UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

California Independent System Operator Corporation	**)** **)** **)**	**Docket Nos. ER15-861-000 and EL15-53-000**

COMMENTS OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION ON TECHNICAL CONFERENCE

The California Independent System Operator Corporation (CAISO) submits these comments on the technical conference held on April 9, 2015, regarding certain pricing excursions based on constraint relaxation parameters and not actual bids that have occurred in the CAISO's Energy Imbalance Market (EIM). During the technical conference, the CAISO indicated that it was developing a market enhancement to address the pricing excursions and would present its proposed solution in comments filed on the technical conference. The CAISO describes its proposal below. The CAISO also responds to questions posed by Commission staff at the technical conference.

Over the past six months the CAISO and PacifiCorp have undertaken significant efforts to successfully implement the first in the Western interconnection. Both shared a substantial amount of information at the April 9, 2015 technical conference and provided a robust survey of the types of post implementation issues they have experienced in the EIM. The CAISO and PacifiCorp have submitted 6 reports, providing detailed information on the issues experienced, the magnitude and frequency of the issues, and the remedial actions each party has taken. The information provided by the CAISO and

PacifiCorp illustrate that the price excursions experienced after the launch, which would have persisted but for the waiver granted by the Commission, resulted from several post-launch issues that could only be identified in an actual production environment. Further, the CAISO and PacifiCorp could only remedy the root causes of such price excursions after gaining experience with the new market and developing, testing, deploying, and reevaluating procedures and remedial measures. Closer evaluation of the total capacity available to PacifiCorp as the balancing authority shows that PacifiCorp has been sufficiently resourced to balance its system and meet load consistent with NERC requirements during this time.

Lessons learned by both parties have led to an enhanced appreciation for the importance of ensuring that the market systems are accurately and timely informed of the amount of capacity available to the EIM entity balancing authority area to balance load. In 95% of market intervals there were sufficient effective economic bids available to manage the imbalance needs. However, in a much smaller number of intervals there were infeasibilities, which were primarily caused by imperfect or delayed information that left the market systems to conclude that there were infeasibilities, when in fact the EIM entity was sufficiently resourced and used those resources to balance the system reliably. Some of these information gaps were due to processing issues related to the post-implementation learning curve. Deeper analysis of the post-implementation issues reveals that under the current EIM functionality there is insufficient time to manually reflect the actions the EIM balancing authority takes in manually deploying its load following and regulation capacity accurately to the market systems. Therefore, the CAISO proposes to adopt an automated feature that will ensure the CAISO market

systems accurately and timely reflect available capacity and operator actions taken in the EIM balancing areas.

The CAISO can implement the automated solution discussed in these comments in a relatively short time and anticipates to be ready to do so by August 24, 2015. This solution will better inform the market systems of capacity available to the EIM balancing authority to address infeasibilities of either the transmission or power balance constraints within the EIM balancing authority area. This will eliminate pricing excursions resulting from misinformed market runs based on false scarcity conditions, when in fact, the EIM balancing authority area was not actually short of available capability including load following or regulation capability. This solution will not, however, eliminate the potential for price excursions that are related to the EIM's learning to manage its total supply resources to balance its balancing area in concert with operating in the new market environment.

In the interim, PacifiCorp and the CAISO will continue to deploy the manual solutions that enable PacifiCorp to inform the EIM of its deployment of additional available capacity. Although the manual measures will minimize the false infeasibilities previously observed, they are still susceptible to human error and processing challenges. The automated feature proposed by the CAISO would significantly ameliorate such risks.

The CAISO respectfully requests that the Commission issue an order directing the CAISO to file tariff revisions to implement these enhancements and resolve the

Commission's investigation in Docket EL15-53. The CAISO believes it can implement these measures by August 24, 2015.[1]

I. Background

The CAISO implemented the EIM on November 1, 2014. Following implementation, 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 to bind more frequently than expected, producing atypically high prices in the fifteen-minute and five-minute markets in the balancing authority areas of PacifiCorp, the first participating EIM entity. The CAISO determined that a combination of factors -- 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 -- restricted the amount of effective economic bids to relieve the power balance and transmission constraints.

To address these circumstances, on November 13, 2014, the CAISO requested that the Commission grant a 90-day limited waiver of CAISO tariff section 27.4.3.2 and the second sentence of section 27.4.3.4 to allow the CAISO to retain the ability to relax the constraints described in those sections without applying the administrative pricing parameter that sets the price at the maximum energy bid price of $1,000/MWh. Instead, under the requested waiver, the CAISO proposed to use the pricing mechanism that

[1] On April 15, 2015, the CAISO moved that the Commission modify the refund effective date to this date and extend the current waiver to enable the CAISO to develop the proposed solution and implement it as soon as possible with minimal impact to rate-payers.

applies when there are sufficient effective economic bids to allow a feasible market solution, *i.e.*, market participants will pay or receive the fifteen-minute market or real-time dispatch locational marginal price, as determined using the locational marginal prices, consistent with Sections 27.1.1, 34.20, and Appendix C of the CAISO tariff.[2] On December 1, 2014, the Commission granted the CAISO's requested waiver.[3] On February 12, 2015, the Commission extended the waiver, at the CAISO's request, until the earlier of March 16, 2015 or the date the Commission issued a subsequent order in this proceeding.

Although by then the CAISO and PacifiCorp had made substantial progress in addressing the issues that gave rise to the price excursions, the CAISO concluded that integration into a sophisticated centralized market would be a major paradigm shift for any new EIM entity. Such a transition requires a learning period to develop new capabilities and mitigate deficiencies in market tools and procedures that may otherwise misinform the market systems and produce anomalous results. Therefore, on January 15, 2015, the CAISO proposed tariff revisions that would apply to each new EIM Entity during such EIM Entity's initial year of EIM participation. Proposed tariff section 29.27(b)(1) provided that the CAISO would determine prices for intervals that experience transmission or system balance constraints within the new EIM Entity's balancing authority area using the last economic bid to establish the market clearing price, rather than using the existing tariff's $1,000/MWh penalty price. Proposed tariff section 29.27(b)(2) stated that, for a 12-month transition period after a new EIM Entity

[2] To effectuate this pricing mechanism, it was also necessary to adjust the penalty price for the flexible ramping constraint parameter for the EIM balancing authority area in order to allow the market software to discover the marginal energy bid price that would set the locational marginal price.

[3] *Cal. Indep. Sys. Operator Corp.,* 149 FERC ¶ 61.194 (2014).

commences operations in the EIM, the CAISO will set the flexible ramping constraint relaxation parameter specified in tariff section 27.10 for the new EIM Entity's balancing authority area at an amount between $0 and $0.01 (instead of $60).

In its March 16, 2015 order, the Commission rejected the proposed tariff amendments. The Commission instituted a proceeding under section 206 of the Federal Power Act, to investigate the justness and reasonableness of the EIM provisions in CAISO's existing tariff related to the imbalance energy price excursions in PacifiCorp's balancing authority areas that the CAISO had described in the tariff and waiver filings discussed above. The Commission established a refund effective date 90 days from publication of notice in the Federal Register.[4] The Commission also directed staff to hold a technical conference to explore the issues raised by the CAISO.[5] The technical conference occurred on April 9, 2015.

On April 10, 2015, the CAISO filed a motion seeking relief pending the Commission's final order or, in the alternative, requesting rehearing on a discrete aspect of the Commission's March 16, 2015 order. The CAISO requested that the Commission either (1) revise the refund effective date to September 2, 2015, and extend the existing waiver of sections 27.4.3.2 and 27.4.3.4 of the CAISO's tariff to that date, or (2) extend the existing waiver of sections 27.4.3.2 and 27.4.3.4 of the CAISO's tariff to the date of the CAISO's compliance with an order resolving proceeding Docket No. EL15-53. On April 14, 2015, the Commission extended the time for the CAISO to submit its proposal and initial comments until April 23, 2015. The Commission also established May 7,

[4] Notice appeared in the Federal Register on March 24, 2015. 80 Fed. Reg. 15594 (Mar. 24, 2015). The refund effective date is thus June 22, 2015.

[5] *Cal. Indep. Sys. Operator Corp.*, 150 FERC ¶ 61,191 (2015).

2015 as the date for parties to submit comments on CAISO's proposal and May 21, 2015 as the date for parties to file reply comments.

II. Discussion

A. Lessons learned over the past six months reveal the need for automatic recognition of all available capacity in the EIM area.

The launch of the first Energy Imbalance Market in the Western Interconnection has been an overall success and, after only six months of operations, overall both the CAISO and PacifiCorp and their market participants are experiencing significant benefits. As with any new significant market launch, there have been some challenges. One challenge was false scarcity in the market clearing process leading to unexpected price excursions. The price excursions experienced since the launch of the new EIM resulted from infeasibilities observed in the market runs that require the relaxation of transmission constraints or the power balance constraint triggering an administrative pricing parameter of $1000/MWh. This occurred because the market systems observed an insufficient amount of effective economic ramp constrained bids to clear the fifteen and five minute markets. These price excursions were intermittent but were more frequent than expected and spanned a few intervals.

After months of investigation and analysis, the CAISO confirmed that these events were not the product of actual capacity insufficiencies in the PacifiCorp balancing areas, but rather resulted from issues that limited the visibility of capacity that is available to PacifiCorp to meet load in its balancing areas. In part these were due to learning curve, but in part due to a market structure issue that obscures the markets ability to observe such available capacity. As PacifiCorp reported at the April 9 conference, despite the signals of infeasibility in the EIM systems, PacifiCorp was

resource sufficient and maintained reliability in its balancing authority areas. Most notably, PacifiCorp reported that since November 1 to present, PacifiCorp has experienced no Reliability Based Control violations, which is the reliability measure applicable to PacifiCorp that measures Area Control Error to ensure maintenance of steady-state frequencies at PacifiCorp's balancing authority area interconnections.

Although the EIM is an extension of the CAISO's real-time market, it is unique in several respects, which are important to understanding the issues experienced after the launch the solutions considered. Under the EIM construct, EIM entities retain all of their balancing authority responsibilities and must perform their balancing functions in concert with the EIM in real-time. In fulfilling the balancing function, the EIM entity must maintain a certain amount of capacity within its balancing authority area, it deems necessary to reliably operate its system within the confines of the transfer capability limitations that exist. With PacifiCorp, the post-go live experience demonstrated that although PacifiCorp has successfully been able to manually dispatch this capacity outside of the EIM to address infeasibilities the EIM has not always been able to recognize the dispatch of this capacity. Dispatch outside of the EIM and retaining control of this capacity is not done for the purpose of withholding capacity from the market, but to ensure capacity is available to the EIM in the event of a reliability event that requires the deployment of such capacity or in the case that reserve requirements increase within the hour. To obtain robust market solutions under the EIM 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 area is infeasible.

The monthly reports submitted by the CAISO and PacifiCorp over the past six months reveal that many of the infeasibilities are due to “learning curve” challenges as operations personnel of EIM Entities become accustomed to coordinating balancing authority operations with new market systems. Other infeasibilities have resulted from operational challenges associated with the need to finely calibrate and improve EIM market systems so that in clearing the real-time market the systems would recognize the full scope of PacifiCorp’s available capacity and the dynamic nature of PacifiCorp’s real-time BAA operations.

The CAISO and PacifiCorp have made significant progress moving along the learning curve and reducing constraint relaxation infeasibilities by closely coordinating their analysis of root causes of the infeasibilities and deploying numerous system and process improvements. At the technical conference, the CAISO addressed questions including what actions have been taken to address the underlying causes of the price excursions and what remedial enhancements under consideration. The remedial actions already taken include enhancements to market systems visibility for PacifiCorp and extensive training and numerous operational and process improvements adopted by PacifiCorp.[6]

Despite these improvements, the CAISO believes it is necessary to enhance the functionality of the market systems to ensure that systems are automatically informed of

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the full scope of available capacity and recognize the actions the EIM entity takes to manage such capacity to balance its system. The CAISO has concluded that an automated process that accounts for an EIM entity's management of its other available capacity, including regulation and load-following capacity, is necessary for reasons unrelated to the learning curve. 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, while 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 their base schedules and bids. While this is not impossible, it requires the EIM entity to quickly and accurately surmise and 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 issues. Second, if it deploys the capacity into the EIM, 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 in the event that an actual reliability issue materializes and the balancing authority is dependent on that capacity.

The EIM flexibility requirements are intended to cover a range of load and supply variability and uncertainty conditions up to the 95% confidence level. However, the EIM itself was designed to other imbalance conditions such as a trip of a large resource

which would trigger activation of contingency reserves. Therefore, when actual imbalance conditions fall outside the set of conditions the EIM is designed to address, the balancing authority still has responsibility and must therfore maintain capability to manage such conditions. Rather than waiting for balancing authority to inform the EIM of such action manually, the proposal would automatically account for such balancing authority actions. An automated mechanism would further reduce price excursions by eliminating the risks discussed above.[7]

B. Functionality to automatically recognize available capacity and operator deployment such capacity.

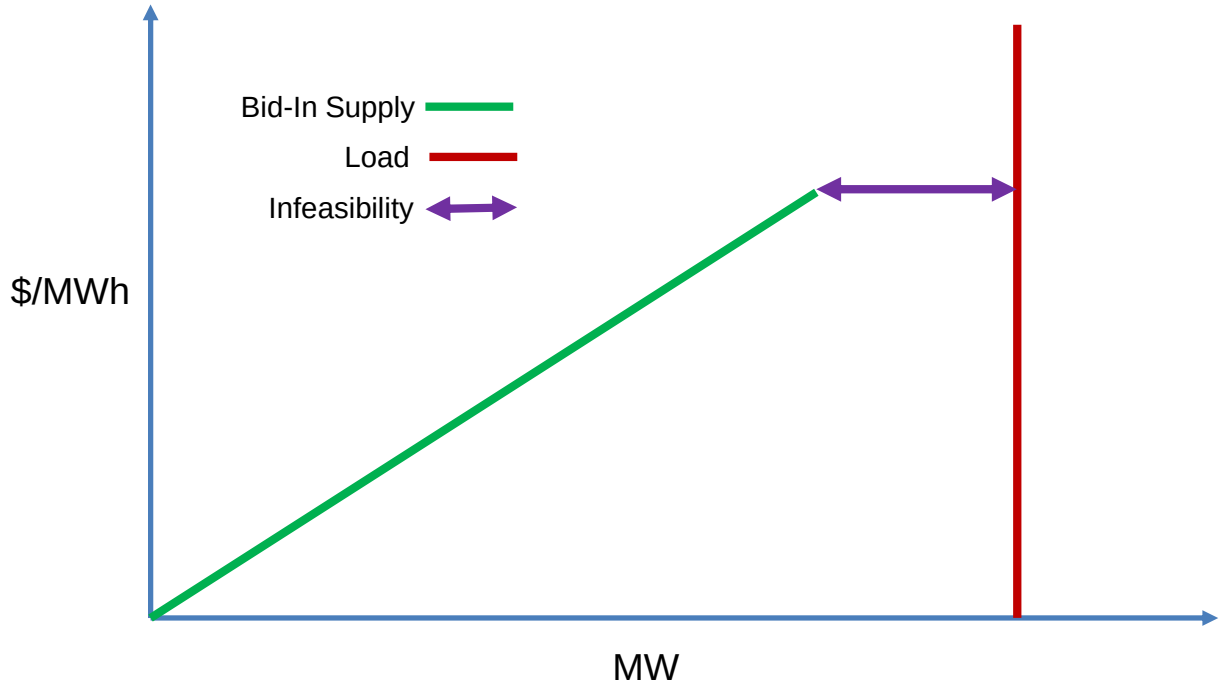
As discussed above, the EIM entity should retain control over the amount of capacity it deems necessary to balance its area reliably, under the current EIM construct that capacity does not normally participate in the EIM. Rather, the EIM entity maintains this capacity in reserve to fulfill its balancing authority area responsibilities such as frequency, tie-line control, balancing, load-following, and reliability. Currently, the EIM does not consider additional capacity that is available to an EIM entity to remediate power balance violations. In contrast, the CAISO optimizes the use of ancillary services and energy. If the CAISO requires additional ancillary services in its balancing authority area, the market processes will co-optimize ancillary services bids and energy bids and release available ancillary services capacity to avoid, to the extent possible, any power balance violations. The EIM does not perform this function for non-CAISO balancing authority areas.

[7] The CAISO may nonetheless still request a form of transition for new EIM Entities.

The discussion below illustrates how the CAISO would deploy the additional available capacity if a power balance violation is detected in the EIM balancing area. The available capacity can also be dispatched to resolve over-generation and transmission constraints internal to the EIM balancing authority area.

Under the current CAISO market design, if there is a lack of effective economic ramp constrained bids to clear demand, the market software will observe a gap and will not reach a feasible solution unless it relaxes the power balance constraint. Figure 1 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.

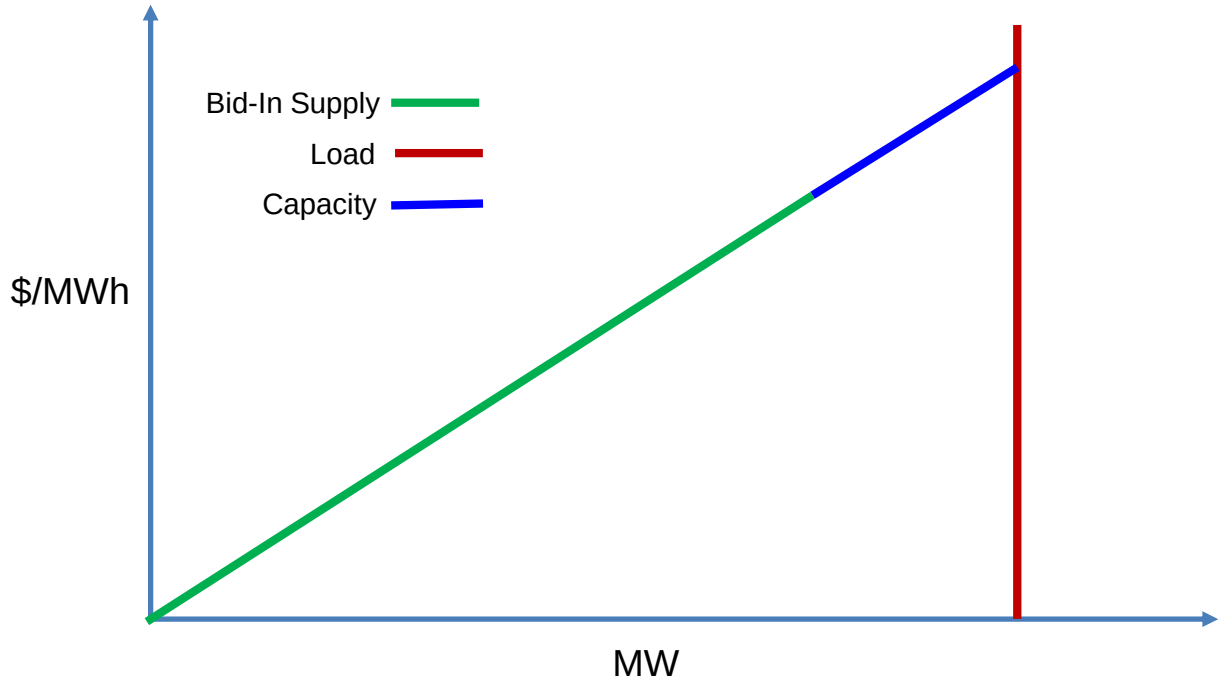
Figure 1



Under the CAISO's proposed enhancement, the market optimization process will automatically recognize and account for available 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 the balancing authority has determined is necessary for reliable operations (referred to generally as “available capacity”). Once recognized and incorporated in the CAISO market, this available capacity will be available to be used if a potential transmission or power balance constraint violation occurs in the EIM entity’s balancing area (see Figure 2 below). Figure 2 illustrates the use of the available capacity to bridge the gap and eliminate the infeasibility.

Figure 2

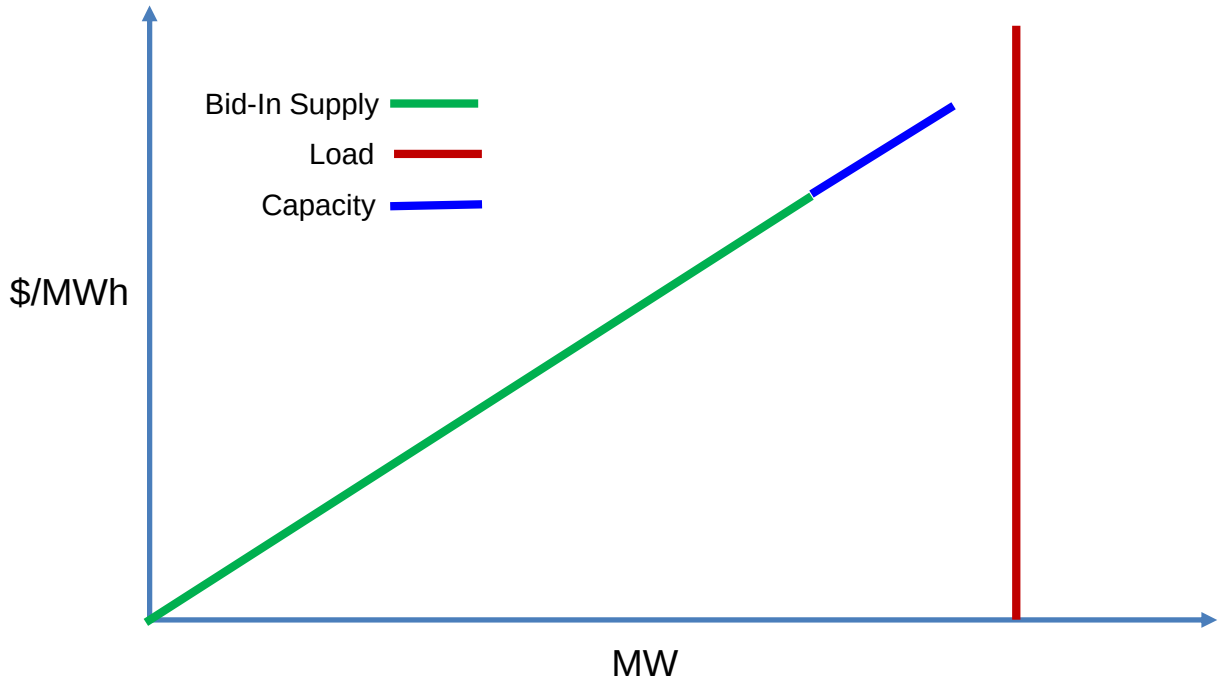


A key element of this proposal is that the EIM entity will still retain capacity it deems necessary to operate its systems consistent with good utility practice and NERC requirements, but it allows the EIM entity to deploy such capacity through the EIM to reflect the actions it would take to resolve any infeasibilities in its operations. This is possible because, with the improved functionality, the CAISO’s market optimization will

only recognize and use this available capacity if a potential power balance infeasibility occurs within an EIM Entity's balancing authority area. Also, because the EIM entity uses the available capacity to meet balancing area reliability requirements, the available capacity cannot be used to support incremental EIM transfers. Because the available capacity is included in the market optimization process, any dispatch of this available capacity will be at the resource level, and therefore consider actual telemetry, physical unit characteristics, and congestion. This allows the CAISO to produce feasible solutions and ensure prices reflect the true nature of the deployed capacity.

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

Figure 3



Under the proposed enhancement, available capacity would automatically be deployed in the CAISO markets to resolve infeasible power balance conditions in EIM balancing area only, as follows. First, by 75 minutes prior to the trading hour, the EIM entity scheduling coordinator would identify the available capacity from each of its EIM participating and non-participating resources. This available capacity will be identified in the regulation up and regulation down fields of the EIM resource plan.[8] The EIM entity will validate and finalize each EIM resource plan by 40 minutes prior to trading hour, reflecting any changes the EIM entity has made based upon the outcome of the resource sufficiency evaluation.[9] The CAISO will not consider the available capacity

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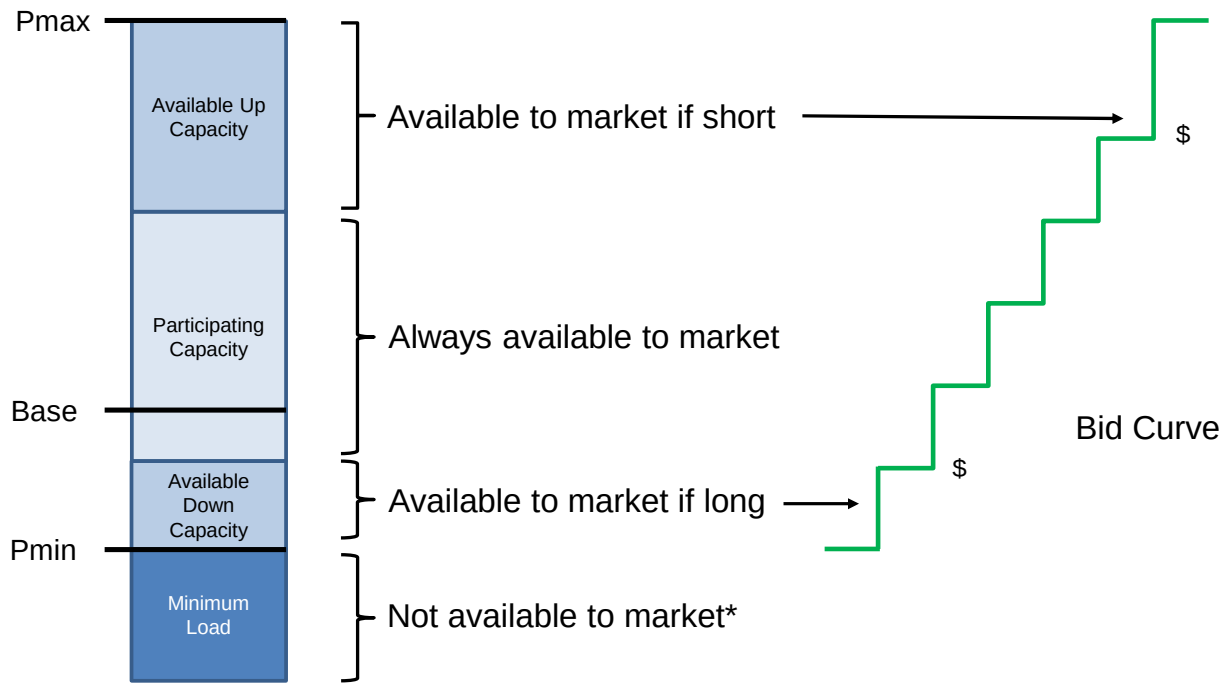
[88] The CAISO recognizes that the full scope of the available capacity may be comprised of load following and actual AGC available capacity, which is different than the CAISO's own definition of regulation up and down. But the existing category functionality can be used for conveying this information to the CAISO systems.

[9] See CAISO Tariff, Section 29.34(l)(1).

identified by the EIM entity scheduling coordinator when performing the resource sufficiency evaluation test which evaluates whether the EIM entity has offered sufficient capacity to meet forecast load and offered sufficient capacity to meet its ramping requirements.

EIM participating resource scheduling coordinators will continue to submit energy bids for EIM participating resources. However, as shown in Figure 4 below, such bids must include a bid curve that spans the range of any additional available capacity the EIM entity wants to make available to relieve potential power balance or transmission infeasibilities in the EIM balancing areas. The CAISO will validate these bids and apply the real-time local market power mitigation procedures under the existing tariff-based rules.

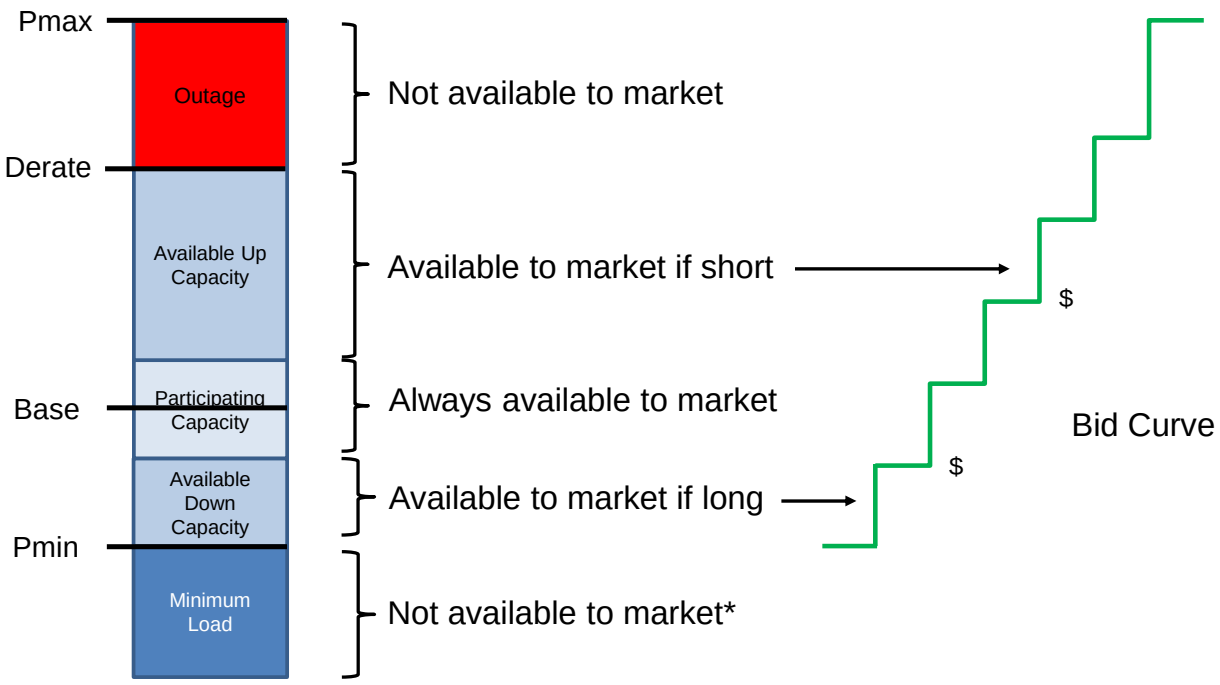
Figure 4



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

As shown in Figure 5 below, if an outage occurs affecting an EIM Participating Resource, the outage will be reflected as a reduction in the resource's overall available capacity before reducing the up/down available capacity available to address market infeasibilities.

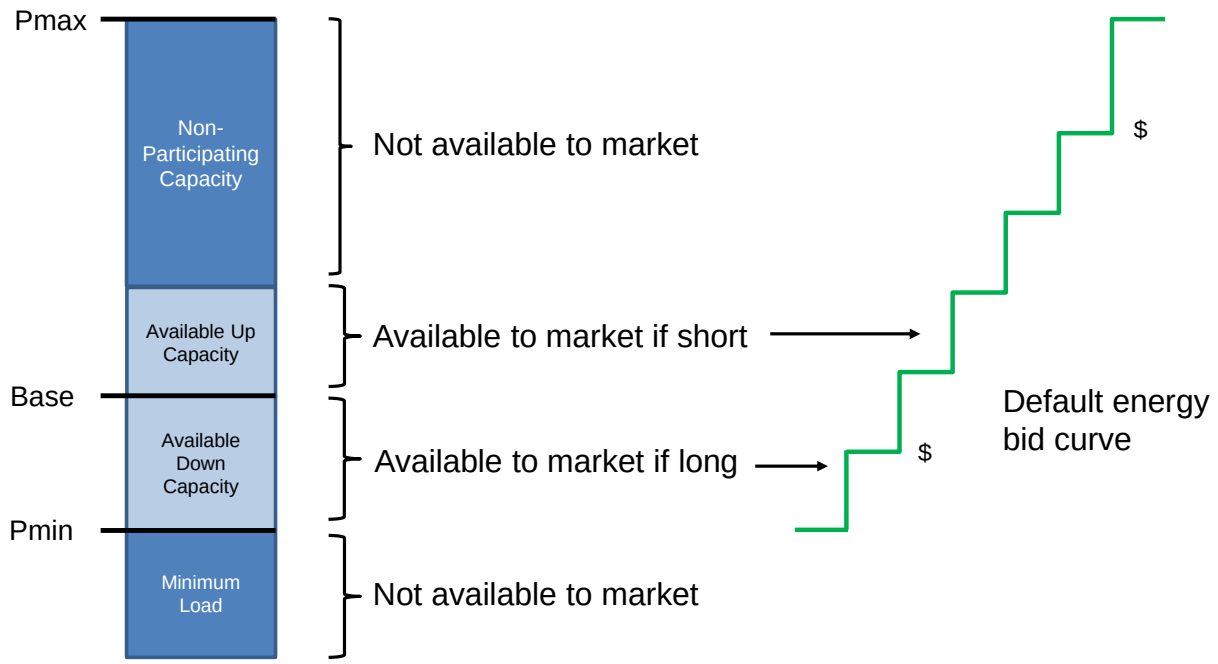
Figure 5



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

Similarly, this feature would apply to non-participating resources in the EIM balancing authority area that the EIM entity also plans to use to address transmission or power balance infeasibilities in its balancing area. However, non-participating resources, by definition, do not submit energy bids in the EIM. Therefore, as illustrated in Figure 6 below, the EIM entity can request that the CAISO calculate a form of the default energy bids for such a non-participating resource to be used in the event the non-participating resource is needed to resolve an infeasibility in the EIM area. The CAISO will calculate these default energy bids consistent with the relevant principles of the CAISO's calculation of default energy bids described in Section 39.7.1 of the CAISO tariff. This will allow the EIM entity to reflect the availability capacity from non-participating resources to balance its system in the EIM and avoid false infeasibilities, but not require that the resource participate in the EIM for economic dispatch.

Figure 6



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.[10] The pricing run is a simple economic dispatch, initialized from the scheduling run solution, where penalty prices are replaced by administrative prices, and any infeasibility is constrained so the ultimate dispatch solution does not significantly vary from the solution of the scheduling run. The pricing run produces both binding schedules and prices. To appropriately use the available capacity to resolve false infeasibilities in the EIM, the CAISO plans to make modifications to the real-time market's scheduling and pricing

[10] *See* CAISO Tariff, Section 27.4.3.

runs, including the components of the fifteen-minute market and real-time dispatch optimization processes.

The scheduling run will use the capacity available to address potential power balance infeasibilities based on the bid curves submitted by scheduling coordinators for EIM participating resources and the proxy energy bids for non-participating resources. In determining commitments, the scheduling run will respect the economic merit order of capacity available to relieve power balance infeasibilities relative to the value of that capacity, and will allow resource awards. The CAISO will add a factor to the bid prices of the deployed capacity so they are used after bids from participating resources are exhausted but prior to relaxing the power balance constraint or transmission constraints

The CAISO will also add a constraint to the scheduling run to ensure that the amount of available capacity released cannot exceed the supply and demand infeasibility within the balancing authority area without any EIM transfer. This will prevent the use of available capacity to support EIM transfers, to ensure that the energy dispatched from this available capacity will not be transferred to other balancing authority areas in the EIM.

The CAISO will add a surplus variable to the EIM transfer equation in the scheduling run at a high penalty price. The surplus variable will ensure that in the event the available capacity released cannot solve a particular infeasibility, the constraint will be relaxed in order that the market can reach a solution.

In the pricing run, the dispatch of available capacity will be limited to the dispatch scheduled in the scheduling run solution. The market will utilize the bids associated with the available capacity absent the adjustment made for the scheduling run. There is

no need to add a constraint to prevent EIM transfers in the pricing run, because available capacity released in the pricing run is limited to the available capacity dispatched in the scheduling run. The CAISO will then reduce the load forecast for the balancing authority area by a small tolerance to allow for price determination. If the amount of available 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 transmission or 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 cannot resolve a potential transmission or power balance infeasibility in the pricing run, then the $1000 penalty price associated with parameter relaxations will apply.

When the market optimization dispatches available capacity through the 15-minute market and 5-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. This new operating target will be the basis for that resource's imbalance energy settlement for the interval. 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.

The CAISO will settle energy dispatched from non-participating resources to resolve a potential power balance infeasibility as follows. Before October 1, 2015, if the resource is dispatched to resolve a constraint in the 15-minute market, it will be settled

as instructed imbalance energy at the relevant 15-minute price; if the resource is dispatched to resolve a constraint in the 5-minute real-time dispatch, it will be settled as uninstructed imbalance energy at the 5-minute price.[11] After October 1, 2015, if the resource is dispatched to resolve a constraint in the 15-minute market, it will be settled as instructed imbalance energy at the relevant 15-minute price; if the resource is dispatched to resolve a constraint in the 5-minute real-time dispatch, it will be settled as instructed imbalance energy at the 5-minute price.

The CAISO believes that the foregoing proposal will solve the differences in how reliability responsibilities are met by EIM entities which is a major cause of the EIM price excursions. The proposal recognizes that the EIM entity maintains available capacity to meet regulation and load following requirements of its balancing authority area. To prevent false market infeasibility being manifested in a balancing authority area, the market can now incorporate the actions that will be taken by the EIM entity to address the infeasibility using its load balancing capability. The PacifiCorp West and PacifiCorp East EIM balancing authority areas, after the start of the EIM are not due to actual capacity or ramp capability shortages. The proposed enhancement will appropriately allow the market to account for such available capacity in its dispatch. It will also allow the EIM dispatch to rationally price the available capacity necessary to resolve potential infeasibilities, based on the fact that PacifiCorp has sufficient capacity to balance its

[11] The current tariff provisions require that the CAISO settle deviations from FMM schedules for non-participating resources as uninstructed imbalance energy. The CAISO is planning on filing a proposed EIM year one enhancement in a separate docket that will modify this settlement to recognize instructed imbalance energy in the 5-minute dispatch in the same manner as ISO resources who do not re-bid their day-ahead schedules into the real-time market.

balancing authority areas at a cost far below the administrative price of $1,000/MWh that the CAISO tariff imposes for power balance constraint violations.

C. The CAISO's Proposed Solution follows Mechanisms Adopted by other ISO/RTOs to Avoid Potential Market Infeasibilities.

As Mr. Harvey explained in his comments at the technical conference, the power balance constraint issues faced by the CAISO and PacifiCorp are not at all unique to the EIM market. Other market operators have faced similar issues regarding the feasibility of balancing the system on a five-minute basis using economic bids. Data from the Midcontinent Independent System Operator (MISO) and the New York Independent System Operator (NYISO) suggest that, in a five-minute dispatch, a market operator's software cannot reach a feasible market solution based solely on economic bids in approximately around one half to one percent of all intervals.[12] This inability to balance load and generation within the time frame of the five minute dispatch does not mean that market operators cannot balance load and generation. Rather, it reflects that the resources and ramp capability used to balance load and generation includes

[12] 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/MSC/2012/20120106/20120106%20MSC%20Item%2006c%20Spinning%20Reserve%20Demand%20Curve%20Proposal.pdf

resources and ramp capability not available in the 5 minute dispatch.

The MISO and NYISO mechanisms to address these concerns are instructive. Both the MISO and NYISO have market designs that account for the additional resources available to balance load and generation in setting real-time prices when ramping constraints are binding, and employing, for a limited period, capacity that would otherwise provide regulation or spinning reserves. These mechanisms do so by employing penalty prices when they exhaust the bid-in supply of resources with sufficient ramping capability to meet demand. However, neither MISO nor NYISO employs a single high penalty tied to constraint relaxation such as the CAISO's $1000 price.

MISO's situation is relevant because, like the EIM, MISO has faced the challenge of managing imbalance energy across multiple balancing authorities without market dispatch of ancillary services in other balancing authority areas. Prior to January 2009, MISO did not coordinate ancillary services across the balancing areas that made up MISO. Instead, as with EIM, the individual balancing authority areas performed this function. To address this situation, in 2006, MISO filed, and the Commission approved, a proposal to allow MISO to implement, under certain energy shortage situations, a procedure known as Adequate Ramp Capability (ARC).[13] This procedure permitted MISO to employ, for up to 60 minutes, up to 50 percent of a unit's capacity above its hourly economic maximum dispatch level, including the uppermost portion of a resource's reserve capacity, until the output of other units could catch up to the required

[13] Midwest Independent Transmission Operator, Inc., Docket No. ER06-1099-000 (June 5, 2006); *Midwest Independent Transmission System Operator, Inc*.,118 FERC ¶ 61,009 (2007).

demand level.[14] In its filing, MISO noted that one of the typical situations in which it would implement the ARC procedures involves a substantial curtailment of imports, either by MISO or another Reliability Coordinator, which could quickly lead to a large demand-supply gap that exceeded the capability of on-line resources.[15] This is analogous to the situation in the EIM markets where the CAISO's ability to dispatch sufficient imbalance energy to meet demand can be significantly hampered by the limited transfer capability between EIM regions available for use in a five-minute timeframe, particularly from PacifiCorp East to PacifiCorp West.[16]

MISO took over responsibility as the balancing authority within its footprint and coordinated ancillary services markets in both day-ahead and real-time in 2009.[17] As part of this design change, MISO implemented a $98 penalty price associated with relaxing the spinning reserve requirement to allow capacity that would otherwise provide spinning reserves to balance load and generation when ramp constraints were binding in the 5 minute dispatch. When MISO relaxed the constraint, it set prices based on the opportunity cost of spinning reserves and the incremental cost of the supply dispatched to meet load. However, MISO observed the lack of an adequate correlation between prices and scarcity. Therefore, MISO proposed, and the Commission accepted, an amendment to implement demand curves that set the price when there is insufficient

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[14] In compensating resources for providing this service, MISO established a proxy price to act as a surrogate for competitive wholesale energy prices, based on a theoretical offer from a natural gas peaking unit.

[15] Midwest Independent Transmission Operator, Inc., Docket No. ER06-1099-000 (June 5, 2006), Affidavit of Mr. Joe Gardner at 4.

[16] The CAISO expects that transfer capability between EIM regions will significantly improve with the participation of NV Energy in EIM.

[17] Midwest Independent Transmission Operator Inc., ER07-1372-000 (September 14, 2007).

capacity to meet the spinning reserve requirements: $65/MW when the cleared capacity is within ten percent of the requirement and $98/MW when the cleared capacity is less than ninety percent of the requirement.[18] Upon implementing these demand curves, MISO resolves ramping constraints by using capacity to meet load that would otherwise provide spinning reserve, with the penalty price directly reflected in energy and reserve prices.

NYISO faced similar challenges when it began operations because capacity designated to provide regulation and 10-minute reserves was blocked off from real-time dispatch absent manual operator intervention. In 2005, the NYISO implemented market design changes that assigned explicit shortage values to the dispatch of capacity to meet load that would otherwise provide regulation, spinning reserves, or 10 minute reserves.[19] It amended these shortage values in 2011. For regulation, if the shortage is less than 25 MW, then the regulation price is set to $80/MW, reflecting the relative cost of energy. If the shortage is equal to 25 MW but less than 80 MW, then the price is set to $180, and if the shortage is 80 MW or more, the price is set to $400, which reflects the cost of starting a gas turbine. For spinning reserves, the shortage price is $500, $25 for eastern spinning reserves, and $150 for 10-minute reserves.[20]

As the practices of these other market operators show, there is nothing unique about the EIM in terms of power balance violations in the timeframe of a 5-minute

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[18] Midwest Independent Transmission Operator Inc., Docket No. ER12-1185 (February 29, 2012); *Midwest Independent Transmission System Operator, Inc*., 139 FERC ¶ 61,081 (2012).).

[19] New York Independent System Operator, Inc., Docket No. ER04-230-000 (November 26, 2003); *New York Independent System Operator, Inc*., 106 FERC ¶ 61,111 (2004).

[20] New York ISO Market Services Tariff Sections 15.3.7 and 15.4.7; *N.Y. Indep. Sys. Operator, Inc*., Docket No. ER10-2454 (December 21, 2010). The NYISO is currently in the process of implementing further refinements in its shortage pricing design, proposed for implementation in November 2015, pending FERC approval in Docket No. ER15-1061-000.

dispatch. Using capacity scheduled to provide regulation and other ancillary services to resolve such issues is well understood and accepted. Shortage pricing must be rationally related to actual shortage. The shortage component of imbalance energy prices in EIM should not be zero when the CAISO is having difficulty balancing load and generation and needs additional resources. The shortage component of energy prices should not be $1000 just because some capacity providing regulation is used, temporarily, to meet load during the interval because of ramp constraints. The CAISO believes that its proposal described meets this standard, similar to the mechanism utilized in MISO and NYISO, and should therefore be accepted by the Commission as a just and reasonable solution to the issues that led to the Commission to initiate this proceeding.

III. Infeasibilities When Flexibility Sufficiency Tests were Passed

During the technical conference Commission staff asked the CAISO to identify the percentage of intervals that were infeasible but during which the EIM entity had passed the flexibility sufficiency test. The following figures show the daily trend of infeasibilities. The bars in grey indicate the portion of infeasibilities where the EIM entity failed the flexibility sufficiency test. This metric has been reported in the monthly informational reports submitted by CAISO about the EIM tariff waiver.

Figure 7

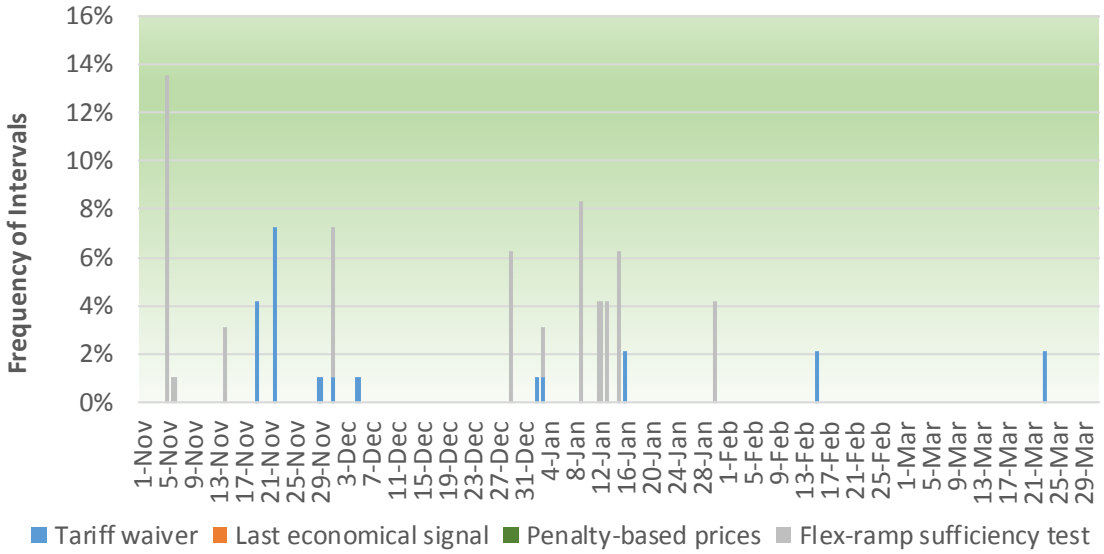
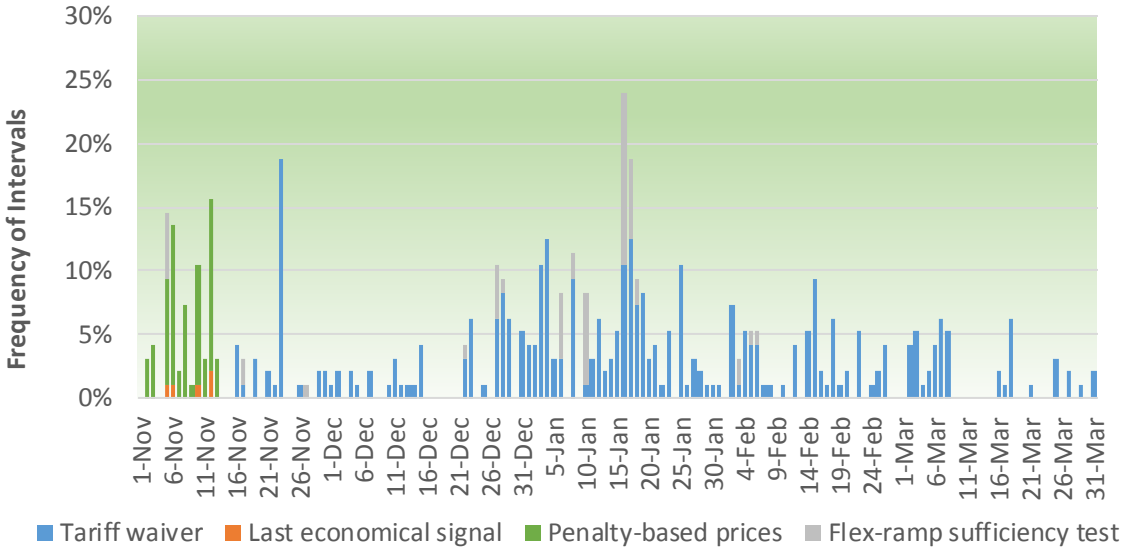


Figure 8



The following table summarizes this metric by PAC East and West. The percentage reflects how frequently the intervals in the fifteen-minute market that had infeasibilities had previously passed the flex sufficiently test.

Table 1

Period	PAC West	PAC East
Nov-Dec	25%	87%
Mar	100%	100%

By design the flexible requirements cover imbalanced up to a 95% confidence interval. In addition, conditions can change from the time base schedules are submitted and when the last flexibility sufficiency test is made. Therefore, because of these two conditions, it may happen that infeasibilities may be occurring when the flexibility test passed.

IV. Conclusion

For the foregoing reasons, the CAISO requests that the Commission accept these comments and issue an order directing the CAISO to file tariff revisions to implement the EIM enhancements described herein, in order to resolve the Commission's investigation in Docket EL15-53.

Respectfully submitted,

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Dated: April 23, 2015

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon all of the parties listed on the official service list for the above-referenced proceeding, under the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 23rd day of April, 2015.

/s/ Anna Pascuzzo

Anna Pascuzzo