlap with Spinning or Non-Spinning Reserves.
- (2) **Downward Capacity.** For downward capacity below the EIM Base Schedule, the CAISO will allocate EIM Downward Available Balancing Capacity to the Energy Bid Curve starting at its lowest value, taking into account any PMin rerates.
- (3) **Remaining Capacity.** The CAISO will use any remaining portion of the Energy Bid Curve after the allocations in Section 29.30(e)(1) and 29.30(e)(2) for Dispatch under any condition, except that for non-participating resources the CAISO will

adjust the EIM Upward Available Balancing Capacity and EIM Downward Available Balancing Capacity towards the EIM Base Schedule so that there will not be any remaining capacity for Dispatch.

Record Content Description, Tariff Record Title, Record Version Number, Option Code:

29.34, EIM Operations, 3.0.0, A

Record Narrative Name:

Tariff Record ID: 9591

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Record Content Type: 1

Associated Filing Identifier:

29.34 EIM Operations

- (a) **In General.** Section 34, as supplemented by provisions in Section 29.34, will govern the operation of the Real-Time Market within the EIM Area.
- (b) **Applicability.** EIM Entity Scheduling Coordinators and EIM Participating Resource Scheduling Coordinators will submit EIM Base Schedules and other necessary information to the CAISO for use in the Real-Time Market pursuant to Section 29.34 and not pursuant to Section 34.
- (c) **Submission Deadlines.** If an EIM Entity Scheduling Coordinator or EIM Participating Resource Scheduling Coordinator fails to submit an EIM Base Schedule according to the timelines established in this Section 29.34, the CAISO will not accept the EIM Base Schedule or use it in the Real-Time Market.
- (d) **Demand Forecast.**
 - (1) **In General.** In accordance with procedures set forth in the Business Practice Manual for the Energy Imbalance Market, the CAISO shall develop short-term and mid-term Demand Forecasts by Demand Forecast zone within each EIM Entity Balancing Authority Area, separately from the CAISO Balancing Authority Area.
 - (2) **Short Term Forecast.** The CAISO's short-term Demand Forecast for an EIM

Entity Balancing Authority Area shall produce a value every five minutes for the duration of the CAISO's Dispatch horizon, which has five-minute granularity and extends several Dispatch Intervals.

- (3) **Mid-Term Forecast.** The CAISO's mid-term Demand Forecast for an EIM Entity Balancing Authority Area shall produce hourly values for the next hour through the next 7 days.
- (4) **EIM Entity Scheduling Coordinator Demand Forecast.**
 - (A) **In General.** An EIM Entity Scheduling Coordinator may opt to provide a non-binding EIM Entity Demand Forecast, net of behind-the-meter Generation that is not registered as an EIM Resource, as part of the hourly EIM Base Schedules.
 - (B) **Timing and Scope.** The EIM Entity Scheduling Coordinator must provide any such Demand Forecasts by 10:00 a.m. for the next 7 days.
 - (C) **Updates.** The EIM Entity Scheduling Coordinator must update any such Demand Forecast for each Operating Hour and the following 6 to 10 hours and submit the update to the CAISO no later than 75 minutes prior to the start of that Operating Hour, as part of its hourly EIM Base Schedule submission.
 - (D) **Effect on Bid Requirement.** If the EIM Entity Demand Forecast is less than the CAISO Demand Forecast, then the EIM Entity's EIM Resource Plan must include sufficient Bids to cover the difference in Demand Forecasts.
- (5) **Posting.** Between 6:00 p.m. of the seventh day prior to the start of the Operating Day and 6:00 p.m. of the day prior to the Operating Day, the CAISO shall post and update hourly Demand Forecasts by Demand Forecast zone.

(e) **EIM Resource Plan.**

- (1) **In General.** By 10:00 a.m. of the day preceding the Operating Day, the EIM Entity Scheduling Coordinators on behalf of non-participating resources and EIM Participating Resource Scheduling Coordinators on behalf of EIM Participating Resources, must submit all applicable components of the EIM Resource Plan as set forth in Section 29.34(e)(3).
- (2) **Scope.** The EIM Resource Plan components must cover a seven day horizon (with hourly detail for each resource) beginning with the Operating Day.
- (3) **Contents.** The EIM Resource Plan shall comprise-
 - (A) EIM Base Schedules of EIM Entities and EIM Participating Resources;
 - (B) Energy Bids (applicable to EIM Participating Resources only);
 - (C) EIM Upward Available Balancing Capacity;
 - (D) EIM Downward Available Balancing Capacity;
 - (E) Spinning Reserves in MW;
 - (F) Non-Spinning Reserves in MW; and
 - (G) if the EIM Entity Scheduling Coordinator is not relying on the CAISO's Demand Forecast, a Demand Forecast.
- (4) **Contents of EIM Base Schedules.** EIM Base Schedules of EIM Entities must include hourly-level Demand Forecasts for EIM Demand, hourly-level schedules for resources, and hourly-level scheduled Interchanges.
- (5) **Adjustment Prior to Submission of Real-Time EIM Base Schedules.** The EIM Entity Scheduling Coordinator may adjust the components of the EIM Resource Plan prior to the submission of Real-Time EIM Base Schedules up to 75 minutes before the Operating Hour.

(f) **Real-Time EIM Base Schedules.**

(1) **In General.**

(A) **Initial Submission.** EIM Entity Scheduling Coordinators, EIM Participating Resource Scheduling Coordinators, and non-participating resources in the EIM Entity Balancing Authority Area that wish to submit real-time hourly EIM Base Schedules, or, with regard to non-participating resources, wish to submit EIM Base Schedule information pursuant to Section 29.34(f)(4), must submit such schedules or other information consistent with the requirements of the Business Practice Manual for the Energy Imbalance Market and at least 75 minutes before the start of the Operating Hour.

(B) **Interim Revisions.** EIM Entity Scheduling Coordinators, EIM Participating Resource Scheduling Coordinators, and non-participating resources in the EIM Entity Balancing Authority Area may revise hourly Real-Time EIM Base Schedules, or, with regard to non-participating resources, revise EIM Base Schedule information submitted pursuant to Section 29.34(f)(4), meeting the requirements of the Business Practice Manual for the Energy Imbalance Market at or before 55 minutes before the start of the Operating Hour.

(C) **Final Revision.** EIM Entity Scheduling Coordinators may further revise hourly Real-Time EIM Base Schedules, including EIM Base Schedules for EIM Participating Resources, at or before 40 minutes before the start of the Operating Hour.

(2) **EIM Base Schedule for EIM Participating Resources.** The EIM Base Schedule for each EIM Participating Resource must be within the Economic Bid range of the submitted Energy Bids for each Operating Hour for EIM Resources,

which the CAISO will make available to the EIM Entity without price information.

- (3) **EIM Base Schedule for Imports and Exports.** EIM Base Schedules must disaggregate Day-Ahead import/export schedules between the EIM Entity Balancing Authority Area and the CAISO Balancing Authority Area, disaggregate the forward export schedules to other Balancing Authority Areas, and identify the relevant EIM Interties for imports and exports to an EIM Entity Balancing Authority Area from Balancing Authority Areas other than the CAISO Balancing Authority Area.
- (4) **EIM Base Schedule Aggregation.** In response to a request by an EIM Entity Scheduling Coordinator, the CAISO will establish an electronic interface by which non-participating resources, Loads, and other customers of the EIM Entity may submit EIM Base Schedule information to the EIM Scheduling Coordinator and the CAISO.
- (g) **Initial EIM Base Load Schedule.** The CAISO will derive an initial EIM Base Load Schedule for each EIM Entity from the Demand Forecast used for the EIM Entity Balancing Authority Area, estimated Transmission Losses, and an assumed Load distribution, pursuant to the methodology set forth in the Business Practice Manual for the Energy Imbalance Market.
- (h) **Energy Bids.** EIM Participating Resource Scheduling Coordinators may submit Energy Bids in accordance with the timelines, processes, and requirements applicable to other resources submitting Energy Bids under Section 34.
- (i) **Interchange Schedules with Other Balancing Authorities.**
 - (1) **In General.** EIM Entity Scheduling Coordinators must submit Interchange Schedules with other Balancing Authority Areas at the relevant EIM Interties and must update these Interchange Schedules with any adjustments, when applicable, as part of the hourly EIM Resource Plan revision.

- (2) **Economic Bidding of EIM Intertie Transactions.** An EIM Participating Resource Scheduling Coordinator may bid a transaction at an EIM External Intertie into the FMM if the EIM Entity supports economic bidding of EIM External Intertie transactions and the relevant transmission service providers or path operators support 15-minute scheduling at the EIM External Intertie under FERC Order No. 764.

- (j) **CAISO Validation.** The CAISO Markets systems will validate the initial EIM Resource Plan by 1:00 p.m. on the day before the Operating Day, and within 15 minutes of the submission of EIM Base Schedules or adjustments to EIM Base Schedules, the CAISO will validate the EIM Resource Plan and notify the EIM Entity Scheduling Coordinator-
 - (1) if the EIM Resource Plan is not balanced;
 - (2) if the EIM Resource Plan provides insufficient Flexible Ramping Constraint capacity to meet requirements determined pursuant to Section 29.34(m); and
 - (3) if the CAISO anticipates Congestion based on the submitted EIM Resource Plans.

- (k) **EIM Resource Plan Balance.** If, after the final opportunity for the EIM Entity to revise hourly Real-Time EIM Base Schedules according to Section 29.34(f)(1)(c), Supply in the EIM Base Schedules does not balance the Demand Forecast, the CAISO will adjust the Demand in the EIM Base Schedule to equal Supply.

- (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.
 - (2) **Insufficient Supply.** An EIM Resource Plan 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. ■

- (3) **Excess Supply.** An EIM Resource Plan 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. ■

(m) **Flexible Ramping Constraint Requirement.**

- (1) **Responsibility.** Each EIM Entity Balancing Authority Area and the CAISO Balancing Authority Area will be responsible for meeting its own portion of the combined Flexible Ramping Constraint capacity requirements for the next hour as determined by Section 29.34(m).
- (2) **Nature.** The Flexible Ramping Constraint capacity requirement is a minimum requirement for each Balancing Authority Area in the EIM Area and on a system wide basis based upon the EIM Transfer limit between Balancing Authority Areas.
- (3) **Determination.** Under the provisions of Section 29.34(m) and the procedures set forth in the Business Practice Manual for the Energy Imbalance Market, the CAISO will determine the Flexible Ramping Constraint capacity requirement using the CAISO Demand Forecast and CAISO Variable Energy Resource forecast for each Balancing Authority Area in the EIM Area and system wide.
- (4) **Sufficiency Determination.**
- (A) **Review.**

- (i) **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 Flexible Ramping Constraint capacity requirement, as adjusted pursuant to Sections 29.34(m)(4)(B), (C), and (E).
 - (ii) **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 Flexible Ramping Constraint capacity requirement, as adjusted pursuant to Sections 29.34(m)(4)(B), (C), and (E).
- (B) **Pro Rata Reduction and Diversity Limit.** Each EIM Entity Balancing Authority Area Flexible Ramping Constraint capacity requirement shall be reduced by its pro rata share of the diversity benefit in the EIM Area as may be limited by the available net import EIM Transfer capability into that EIM Entity Balancing Authority Area.
- (C) **Sufficiency of an EIM Entity Balancing Authority Area with a Net Outgoing EIM Transfer.** If an EIM Entity Balancing Authority Area has a net outgoing EIM Transfer (net export with reference to the EIM Base Schedule) before the Operating Hour, then the CAISO will apply a Flexible Ramping Constraint capacity requirement credit in determining the sufficiency of the Flexible Ramping Constraint capacity for that EIM Entity Balancing Authority Area equal to the net outgoing EIM Transfer before the Operating Hour.
- (D) **Sufficiency of an EIM Entity Balancing Authority Area with a Net**

Ingoing EIM Transfer. If an EIM Entity Balancing Authority Area has a net incoming EIM Transfer (net import with reference to the EIM Base Schedule) before the Operating Hour; then the Flexible Ramping Constraint capacity for that EIM Entity Balancing Authority Area will be considered sufficient if it meets its own Flexible Ramping Constraint capacity requirement, irrespective of the incoming EIM Transfer that results from Real-Time Dispatch in the EIM Area.

(E) **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 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 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 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.

- 5) **System Wide Constraint.** The CAISO shall determine the Flexible Ramping Constraint capacity requirement system wide, including requirements for individual Balancing Authority Areas in the system wide constraint, by reducing the total Flexible Ramping Constraint capacity requirement for each Balancing

Authority Area by the total amount of EIM Internal Intertie import capability to that Balancing Authority Area from each Balancing Authority Area in the EIM Area.

(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 has insufficient supply as determined according to Section 29.34(l)-

(A) the CAISO will not include the EIM Entity Balancing Authority Area in any Flexible Ramping Constraints for any combination of Balancing Authority Areas;

(B) the CAISO will formulate only individual constraints for the EIM Entity Balancing Authority Area's individual Flexible Ramping Constraint capacity requirements; and

(C) the CAISO will hold the EIM Transfer limit into the EIM Entity Balancing Authority Area 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 as provided in Section 29.34(f)(1)(c), the CAISO determines that an EIM Entity Balancing Authority Area has insufficient Flexible Ramping Constraint capacity according to Section 29.34(m), the CAISO will take the actions described in Section 29.34(n)(1).

(o) **Transmission Constraint Relaxation.** If an EIM Entity Scheduling Coordinator's approved EIM Resource Plan does not have sufficient Bids to resolve Congestion, the CAISO will relax the relevant Transmission Constraints in the Market Clearing and the EIM Entity will become responsible for managing its congested Transmission Constraints through other means, and the CAISO will determine prices for Congestion consistent with Transmission Constraint relaxation parameters established in the Business Practice

Manual for the Energy Imbalance Market until the Transmission Constraint is no longer binding in the Real-Time Market.

(p) **Operating Reserves.**

(1) **Schedules.**

- (A) **EIM Entity Responsibility.** Each EIM Entity is responsible for its contingency reserves, or share of such contingency reserves under the terms of a reserve sharing group agreement, and it and the reserve sharing group are responsible for deploying operating reserves, including regulating reserves, in conformance with NERC and WECC requirements.
- (B) **EIM Entity Scheduling Coordinator Responsibility.** The EIM Entity Scheduling Coordinator shall-
 - (i) include any Energy deployed from reserves in the hourly EIM Base Schedules, if time permits, in which case they will be settled in the Real-Time Market;
 - (ii) otherwise include the Energy deployed from reserves as EIM Manual Dispatches, if time does not permit;
 - (iii) immediately inform the CAISO of events requiring Dispatch of operating reserves and resource EIM Base Schedule adjustments in response to contingencies;
 - (iv) if a resource's actual response differs from the resource EIM Base Schedule adjustment, provide a resource EIM Base Schedule update showing the actual resources dispatched during the event by no later than 1:00 a.m. seven days after the Operating Day in which the event occurred; and

- (v) inform the CAISO of the amount of resource capacity that is reserved for contingency reserve responsibility by either ensuring that an Energy Bid for the resource is below the maximum operating limit of the resource or reducing the maximum operating limit of the resource.

(C) **CAISO Actions.**

- (i) **Prior to Update.** Until the CAISO receives resource operating limit updates from an EIM Entity Scheduling Coordinator, the CAISO will continue to send Dispatch Instructions based upon pre-event operating limits.
- (ii) **After Update.** After EIM Base Schedule updates are received and Dispatches in the Real-Time Market reflect the updated Self-Schedules and operating limits, the CAISO shall account for the Dispatches in the net scheduled Interchange values that it provides to EIM Entity Scheduling Coordinators.

(2) **Updates to Data for Reserve Sharing Event.**

- (A) **Responsibilities.** Immediately following a reserve sharing event impacting the EIM Entity Balancing Authority Area-
 - (i) the EIM Entity must submit information regarding the assistance provided, including impacts to Balancing Authority Area Load schedules for each participant involved in the reserve sharing event; and
 - (ii) the EIM Entity Scheduling Coordinator must submit to the CAISO EIM Manual Dispatch instructions for resources in the EIM Entity Balancing Authority Area deployed in response to the reserve sharing event, pursuant to the reserve sharing group's criteria.

- (B) **Offsets.** Until 1:00 a.m. seven days following the reserve sharing event impacting the EIM Entity Balancing Authority Area, the EIM Entity may offset the Load schedules created by the reserve sharing event by entering resource to Load schedules, reflecting generation resources actually utilized to assist in the event.
- (q) **Variable Energy Resources.** Provisions of Section 34 specifically applicable to Variable Energy Resources and Eligible Intermittent Resources appear in Sections 34.1.3, 34.1.6, 34.2.2, 34.5.1. 34.13.2.
- (r) **Use of EIM Available Balancing Capacity.**
- (1) **In General.** The CAISO will use EIM Available Balancing Capacity identified in the EIM Resource Plan to address power balance constraint infeasibilities in the EIM Balancing Authority Area for which the EIM Available Balancing Capacity is designated by the responsible EIM Entity Scheduling Coordinator, while simultaneously participating in Congestion Management.
- (2) **Resource Sufficiency Evaluations.** The CAISO will not apply the EIM Available Balancing Capacity towards its evaluation of the resource sufficiency tests specified in Section 29.34(k), (l), and (m).
- (3) **Real-Time Market Scheduling Run.** In each interval of the Real-Time Market, the CAISO will use the EIM Available Balancing Capacity in the run of the market optimization used to establish scheduling priorities by-
- (A) adding a penalty price factor to EIM Available Balancing Capacity Energy Bid prices so that the EIM Available Balancing Capacity is dispatched to address power balance violations, after Effective Economic Bids submitted for EIM Participating Resources in the respective EIM Balancing Authority Area not associated with the EIM Available Balancing Capacity have cleared, while respecting the economic merit order of the EIM Available Balancing Capacity Energy Bid prices;
- (B) enforce a constraint that prevents the release of EIM Upward Available

Balancing Capacity in excess of the difference between the EIM Entity's demand and the supply of Effective Economic Bids cleared within the applicable EIM Balancing Authority Area, minus the import transfer into that EIM Balancing Authority Area; and

(C) enforce a constraint that prevents the release of EIM Downward Available Balancing Capacity in excess of the difference between the supply of Effective Economic Bids cleared within the applicable EIM Balancing Authority Area and the EIM Entity's demand, minus the export transfer out of that EIM Balancing Authority Area.

(4) **Real-Time Market Pricing Run.** For each interval of the Real-Time Market, in the run of the market optimization used to set binding schedules and prices, the CAISO will—

(A) use the EIM Available Balancing Capacity released in the run of the market optimization to establish scheduling priorities based on the Energy Bid Curves for EIM Participating Resources and non-participating resources created pursuant to Sections 29.30(c) and (d), respectively;

(B) change the load forecast for the EIM Balancing Authority Area by a small tolerance to allow for price determination;

(C) clear the Real-Time Market and establish prices based on the pricing parameters in Sections 27.4.3.2 and 27.4.3.4, if the amount of EIM Available Balancing Capacity released in the scheduling run is not sufficient to clear the potential infeasibility identified in the scheduling run.

Record Content Description, Tariff Record Title, Record Version Number, Option Code:

-, EIM Available Balancing Capacity, 0.0.0, A

Record Narrative Name:

Tariff Record ID: 9737

Tariff Record Collation Value: 1130388472 Tariff Record Parent Identifier: 6859

Proposed Date: 2015-11-01

Priority Order: 500

Record Change Type: NEW

Record Content Type: 1

Associated Filing Identifier:

EIM Available Balancing Capacity.

Any EIM Upward Available Balancing Capacity or EIM Downward Available Balancing Capacity.

Record Content Description, Tariff Record Title, Record Version Number, Option Code:
-, EIM Downward Available Balancing Capacity, 0.0.0, A
Record Narrative Name:
Tariff Record ID: 9738
Tariff Record Collation Value: 1130629592 Tariff Record Parent Identifier: 6859
Proposed Date: 2015-11-01
Priority Order: 500
Record Change Type: NEW
Record Content Type: 1
Associated Filing Identifier:

EIM Downward Available Balancing Capacity.

Any downward capacity from an EIM Participating Resources or a non-participating resource that an EIM Entity Scheduling Coordinator has identified in the EIM Resource Plan as available to address power balance and transmission constraint violations in the EIM Balancing Authority Area.

Record Content Description, Tariff Record Title, Record Version Number, Option Code:
-, EIM Upward Available Balancing Capacity, 0.0.0, A
Record Narrative Name:
Tariff Record ID: 9739
Tariff Record Collation Value: 1130663654 Tariff Record Parent Identifier: 6859
Proposed Date: 2015-11-01
Priority Order: 500
Record Change Type: NEW
Record Content Type: 1
Associated Filing Identifier:

EIM Upward Available Balancing Capacity.

Any upward capacity from an EIM Participating Resources or a non-participating resource that an EIM Entity Scheduling Coordinator has identified in the EIM Resource Plan as available to address power balance and transmission violations in the EIM Balancing Authority Area.

Document Content(s)

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438-dfd3986e-e3f7-4d92-a1bf-a88a82b931a6.PDF.....62-69

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