California Independent
System Operator Corporation

January 15, 2015

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

Re: California Independent System Operator Corporation
Docket No. ER15- ___-000

Tariff Amendment to Implement Transition Period Pricing for Energy Imbalance Market

Request for Expedited Consideration and Waiver of Notice Period

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) submits this tariff amendment to revise section 29.27 of the CAISO tariff to provide a 12-month transition period during which the pricing of energy in the balancing authority area of a new Energy Imbalance Market (EIM) entity is not subject to the pricing parameters, currently pegged to the $1,000 per megawatt-hour (MWh) price cap, that normally apply under the CAISO tariff when the market optimization relaxes a transmission constraint or the power balance constraint in clearing the real-time market.[1]

This amendment provides a necessary and prudent transition period for entities that begin participating in centralized energy markets for the first time. Implementing, participating in, and integrating into a centralized market framework constitutes a significant paradigm shift for such entities and requires a period of time to properly allow these entities to gain important experience, make necessary system, operational, and functional changes and mature their practices to ensure that they can manage market systems and processes

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

efficiently and effectively. These transitional measures are not unlike the measures the Commission approved previously in the CAISO markets as it transitioned to implement new and significant market rule changes.

The importance of such transitional measures was highlighted by the CAISO's experience implementing the Energy Imbalance Market for the first EIM entities on November 1, 2014. Shortly after implementation, the CAISO identified the need to adopt transitional measures to avoid energy prices that did not reflect the actual economic and operational conditions on the system. It became apparent that Issues related to the adoption and implementation of new practices and procedures artificially constrained the market clearing process and unnecessarily triggered high parameter pricing.

This tariff amendment extends to new EIM entities, for a 12-month transition period, the treatment of tariff sections 27.4.3.2 and 27.4.3.4 that the Commission authorized with regard to the PacifiCorp (PacifiCorp East and PacifiCorp West) balancing authority areas in its December 1, 2014, order granting the CAISO's petition for a limited 90-day tariff waiver.[2] To avoid such issues arising when new EIM entities join the Imbalance Energy Market, the CAISO proposes to base the market price for energy in such EIM entities' balancing authority areas based on the marginal economic bid instead of the otherwise applicable pricing parameter for a 12-month transition period beginning on the implementation date for each new EIM entity. In addition, the CAISO and PacifiCorp have not yet determined whether all the circumstances that led to the limited tariff waiver will be addressed by the time the 90-day waiver period expires, and new issues could still arise. The transition period will therefore also apply to PacifiCorp East and PacifiCorp West, for the remainder of their first 12-months of participation in the Energy Imbalance Market.

The CAISO also proposes to revise tariff section 29.27 to state that during the 12-month transition period the flexible ramping constraint relaxation parameter specified in tariff section 27.10 will be set in a range between $0 and $0.01 for each EIM entity's balancing authority area. This revision allows the market software to determine the marginal energy bid price pursuant to the other changes proposed in this amendment that allow the CAISO to price based on the last economic bid price as opposed to the parameters specified in tariff sections 27.4.3.2 and 27.4.3.4.

The CAISO requests that the Commission waive its notice requirements and permit this tariff amendment to become effective February 13, 2015, *i.e.*, the day after the limited tariff waiver granted in the December 1 Order will expire. The CAISO also respectfully requests a shortened comment period and

expedited order on this filing as contemplated in the Commission's *Guidance Order on Expedited Tariff Revisions for Regional Transmission Organizations and Independent System Operators*, 111 FERC ¶ 61,009 (2005) ("Guidance Order"). Continued conditions in the current Energy Imbalance Market and the tariff revisions proposed in this filing meet the criteria in the Guidance Order. Therefore, the requested February 13 effective date is consistent with the Commission's policy of promptly revising market rules to assure that prices in independent system operator and regional transmission organization markets continue to be just and reasonable.

I. Background

A. Relevant CAISO Tariff Provisions

1. Pricing Parameters

The CAISO operates its day-ahead market[3] and real-time market, and their component CAISO markets processes, using a set of integrated optimization programs. These programs include security constrained unit commitment and security constrained economic dispatch.[4] In instances where effective economic bids are sufficient to allow a feasible market solution, CAISO market participants pay or receive the applicable fifteen-minute market or real-time dispatch locational marginal price (LMP).[5]

In some cases, however, because of transmission constraints or insufficient supply, there is a lack of effective economic bids to allow a feasible market clearing solution. In such circumstances, if in the pricing run the optimization software must relax non-priced constraints, such as identified transmission constraints or system energy-balance constraints to enable the market to reach a feasible solution, the price for relaxing the constraint in the pricing run is based on the constraint relaxation pricing parameter.[6] Therefore, during such intervals, market clearing prices are not based on submitted bids, but instead are driven by the parameter. The CAISO tariff specifies the pricing parameters that will be the basis for pricing energy in instances where the market

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3 The integrated forward market and the residual unit commitment, which are referenced below, are part of the day-ahead market. Tariff section 31.

4 Tariff section 27.4.

5 Tariff section 34.20.1. Real-time market transactions are settled at the dispatch interval LMPs in accordance with tariff section 11.5. Tariff section 34.20.2.2.

6 Tariff section 27.4.3.

clearing software adjusts one or more non-priced quantities. The pricing parameters are based on the bid cap.[7]

Tariff section 27.4.3.2 states that, for the purpose of determining how the relaxation of a transmission constraint in the real-time market,[8] the CAISO will set the pricing parameter at the maximum energy bid price specified in tariff section 39.6.1.1, which is $1,000/MWh.[9] When the market works as expected, this parameter appropriately reflects the cost to the market of the lack of economic energy supply bids that would have been necessary to avoid relaxing the transmission constraint. Similarly, tariff section 27.4.3.4 states that for the real-time market in instances where energy offers are insufficient to meet the CAISO forecast of CAISO demand, and the market software will relax the system energy-balance constraint (sometimes called the power balance constraint) using the same pricing parameter that applies to the relaxation of the transmission constraints (*i.e.*, the maximum energy bid price specified in tariff section 39.6.1.1).[10]

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[7] *Id.* The pricing parameters are specified in tariff sections 27.1.2.3; 27.4.3.2; 27.4.3.3; and 27.4.3.4. The complete set of pricing parameters used in all CAISO markets is maintained in the Business Practice Manuals. *Id.* These parameters only apply to the pricing run. It is also possible that the software may need to relax these constraints in the scheduling run to clear the market, but that the pricing run does not price based on the parameters if the applicable constraints are not relaxed in the pricing run. The CAISO identified such cases in its recent reports, referred to as cases in which there is a degeneracy. *See* pages 11-12 and 41-42 of the January 15, 2015 report provided attachment F to this filing. In such cases, the pricing run does not produce prices based on the relaxation of the constraint because there was no such relaxation in the pricing run.

[8] Tariff section 27.4.3.2 specifies the parameter for the integrated forward market as well as the real-time market. However, this tariff amendment does not impact the integrated forward market**.**

[9] The parameter in this section only applies to the pricing run. The parameter in the scheduling run for relaxing transmission constraints is set forth in tariff section 27.4.3 1. Also, the second sentence of tariff section 27.4.3.2 states that the corresponding pricing parameter used in the residual unit commitment is set at the maximum residual unit commitment availability bid price specified in tariff section 39.6.1.2. However, this tariff amendment does not seek to revise that provision in section 27.4.3.2.

[10] This tariff amendment does not seek to revise the first sentence of tariff section 27.4.3.4, which states that, in the real-time market, in the event that energy offers are insufficient to meet the CAISO forecast of CAISO demand, the security constrained unit commitment and security constrained economic dispatch software will relax the power balance constraint. The parameter specified in section 27.4.3.4 only applies to the pricing run and the tariff does not specify the scheduling run parameter, which are available in Section 6.6.5 in the Business Practice Manual for Market Operations available at: http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Market%20Operations.

2. Flexible Ramping Constraint Relaxation Parameter

The CAISO tariff permits the CAISO to enforce a flexible ramping constraint in the optimization of the real-time market to ensure the availability of requisite capacity for unit commitment or dispatch of resources for real-time dispatch intervals beyond the applicable commitment or dispatch period. The tariff includes a flexible ramping constraint relaxation parameter set at $60 effective January 15, 2015.[11]

B. Effects of the Pricing Parameters During Implementation of the Energy Imbalance Market

The Energy Imbalance Market 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. PacifiCorp's balancing authority areas are the first two to join the Energy Imbalance Market. To prepare for implementation of the Energy Imbalance Market, the CAISO and PacifiCorp established operations and technology implementation teams in addition to preparing and training the personnel that would operate the systems. The CAISO's market rules went into effect on October 24, 2014, for the first trading day November 1, 2014,[12] and the teams have been effectively deployed on a 24-hour/7-day basis since implementation.

The CAISO and PacifiCorp subsequently identified three primary types of circumstances 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.[13]

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[11] Tariff section 27.10; tariff appendix A, definition of "Flexible Ramping Constraint." The Commission recently approved a change in the level of the flexible ramping constraint relaxation parameter from $247 to $60, effective January 15, in *California Independent System Operator Corporation*, 149 FERC ¶ 61,256 (2014).

[12] *See Cal. Indep. Sys. Operator Corp.*, 147 FERC ¶ 61,231 (2014) (conditionally accepting tariff revisions to implement Energy Imbalance Market); *Cal. Indep. Sys. Operator Corp.*, 149 FERC ¶ 61,058 (2014) (order denying requests for rehearing, granting in part and denying in part requests for clarification, and conditionally accepting tariff revisions on compliance with regard to order listed above); Commission Letter Order, 149 FERC ¶ 61,005 (Oct. 2, 2014) (order granting CAISO request to extend effective date of Energy Imbalance Market tariff revisions from September 23, 2014, to October 24, 2014, for trading day November 1, 2014).

[13] As discussed further below, on November 13, 2014, the CAISO filed a petition for limited tariff waiver and request for expedited consideration (Petition for Limited Tariff Waiver)

First, the implementation teams were unable to identify all of the process changes, procedures, and tools necessary to sustain stable market operations in this new environment because it was not possible to fully to represent, simulate, and test all potential operational conditions, including interactions between disturbance events and other conditions on the system during these earlier phases. These circumstances did not arise until actual operations, and only then did the resulting price excursions became apparent. In some cases, data issues occur due to errors in processing information, and in such intervals the CAISO has authority to correct prices; in other cases, however, the high prices were due to the need to adopt better practices generally and not because of an erroneous data processing issue. The CAISO and PacifiCorp required additional time to complete the necessary adaptation, improvement, and stabilization processes.[14]

Second, the CAISO and PacifiCorp identified certain limitations on the resources available to PacifiCorp for use within the Energy Imbalance Market. Several resources had not yet received the necessary metering upgrades due to various outage schedule limitations. This prevented PacifiCorp from making these resources available in the initial pool of resources participating in the Energy Imbalance Market. The CAISO had been processing temporary metering exemptions in accordance with its requirements, and although participation by some resources improved conditions other issues remained. For instance, some resources are subject to multiple ownership rights and have contractual issues that must be resolved to enable their participation in the Energy Imbalance Market. Also, third-party participating resources in PacifiCorp's balancing authority areas had not yet begun participating in the Energy Imbalance Market, thereby further limiting the pool of available resources.[15]

Third, the PacifiCorp East and PacifiCorp West balancing authority areas experienced several forced outages of large EIM participating resources, which led to short-term supply deficiencies in the market. While outages are not necessarily uncommon, these outages quickly exacerbated an already tight supply situation and contributed to price increases in the associated intervals. In addition, while PacifiCorp operations accounted for the outages by responding to system conditions, these actions were not always communicated in a timely manner to the market. Without such information, the market results did not necessarily reflect actual physical conditions on PacifiCorp's system. The

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with the Commission to address the three types of circumstances the CAISO and PacifiCorp had identified.

14 Petition for Limited Tariff Waiver at 8-9.

15 *Id.* at 9-10.

addition of more supply EIM participating resources and enhanced operational procedures should mitigate the impact of such outages in the future.[16]

These factors together resulted in a lack of sufficient effective bids in the real-time market, thereby triggering the need to relax the transmission constraints and power balance constraint in the EIM areas. This unnecessarily triggered the pricing mechanisms in tariff sections 27.4.3.2 and 27.4.3.4, causing the prices to be set by bid caps although actual conditions on the system did not warrant such high prices.[17]

C. Waiver Request

To address the anomalous effect on prices resulting from the circumstances described above, the CAISO filed a petition for a limited tariff waiver on November 13, 2014. The CAISO requested that the Commission grant limited waiver of tariff section 27.4.3.2 and the second sentence of tariff section 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 establishes the price at the maximum energy bid price of $1,000/MWh. 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 LMPs, consistent with tariff sections 27 and 34 and tariff appendix C. The CAISO requested that the waiver apply solely to constraints within the PacifiCorp East and PacifiCorp West balancing authority areas and to constraints that affect EIM transfers between those two EIM balancing authority areas. The CAISO asked the Commission to act expeditiously and make the limited tariff waiver effective for the 90-day period from November 14, 2014, through February 12, 2015.[18]

The CAISO explained that it would perform a review and consider, in the planned stakeholder process for enhancements to the Energy Imbalance Market, whether it should propose a similar approach beyond the 90-day period for other EIM entities besides PacifiCorp East and PacifiCorp West. The CAISO stated that it would file a tariff amendment rather than request additional waivers of its

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16 *Id.* at 10.

17 *Id.* at 10-11.

18 *Id.* at 12-18.

current tariff authority if it concluded that relief from similar conditions was necessary in the future.[19]

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.[20] 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.[21] The Commission noted that, "[s]hould CAISO conclude that revisions to its tariff are necessary, we strongly encourage CAISO to file such revisions sufficiently in advance of the expiration of the waiver in order to avoid any subsequent financial impacts to market participants."[22]

D. Stakeholder Process to Consider Transitional Measures for all EIM Entities

Shortly after filing the requested waiver on November 13, and consistent with the December 1 Order, the CAISO considered whether to adopt the transitional pricing measures for all new EIM entities and for what period of time. The CAISO launched a stakeholder process on December 15, 2014, to consider such transitional measures on an expedited basis.[23] The CAISO's goal was to identify proper measures for new EIM entities and consider what measures would apply to the PacifiCorp Energy Imbalance Market following the expiration of the Commission-approved waiver on February 12, 2015, if such measures were necessary.

The CAISO worked expeditiously with stakeholders and its Governing Board to prepare and file this tariff amendment in advance of the February 12

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19 *Id.* at 12, 14.

20 December 1 Order at Ordering Paragraph (A).

21 *Id.* at PP 25-26.

22 *Id.* at P 26. Subsequently, the CAISO filed a further request to extend the waiver to the period from November 1 through November 13, 2014. *See* Petition for Limited Tariff Waiver, Docket No. ER15-817-000 (Dec. 31, 2014). Commission action on that further waiver request is pending.

23 Materials related to the stakeholder process are available on the CAISO website at http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyImbalanceMarketYear1Enhancements.aspx. This webpage provides information on additional Energy Imbalance Market enhancements the CAISO is considering on a separate track and is not including in this tariff amendment, which is solely focused on the 12-month transitional measures for any new EIM entity. These materials include the draft final proposal for the transitional measures, which is also provided in attachment C to this filing. Section IV of this transmittal letter addresses the stakeholder comments and the CAISO's responses.

expiration of the waiver, while also providing sufficient opportunity for stakeholder feedback.[24] The CAISO posted a draft final proposal regarding the transition period on December 15, 2014, held a conference call regarding the draft final proposal on December 19, and solicited written comments from stakeholders regarding the draft final proposal by December 31. At its January 5, 2015, meeting, the Governing Board authorized the CAISO to submit this tariff amendment.[25]

II. Need for Transitional Measures

The implementation of the Energy Imbalance Market made clear that integration into a sophisticated centralized market is a major paradigm shift for any entity, including a new EIM entity. It 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. The CAISO's market systems were developed and are finely tuned to ensure that the CAISO is able to produce feasible solutions that reflect actual operational and market conditions through its security constrained economic dispatch and unit commitment processes. The systems require expert attention and management to ensure that information flows accurately and in a timely manner. Otherwise, as described above, the market systems will produce anomalous results.

The figures and information provided in this section illustrate the frequency of the issues a new participant likely will experience and the impact these issues can have on market results. This information is reflected in the January 15 report, which the CAISO is also providing in Attachment E to this filing.

Figures 1 and 2 illustrate the frequency with which the transitional issues described above impacted the Energy Imbalance market. The CAISO described the types of implementation issues it experienced with the new Energy Imbalance Market in greater detail in the two 30-day informational reports it has filed pursuant to the December 1 Order.[26] Figures 1 and 2 are drawn from that

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[24] As discussed below in section IV of this transmittal letter, the CAISO also initially proposed to set a gradually increasing energy bid cap for EIM participating resources but later tabled that proposal based on stakeholder feedback.

[25] Materials related to the Board's January 5 meeting are available on the CAISO website at http://www.caiso.com/informed/Pages/BoardCommittees/Default.aspx. These materials include a memorandum to the Board regarding the proposed transition period from Keith Casey, Vice President, Market & Infrastructure Development, which is also provided in attachment D to this filing.

[26] The first informational report, dated December 15, 2014 (December 15 Report), is provided in attachment E to this filing, and the second informational report, dated January 15, 2015 (January 15 Report), is provided in attachment F to this filing.

report and show the frequency of the issues in the first two months of implementation. These figures are also instructive because they reflect the types of issues any new EIM entity may experience as it enters the new market paradigm. Prudence and Good Utility Practice requires that we anticipate these types of potential issues and put reasonable transitional steps in place to address them and ensure market outcomes that are more reflective of actual market conditions.

The frequency of these issues is not an absolute reflection of what affected each interval because each interval may be constrained as a result of any number of issues. The CAISO categorized the types of issues described in part I.B of this transmittal letter further into types of issues and then based on its assessment on which of these issues afflicted an interval the most. The CAISO then quantifed the frequency to produce these bar charts.[27]

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[27] The categories of issues reflected in Figures 1 and 2 are defined as: (1) Renewable deviations for conditions in which wind or solar changes lead to the loss of capacity and for the need to increase generation from other resources; (2) Load changes refer to conditions where either the load forecast is adjusted or there is a change in the load bias. (3) Import/Export changes is for adjustments and updates to imports and exports as seen by the market; (4)Resource outage is for conditions in which an outage results in the loss of capacity available to the market, and for which the market needs to increase generation from other resources. (Similar conditions apply for manual dispatches leading to a reduction of available capacity to the market.); (5) Manual dispatches is for instances where the introduction of a manual dispatch may cause imbalances, such as max go to manual dispatch may limit the unit up to certain capacity, resulting in the loss of capacity for the market; (6). Resource data alignment is for any other condition not captured in the previous five categories. This group accounts for resource deviating from their dispatch, differences between base schedules and bids or dispatches, and changes between markets; and (7) Transfer/Congestion constraints is for instances where the interplay of EIM transfer constraints or congestion in either PAC or CAISO balancing authority area may restrict the incremental generation of resources leading to infeasibilities.

Figure 1: Reasons for intervals with EIM external Load Aggregation Point prices exceeding $500 in the fifteen-minute market during November.

PAC West and PAC East combined.

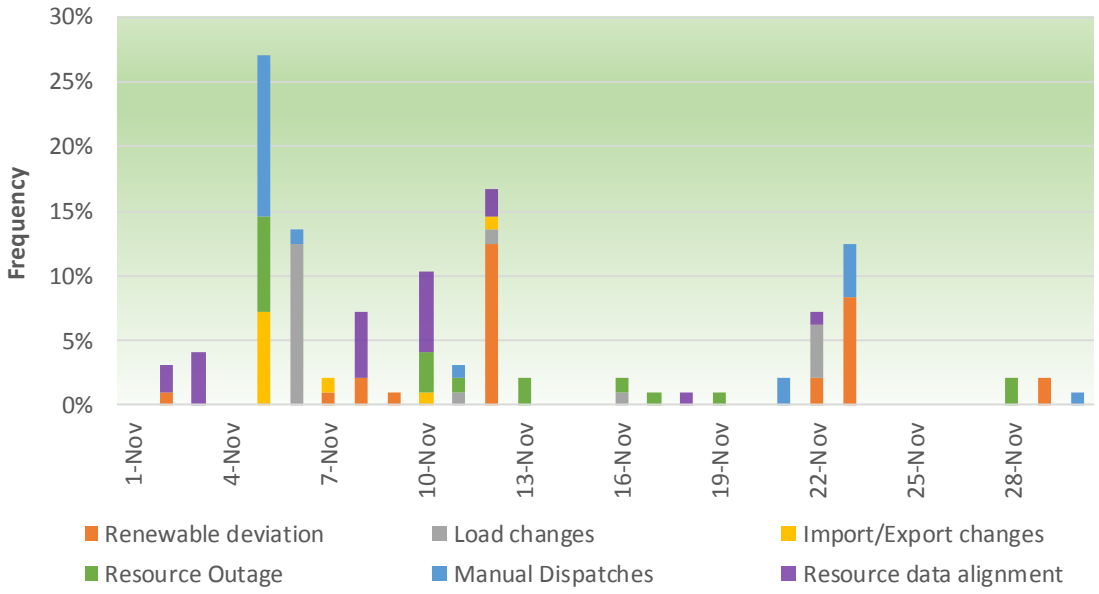
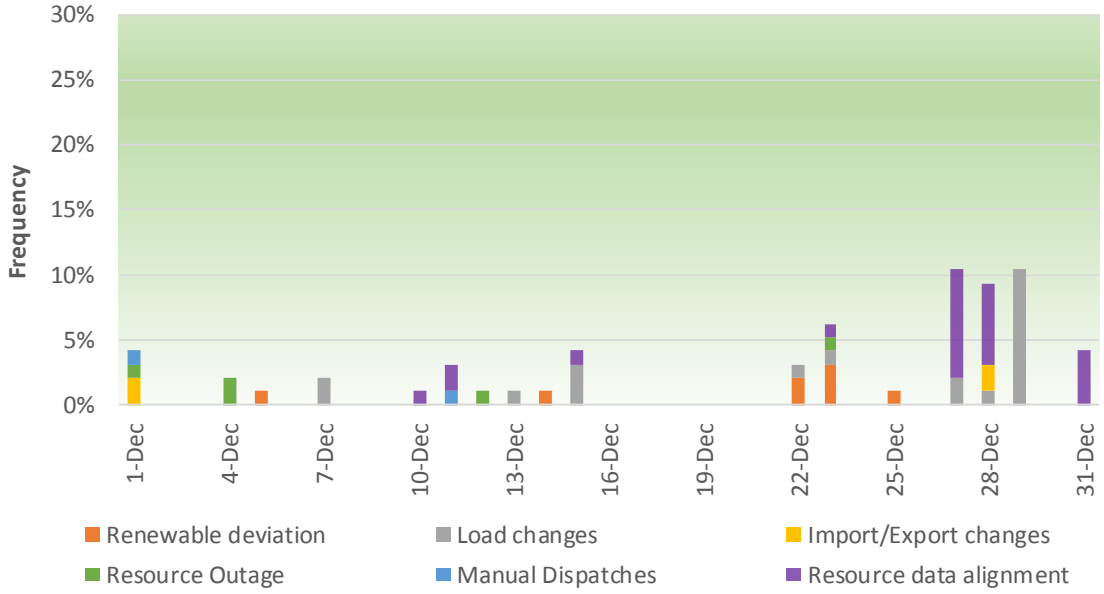


Figure 2: Reasons for intervals with power balance infeasibility (under-supply) in the fifteen-minute market during December.

PAC West and PAC East combined.



Figures 1 and 2 show that while the frequency of issues has lessened over time, these issues do not disappear soon after implementation. This is not

surprising because the entities must adapt to the new market environment under different system conditions. For example, the issues arose again more frequently in later parts of December when the system was more constrained and holiday conditions affected the market differently. The changing conditions can occur over the course of a year given seasonal changes and other changes in system conditions. This necessitate a full year's experience to provide the entity an opportunity to manage the systems over the ever changing conditions and make adjustments to their practices as necessary based on their experience.

The monthly reports also demonstrate how the market systems have responded to these post-implementation issues experienced. Below, the CAISO provides some of the information from the reports and discusses its significance and relevance to the proposed tariff amendment.

Figures 3 through 4 below show the daily average prices for PacifiCorp East and PacifiCorp West, in the fifteen minute market.[28] The figures show that the presence of the issues described above trigger parameter-based pricing that deviates significantly from the pricing based on the last economic signal as the CAISO is proposing to adopt in this amendment. They also illustrate that due to the issues described above that misinform the market systems of how constrained the areas actually are, the resulting parameter-based pricing deviates significantly from the west wide average hub prices. That is not a reasonable outcome.

[28] The information in Figures 1 through 4 is also contained on pages 9-10 and 13-15 of the January 15 report provided.

Figure 3: Daily Average of Fifteen Minute Market Prices in PacifiCorp West

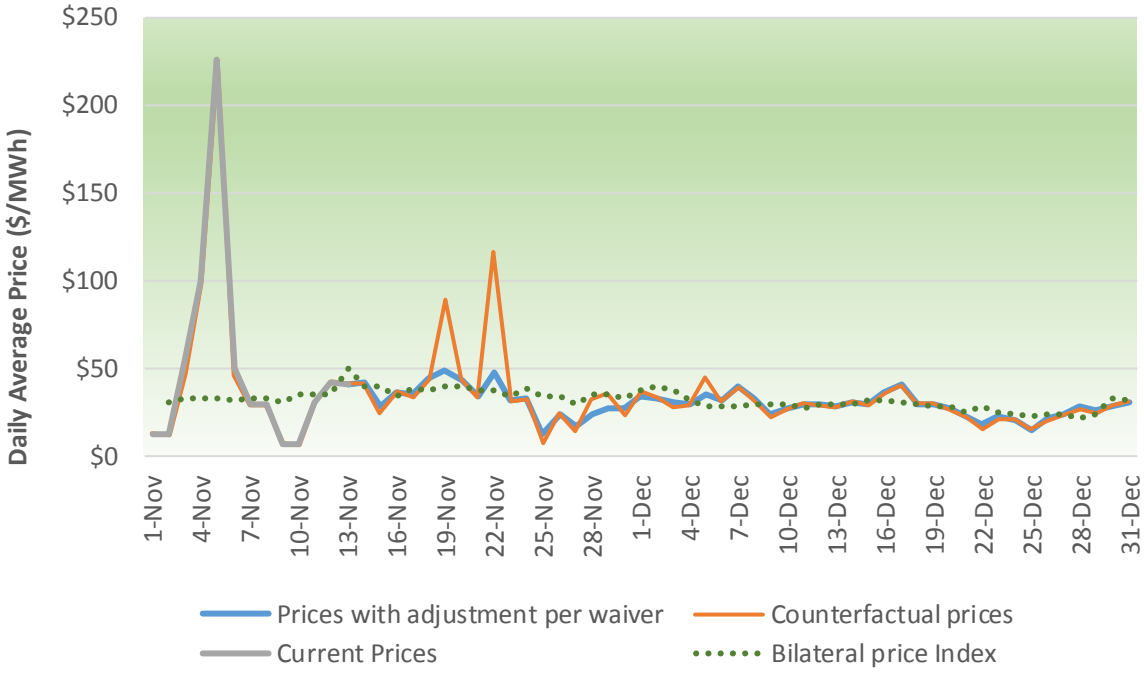
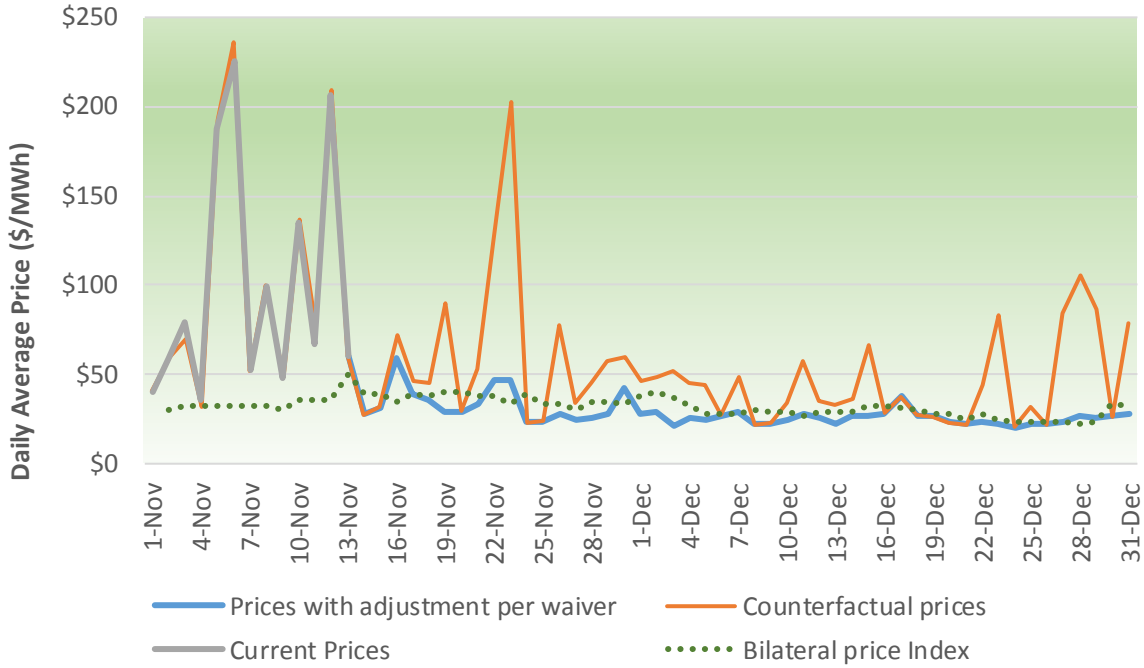


Figure 4: Daily Average of Fifteen Minute Market Prices in PacifiCorp East



Attachment E describes the derivation of these price trends is in greater detail. The orange line in each figure shows what prices would have been throughout November and December of 2014 if the CAISO had based pricing on the parameters set forth in tariff sections 27.4.3.2 and the second sentence of tariff section 27.4.3.4 for all instances in which it had observed a constraint relaxation. The grey and blue lines represents the prices as posted and currently applicable for settlements. The posted prices are distinguished by the blue and grey line because the December 1 Order authorizes the non-parameter based pricing only as of November 14. Therefore, the prices as of November 14 in these figures provide an indication of how the pricing mechanism employed under the December 1 waiver works, which is also the mechanism the CAISO would adopt if the Commission accepts this amendment. The price trends show that pricing based on the parameters would have resulted in more volatile pricing; whereas, prices are more stable under the economic signal based pricing.

The dotted green line in each of Figures 3 and 4 show the average hub prices in the Western bilateral markets. These charts show that under the pricing in place as a result of the tariff waiver, the prices produced in the EIM areas are closely aligned with average prices in the bilateral market in the West. Conversely, comparing the orange line with the dotted green line in each figure illustrates that the pricing under the tariff parameters would have resulted in prices that diverge significantly from the prices elsewhere in the West.

These charts also illustrate that since the limited waiver of tariff sections 27.4.3.2 and 27.4.3.4 went into effect, the CAISO and PacifiCorp have made progress in addressing the three types of circumstances discussed above. However, experience to date suggests it will not be possible to address all the issues by the time the 90-day waiver period expires, and new issues could still arise. The CAISO also believes that, as a new EIM entity experiences the changing seasons and conditions on the system, it will be necessary to adjust practices and procedures based on lessons learned and the need to tailor the systems to the changing needs. This is illustrated by the fact that despite the improvements shown in the charts above, as seasons and conditions change, there is a need to adjust and fine tune ones practices.

The CAISO initially requested only a 90-day waiver with respect to the PacifiCorp balancing authority areas because it believed many of the issues experienced by the transition of PacifiCorp into the Energy Imbalance Market would be remedied within that time frame, but recognized there could be a need for extended measures. Given the immediacy of the issues experienced in November, the limited waiver was the most appropriate relief. The CAISO recognized that any longer-term solutions should be adopted through a tariff amendment and considered for future EIM entities as they enter the market. By early December, the CAISO determined that it should discuss with stakeholders

the need to file this tariff amendment to implement a transition period during which the CAISO would continue to mitigate the anomalous effects of the pricing parameters on the Energy Imbalance Market.

III. Proposed Tariff Revisions

The CAISO proposes to revise tariff section 29.27 to state that, for a 12-month transition period after a new EIM entity commences operations, the pricing parameters set forth in tariff section 27.4.3.2 and the second sentence of tariff section 27.4.3.4 will not apply to constraints that are within balancing authority areas of the new EIM entity or affect EIM transfers between the balancing authority areas of the new EIM entity and any other EIM entity that is subject to the revised tariff provisions.[29] Instead, the CAISO will determine prices consistent with the provisions of tariff sections 27 and 34 and tariff appendix C that would have applied in the absence of section 27.4.3.2 and the second sentence of tariff section 27.4.3.4.[30] The CAISO is requesting that these tariff provisions become effective as of February 13, 2015, so that the existing EIM entity, which includes the PacifiCorp East and PacifiCorp West balancing authority areas, will also benefit from these revisions for the remaining months of its 12-month transitional period.

With these changes, the CAISO can continue to apply the same pricing mechanism it has employed during the 90-day term of the waiver the Commission granted in its December 1 Order. The pricing mechanism enables the CAISO to clear the market as it would in any instance in its initial run of the market software (*i.e.* the scheduling run), the scheduling run, and establish feasible dispatch instructions to resources. In the subsequent pricing run, the CAISO employs the market clearing rules pursuant to various provisions of its tariff to establish the market clearing prices. The pricing mechanism under the proposed tariff amendment (and under the December 1 Order waiver) allows the pricing run to ignore infeasibility caused by a transmission constraint or a power balance constraint in the pricing run, and instead establishes the market clearing price based on the rules it would have applied absent the infeasibility, *i.e.*, based on the last economic bid. All other existing tariff rules for pricing energy in the real-time market will still apply. For example, if a resource's bid is mitigated pursuant to tariff section 34.1.5, the CAISO market clearing price would be based on the mitigated bid as required by the tariff. Similarly, if the resource is constrained by ramping capability for the interval, pursuant to tariff section 34.20.2.3 the resource will not be permitted to set the price for that interval.

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29 Proposed tariff section 29.27(b)(1).

30 *Id.*

This procedure avoids the need to request additional tariff authority for pricing energy during the transition period because it relies on existing tariff-based mechanisms. In addition, as shown in Figures 1 through 4 above, this pricing mechanism has yielded prices that are closely aligned with the prices elsewhere in the West. The pricing mechanism mitigates anomalous pricing during the transition period as each EIM entity gains operational experience with the Energy Imbalance Market, while still allowing prices to be based on economic price signals reflected in market participants' bids, as opposed to administratively set tariff parameters. Therefore, the tariff revisions will prevent inappropriately high, and unjust and unreasonable, prices that do not reflect actual scarcity of energy, but instead reflect artificial market scarcity due to the entities' various transitional issues discussed above.

The CAISO also proposes to revise tariff section 29.27 to state that, for a 12-month transition period after a new EIM entity commences operations, 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 between $0 and $0.01.[31] This revision allows the market software to determine the marginal energy bid price. Absent this revision, the market software would be unable to determine prices based on the marginal energy bid price and that price would instead be set at the flexible ramping constraint relaxation parameter level, which as of January 15 is $60. This tariff revision is consistent with the rationale for allowing the market systems to avoid using the parameters in tariff section 27.4.3.2 and 27.4.3.4 as described above. Both are based on the principle that the infeasibilities observed by the market systems are not reflective of actual market and operational conditions.

IV. Issues Raised by Stakeholders

In the stakeholder process for this tariff amendment, stakeholders generally supported providing PacifiCorp with additional time beyond the current 90-day waiver period to resolve the types of circumstances discussed above. However, they disagreed whether the CAISO should provide this additional time pursuant to a tariff amendment. Some stakeholders also argued that the EIM transition period should not apply to all new EIM entities. They stated that the Energy Imbalance Market enhancements stakeholder initiative is the proper venue to consider the appropriateness of the long-term design of a transition period for new EIM entities. In response, the CAISO explained that the December 1 Order strongly encouraged the CAISO to propose a long-term transition period if the current 90-day waiver period is insufficient. The CAISO's Department of Market Monitoring supports the proposed transition period, including its 12-month duration, for the same reasons discussed in this filing.

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[31] Proposed tariff section 29.27(b)(2).

The CAISO believes that implementing a 12-month EIM transition period responds to the Commission's directive and is preferable to requesting additional extensions on an ad hoc basis. In addition, the CAISO supports discussing potential enhancements or modifications to the EIM transition period in the Energy Imbalance Market enhancements stakeholder initiative. That initiative currently has two phases. The CAISO plans to submit the Phase 1 items to its Board decision in March 2015 and to implement them in fall of 2015. The CAISO would begin Phase 2 after six months of operational experience with the Energy Imbalance Market. The design of the EIM transition period may benefit from the observations during this 6-month period.

Some stakeholders argued that the 12-month transition period is too long. They suggested the extended transition period should not be fixed at 12 months but should instead depend on t how well the transitional issues are actually being addressed. The CAISO responded to these arguments by explaining that the 12-month duration is necessary to give each EIM entity sufficient operational experience during changing seasonal conditions that occur over the course of a year. Operational challenges differ between seasons and may require different operational or business process revisions that cannot be identified until actual system conditions occur. Further, in order to provide additional transparency to market participants, upon expiration of the 90-day tariff waiver, the CAISO will voluntarily continue the reporting requirements ordered by the Commission through the entire 12-month transition period on a quarterly basis.

In the stakeholder process, the CAISO initially proposed an additional tariff change not included in this amendment filing: the implementation of an energy bid cap for EIM participating resources that would gradually increase over the 12-month transition period. Stakeholders expressed concern that gradually increasing energy bid caps might cause unintended market inefficiencies because different pricing rules would apply in different balancing authority areas participating in the Energy Imbalance Market. The CAISO's Department of Market Monitoring shared this concern and stated that the proposal would benefit from additional time and consideration. In response to this feedback, the CAISO tabled the proposal for further discussion in the Energy Imbalance Market enhancements stakeholder initiative. As the CAISO has explained in that initiative, economic bidding on EIM external intertie schedule points would increase market liquidity and give load serving entities additional opportunities to hedge imbalance charges within the EIM entity balancing authority area. During the initiative, the CAISO will decide whether economic participation on EIM external intertie scheduling points should remain at the discretion of the EIM entity. The CAISO will also consider whether additional measures, such as gradually increasing bid caps, are necessary to maintain the effectiveness of using the marginal economic bid to set prices when transmission and power balance constraints within the EIM entity balancing authority area are relaxed.

V. Effective Date and Request for Waiver

The CAISO requests that the Commission waive its notice requirements for the proposed amendment, accept it for filing, and permit it to become effective February 13, 2015, *i.e.*, the day after the limited tariff waiver granted in the December 1 Order will expire.[32] Good cause exists for granting this waiver. As explained above, the proposed tariff revisions are necessary to maintain the effectiveness of the limited tariff waiver for a 12-month transition period and address the ongoing risk that the pricing parameters will have anomalous effects on the Energy Imbalance Market.

The Commission has recognized that certain rules and tariff flaws may require prompt revision to assure that prices in wholesale markets continue to be just and reasonable.[33] In the Guidance Order, the Commission stated that a request by a regional transmission organization or independent system operator for expedited treatment of a tariff revision should clearly demonstrate that a rule change is required due to a flaw, why action is necessary in the market, and that the proposed tariff revision will correct the flaw.[34] The tariff revision qualifies for the use of expedited tariff revision procedures if the flaw meets the following criteria:

(1) it materially adversely impacts the market (due to the unanticipated workings of the tariff or unanticipated actions by market participants);

(2) it requires prompt action to prospectively revise the tariff to remove the ability to cause such material adverse impacts; and

(3) it is susceptible to a clear-cut revision or interim tariff revision or market rule.[35]

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[32] Specifically, pursuant to Section 35.11 of the Commission's regulations (18 C.F.R. § 35.11), the CAISO requests waiver of Section 35.3 of the Commission's regulations (18 C.F.R. § 35.3) in order to permit this effective date.

[33] Guidance Order at P 1.

[34] *Id.* at P 2.

[35] *Id. See also Cal. Indep. Sys. Operator Corp.*, 135 FERC ¶ 61,110, at PP 24, 26 (2011) (granting expedited treatment and waiver of prior notice requirement pursuant to Guidance Order to accept tariff revisions modifying bid cost recovery settlement rule); *ISO New England Inc.*, 111 FERC ¶ 61,184, at PP 1, 10 (2005) (granting expedited treatment and waiver of prior notice requirement pursuant to Guidance Order to accept tariff revisions ending use of market-based reference levels for units that run out-of-merit more than 50 percent of the time).

The proposed amendment meets these criteria. First, the ongoing risk that the pricing parameters will have anomalous effects on the Energy Imbalance Market constitutes a material and adverse impact on that market due to unanticipated workings of the tariff. Prompt action is required to prospectively revise the tariff to remove the ability to cause that material and adverse impact. Lastly, the flaw is susceptible to the clear-cut interim tariff revision proposed in this filing.

If the Commission decides that the waiver of the notice period is not appropriate in this case, then the CAISO respectfully requests that the Commission grant a modest extension of the waiver granted in the December 1 Order to ensure the current EIM entity is not exposed to unnecessarily high prices until the Commission authorizes implementation of the tariff amendments proposed herein. Such an extension would be appropriate because, as shown in the December 15 and January 15 Reports and as discussed above, the existing EIM entity is still prone to potential price swings due to the same issues that led the Commission to grant the initial tariff waiver.

The CAISO respectfully requests that the Commission act expeditiously and issue an order no later than February 12, 2015 accepting this amendment filing. To permit the timely issuance of the order, the CAISO also requests that the Commission shorten the comment period on this filing to no more than ten calendar days.

As discussed above, the amendment filing meets the criteria for expedited consideration set forth in the Guidance Order. The fact that the CAISO will be able to rerun the market for the period between February 13, 2015, and the date of the Commission's order does not negate the need for expedited consideration. Without the authority to implement the new tariff provisions, once the tariff waiver granted by the Commission expires, the CAISO would have to reconfigure the market software systems to apply the maximum energy bid price set forth in tariff sections 27.4.3.2 and 27.4.3.4 rather than the applicable fifteen-minute market or real-time dispatch locational marginal price under the requested authority. The CAISO recognizes that if the Commission does not treat this tariff amendment on an expedited basis as requested and simply applies the standard notice provisions, the CAISO could rerun the pricing runs to determine the appropriate market clearing prices and resettle the market accordingly. However, this would require significantly more time and subject market participants to unnecessary uncertainty. The CAISO conducted an expedited stakeholder process to permit stakeholders to suggest and the CAISO to consider any additional changes to the transitional measures as originally proposed. This resulted in changes to the transitional measures to address disagreements among stakeholders. Thus, stakeholders have already had an opportunity to review and comment on the

transitional measures proposed in this filing, so an extended comment period is unnecessary.

VI. Communications

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

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VII. Service

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

VIII. Contents of Filing

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

Attachment A	Clean CAISO tariff sheets incorporating this tariff amendment
Attachment B	Red-lined document showing the revisions contained in this tariff amendment
Attachment C	Draft final proposal
Attachment D	Board memorandum

Attachment E December 15 Report

Attachment F January 15 Report

IX. Conclusion

For the reasons set forth in this filing, the CAISO respectfully requests that the Commission grant waiver of its notice requirements and issue an order on an expedited basis that accepts the tariff revisions proposed in the filing effective as of February 13, 2015.

Respectfully submitted,

/s/ Anna McKenna

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Counsel for the California Independent System Operator Corporation

Attachment A – Clean Tariff Records

Tariff Amendment to Implement Transition Period Pricing for Energy Imbalance Market

California Independent System Operator Corporation

29.27 CAISO Markets And Processes.

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

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

(1) **Transmission Constraint Relaxation.** For a period of twelve months following the Implementation Date of a new EIM Entity, the provisions of Sections 27.4.3.2 and the second sentence of Section 27.4.3.4 shall not apply to constraints that are within Balancing Authority Areas of the new EIM Entity or affect EIM Transfers between the Balancing Authority Areas of the new EIM Entity and any other EIM Entity that is subject to this subsection (b). For the those intervals that experience infeasibilities described in those provisions, the CAISO shall instead determine prices consistent with the provisions of Sections 27, 34, and Appendix C, that would apply in the absence of Section 27.4.3.2 and the second sentence of Section 27.4.3.4.

(2) **Flexible Ramping Constraint**: For a period of one year following the Implementation Date of a new EIM Entity, the CAISO shall set the Flexible Ramping Constraint parameter specified in Section 27.10, for pricing purposes, for the new EIM Entity Balancing Authority Area, at an amount between and including $0 and $0.01.

Attachment B – Marked Tariff Records

Tariff Amendment to Implement Transition Period Pricing for Energy Imbalance Market

California Independent System Operator Corporation

29.27 CAISO Markets And Processes.

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

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

(1) **Transmission Constraint Relaxation.** For a period of twelve months following the Implementation Date of a new EIM Entity, the provisions of Sections 27.4.3.2 and the second sentence of Section 27.4.3.4 shall not apply to constraints that are within Balancing Authority Areas of the new EIM Entity or affect EIM Transfers between the Balancing Authority Areas of the new EIM Entity and any other EIM Entity that is subject to this subsection (b). For the those intervals that experience infeasibilities described in those provisions, the CAISO shall instead determine prices consistent with the provisions of Sections 27, 34, and Appendix C, that would apply in the absence of Section 27.4.3.2 and the second sentence of Section 27.4.3.4.

(2) **Flexible Ramping Constraint**: For a period of one year following the Implementation Date of a new EIM Entity, the CAISO shall set the Flexible Ramping Constraint parameter specified in Section 27.10, for pricing purposes, for the new EIM Entity Balancing Authority Area, at an amount between and including $0 and $0.01.

Attachment C – Draft Final Proposal

Tariff Amendment to Implement Transition Period Pricing for Energy Imbalance Market

California Independent System Operator Corporation

Energy Imbalance Market Transition Period

Draft Final Proposal

December 15, 2014

EIM Transition Period
Draft Final Proposal
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1 Transition Period Proposal

On November 13, 2014, the ISO requested that FERC grant a 90-day waiver of the applicability of section 27.4.3.2 and the second sentence of section 27.4.3.4 of the ISO tariff for constraints that are within balancing authority areas of PacifiCorp or affect Energy Imbalance Market ("EIM") transfers between those balancing authority areas. These tariff provisions establish the price for energy in circumstances where the ISO's market clearing software must resort to relieving modeled constraints, such as transmission or system balance constraints in order to clear the market using effective economic bids. The requested waiver prices energy in the EIM entity's balancing authority area based on the marginal economic bid instead of the $1000/MWh pricing parameter.

The ISO requested the waiver because during the initial implementation of the EIM, the market encountered transitional conditions that restricted the timing and amount of capacity available through the market clearing process. This caused the transmission and system energy-balance constraints to bind more frequently than expected, producing atypically high prices in the fifteen-minute and five-minute markets in the EIM entity's balancing authority area. The ISO determined that system conditions, operations processes, the current level of EIM participating resources, and the new operating environment are complicating the timing of, and restricting the amount of, effective economic bids necessary to relieve the constraints. These anomalies are temporary as they are associated with the initial startup and transitional period of EIM operations, and do not necessarily reflect actual physical conditions on the system in all cases.

FERC granted the waiver on December 1, 2014. FERC strongly encouraged[1] the ISO to file any tariff revisions that might be necessary to deal with the identified issues beyond the term of the waiver sufficiently in advance of the expiration of the waiver in order to avoid any subsequent financial impacts to market participants. The ISO believes that an appropriate transition period is needed beyond the currently approved tariff waiver. The transition period design described below will be filed with FERC prior to the waiver expiring and will be applicable to all new EIM Entities as well as PacifiCorp.

The ISO proposes a twelve month transition period. During this period, the ISO will price energy in the EIM entity's balancing authority area based on the marginal economic bid instead of the $1000/MWh pricing parameter when modeled constraints must be relaxed, consistent with the December 1 approved tariff waiver. In order to effectuate the use of the marginal economic bid, the flexible ramping constraint relaxation parameter will be $0/MWh in the pricing run during the transition period. At the end of the transition period, the $1000/MWh pricing parameter and the standard flexible ramping constraint relaxation parameter will apply.

[1] See page 13 of the November 14, 2014 FERC Order available at http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13698643

In addition, the bid cap for EIM participating resources and imports/exports on EIM external intertie scheduling points will start at $250/MWh and gradually increase over the year as follows:

Months 1 – 6	$250/MWh
Months 7 – 9	$500/MWh
Months 10 – 12	$750/MWh
Beyond transition period	$1000/MWh

The ISO believes that the graduated bid cap feature of the proposed twelve month EIM transition period is needed to address situations where an unmitigated bid (e.g., $1,000/MWh) could potentially be the marginal economic bid used to set the price during a constraint violation. This risk is particular high for imports bids at EIM external intertie scheduling points as these bids are not subject to market power mitigation because the external intertie scheduling points are deemed competitive. Imports and exports, participating in the fifteen-minute market on EIM external interties scheduling points, are an additional source of market liquidity but participation may be limited during the first twelve months of EIM operation. The existing market power mitigation procedures will mitigate EIM participating resources within the EIM balancing authority area when constraints are binding. The graduated bid cap allows imports/exports to voluntarily participate in the EIM, while maintaining the effectiveness of the constraint relaxation parameter needed to address the potential of anomalous pricing results during the transition period.

This transition period proposal will be applicable to all new EIM entities and will apply to the PacifiCorp EIM based its November 1 deployment. Accordingly, upon FERC approval of the transition period proposal, the applicable bid cap for the PacifiCorp EIM will be based on the November 1 deployment date.

The ISO believes that the combination of the bid cap increases and constraint relaxation parameter will mitigate anomalous pricing that results from the EIM Entity gaining operational experience in EIM. By increasing the bid caps over time, the EIM Entity has incentives to implement needed operational and business process improvements quickly. In addition, increasing economic participation within the EIM Entity balancing authority area will provide additional capacity that would allow the market to clear without triggering constraint violations.

2 Plan for Stakeholder Engagement

Item	Date
Post Draft Final Proposal	December 15, 2014
Stakeholder Conference Call	December 19, 2014
Stakeholder Comments Due	December 31, 2014
Board of Governors Decision	January 5, 2015
FERC Filing	Week of January 5, 2015

3 Next Steps

The ISO plans to discuss this draft final proposal with stakeholders during a conference call to be held on December 19. The ISO requests comments from stakeholders on the proposed market design changes described in this draft final proposal. Stakeholders should submit written comments by December 31 to EIM@caiso.com.

Attachment D – Board Memorandum

Tariff Amendment to Implement Transition Period Pricing for Energy Imbalance Market

California Independent System Operator Corporation

Memorandum

To: ISO Board of Governors

From: Keith Casey, Vice President, Market & Infrastructure Development

Date: January 2, 2015

Re: **Decision on EIM transition period proposal**

This memorandum requires Board action.

EXECUTIVE SUMMARY

On November 13, 2014, the ISO requested that FERC grant a 90-day waiver to allow the prices for energy in the energy imbalance market (EIM) entity's balancing authority area to be based on the marginal economic bid instead of the $1,000/MWh pricing parameter. The ISO requested the waiver because during the initial implementation of the energy imbalance market, the market encountered transitional conditions that restricted the timing and amount of capacity available through the market clearing process. This caused the transmission and system balance constraints to bind more frequently than expected, producing atypically high prices in the fifteen-minute and five-minute markets in the EIM entity's balancing authority area. FERC granted the waiver on December 1, 2014. In doing so, FERC, however, strongly encouraged the ISO to file any tariff revisions that may be necessary sufficiently before the waiver expires, to avoid any subsequent financial impacts to market participants.

Management believes that a transition period is needed beyond the expiration of the tariff waiver. Management proposes to file the transition period design described below with FERC prior to the waiver expiring and to apply it to all new EIM entities including PacifiCorp. Management proposes a twelve month transition period which will price energy at the marginal economic bid instead of the $1,000/MWh pricing parameter consistent with the currently approved 90-day waiver.

> ***Moved, that the ISO Board of Governors approves the EIM transition period proposal, as described in the memorandum dated January 2, 2015; and***
>
> ***Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed tariff change.***

DISCUSSION AND ANALYSIS

Background

On November 13, 2014, the ISO requested that FERC grant a 90-day waiver of the applicability of section 27.4.3.2 and the second sentence of section 27.4.3.4 of the ISO tariff for constraints within the balancing authority areas of PacifiCorp or that affect EIM transfers between balancing authority areas. These tariff provisions establish the price for energy when the ISO's market clearing software must resort to relaxing modeled constraints, such as transmission or system balance constraints, to clear the market. The requested waiver prices energy in the EIM entity's balancing authority area based on the marginal economic bid instead of the $1,000/MWh pricing parameter that would normally apply in such situations.

The ISO requested the waiver because during the initial implementation of the energy imbalance market, transitional conditions were encountered that restricted the timing and amount of capacity available through the market clearing process. This caused the transmission and system balance constraints to bind more frequently than expected, producing atypically high prices in the fifteen-minute and five-minute markets in the EIM entity's balancing authority area. The ISO determined that system conditions, operations processes, the current level of EIM participating resources, and the new operating environment are complicating the timing of, and restricting the amount of, effective economic bids necessary to relieve the constraints. These anomalies are temporary as they are associated with the initial startup and transition period of EIM operations, and do not reflect actual physical conditions on the system in all cases.

FERC granted the waiver on December 1, 2014, but in doing so strongly encouraged the ISO to file any tariff revisions that might be necessary beyond the term of the waiver sufficiently before the waiver expires to avoid any subsequent financial impacts to market participants. Although progress has been made during the waiver period in resolving known issues, since the 90-day period has not yet concluded, it is not yet known if all issues will be sufficiently addressed, and new issues could still arise. Management thus believes that a transition period is needed beyond the approved tariff waiver. Management proposes to file the transition period design described below with FERC prior to the waiver expiring and to apply it to all new EIM entities and PacifiCorp.

Design elements of transition period

Management proposes a twelve month transition period for new EIM entities to allow a new EIM entity to gain sufficient operational experience across all seasons. During the stakeholder process, Management originally planned for the transition period to consist of the following two measures:

- The market will price energy in the EIM entity's balancing authority area based on the marginal economic bid instead of the $1,000/MWh pricing parameter

when modeled constraints must be relaxed, consistent with the December 1, 2014 approved tariff waiver.[1]

- The energy bid cap[2] for EIM participating resources, including imports/exports on EIM external intertie scheduling points economically bidding in the fifteen-minute market, will start at $250/MWh and gradually increase over the year as follows:

Months 1 – 6	$250/MWh
Months 7 – 9	$500/MWh
Months 10 – 12	$750/MWh
Beyond transition period	$1000/MWh

Management believes using the marginal economic bid for constraint relaxation will mitigate anomalous pricing that may result from the EIM entity gaining operational experience under the energy imbalance market. This feature will prevent inappropriately high prices that do not reflect actual energy scarcity, but would rather reflect artificial market scarcity, because new EIM entities are still implementing operational and business process improvements to make resources available to the market.

Based upon stakeholder comments, Management will not propose the graduated energy bid caps within the EIM entity balancing authority area in the tariff filing with FERC prior to expiration of the waiver. Management believes that stakeholder concerns regarding potential unintended consequences from different energy bid caps between balancing authority areas in the EIM footprint can be addressed through additional stakeholder discussion in the EIM year 1 enhancements stakeholder initiative.

Management supports greater economic participation within the EIM entity's balancing authority area, including 15-minute imports and exports on EIM external intertie scheduling points (i.e. interties connecting an EIM entity's balancing authority area to a non-EIM balancing authority area). This will provide additional capacity that would allow the market to clear without triggering constraint violations. In addition, Management believes that the graduated bid cap, or other measures, may be needed during the transition period to address situations where an unmitigated bid (e.g., $1,000/MWh) might be the marginal economic bid. This scenario could undermine the effectiveness of the EIM transition period proposal to use the marginal economic bid to set the price when transmission or supply constraints are binding.

[1] To effectuate this price discovery, it is 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 will set the locational marginal price, to avoid otherwise setting the price at the constraint's parameter.

[2] In the EIM balancing authority area the energy bid plus the greenhouse gas bid adder must be lower than or equal to the bid cap. This bidding rule still applies during the EIM transition period.

STAKEHOLDER PROCESS

The stakeholder process was accelerated to be responsive to FERC's directive that any tariff amendment for a longer transition period be filed prior to the expiration of the 90-day waiver. Nonetheless, Management provided a stakeholder process for this proposal pursuant to the following timeline:

Date	Activity
November 10, 2014	Posted EIM year 1 enhancements issue paper/straw proposal
November 14, 2014	Filed request for tariff waiver with FERC
November 17, 2014	Held EIM year 1 enhancements stakeholder meeting and communicated that Management would propose a permanent transition period
December 1, 2014	FERC Order approving tariff waiver received
December 15, 2014	First informational report required in waiver filed with FERC
December 15, 2014	Posted EIM transition period draft final proposal
December 19, 2014	Held EIM transition period stakeholder conference call
December 31, 2014	Final date for stakeholder written comments on EIM transition period draft final
January 2, 2015	Posted EIM transition period board memo
January 5, 2015	Special Board of Governors general session teleconference for decision
January 9, 2015	If approved by Board of Governors, file EIM transition period tariff language with FERC
February 14, 2015	Expiration of 90-day waiver approved by FERC

POSITIONS OF THE PARTIES

Stakeholders acknowledge the significant learning curve for new EIM entities when implementing an energy imbalance market to manage its balancing authority area. Stakeholders generally support providing PacifiCorp with additional time beyond the currently approved waiver to resolve identified issues, but disagree as to whether the additional time must be accomplished through an ISO tariff filing. Stakeholders believe

that the current EIM year 1 enhancements stakeholder initiative is an appropriate venue to consider, if appropriate, the long term design of a transition period for other EIM entities. Stakeholders express concern for unintended market inefficiencies that may occur with the graduated energy bid caps. The Department of Market Monitoring shares this concern and believes the graduated energy bid cap proposal would benefit from additional time and consideration. In response to stakeholder comments, Management has removed the graduated energy bid caps from the proposal which we will file with FERC prior to expiration of the tariff waiver. The graduated energy bid cap proposal will be discussed further in the current EIM year 1 enhancements stakeholder initiative.

Issue 1 – The EIM transition period should not apply to all new EIM entities. A long term design, if appropriate, should be considered in a comprehensive stakeholder initiative.

Management Response – In FERC's order approving the 90-day tariff waiver for PacifiCorp, FERC strongly encouraged the ISO to propose a long term transition period if the waiver duration was insufficient. Management believes a tariff amendment implementing an EIM transition period is responsive to FERC's directive and is preferable to requesting additional extensions on an ad hoc basis. Management is supportive of discussing potential enhancements or modifications to the EIM transition period in the EIM year 1 enhancements stakeholder initiative. This initiative currently has two phases. Phase 1 items are planned for Board decision in March 2015 and will be implemented in Fall 2015. Phase 2 will begin after six months operational experience of the energy imbalance market. The EIM transition period design may benefit from the observations during this six month period.

Issue 2 – The twelve month duration is too long. Some stakeholders have suggested the extended transition period should not be fixed at 12 months but should informed by information about how well the transitional issues are being addressed.

Management Response – The twelve month duration allows the EIM entity sufficient operational experience during all seasons. Operational challenges differ between seasons and may require different operational or business process changes that cannot be identified until actual system conditions change. In order to provide additional transparency to market participants, upon expiration of the tariff waiver, Management will continue the reporting requirements ordered by FERC through the entire EIM transition period on a quarterly basis.

Issue 3 – The graduated bid caps may give rise to unintended market efficiencies because different pricing rules will apply in different balancing authority areas participating in the energy imbalance market.

Management Response – In response to the stakeholder comments, the graduated bid caps will be discussed further in the EIM year 1 enhancements stakeholder initiative. As Management has discussed in that initiative, economic bidding on EIM external

intertie schedule points would increase market liquidity and allow load serving entities additional opportunities to hedge imbalance charges within the EIM entity balancing authority area. During this initiative, Management will decide if economic participation on EIM external intertie scheduling points remains at the discretion of the EIM entity and consider additional measure, such as gradually increasing bid caps, necessary to maintain the effectiveness of using the marginal economic bid to relax constraints within the EIM entity balancing authority area as proposed in the twelve-month EIM transition period.

CONCLUSION

Management requests Board approval of the EIM transition period proposal. The proposed EIM transition period will mitigate unwarranted price volatility as new EIM entities gain sufficient operational experience under the new market based paradigm for all seasons of the year. This transition period proposal will apply to all new EIM entities and will apply to PacifiCorp based on its November 1, 2014 deployment date. Management will review additional measures, such as the graduated energy bid caps, in the EIM year 1 enhancements stakeholder initiative.

Board of Governors **January 5, 2015** **Decision on EIM transition period proposal**

Motion

Moved, that the ISO Board of Governors approves the EIM transition period proposal, as described in the memorandum dated January 2, 2015; and

Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed tariff change.

Moved: Galiteva Second: Bhagwat

Board Action: **Passed**	Vote Count: **4-0-0**
Bhagwat Y	
Galiteva Y	
Maullin Y	
Olsen Y	

Motion Number: 2015-01-G1

Attachment E – December 15, 2014 Report

Tariff Amendment to Implement Transition Period Pricing for Energy Imbalance Market

California Independent System Operator Corporation

December 15, 2014

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

Re: California Independent System Operator Corporation
Docket No. ER15-402___
Informational Report – Performance of Energy Imbalance Market

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its December 15 report on the performance of the Energy Imbalance Market for November 1 – November 30, 2014.[1]

The CAISO also respectfully requests a modest extension of no more than seven days after the date of this submission to allow the Department of Market Monitoring additional time to review the CAISO's report and provide its independent assessment. The Commission directed the Department of Market Monitoring to submit independent assessments on the causes and solutions identified by CAISO. Because this first reporting requirement came so quickly after the issuance of the Commission's order, the Department of Market Monitoring requires some additional days to fully review and evaluate the CAISO's report and provide an independent assessment.

Please contact the undersigned with any questions.

Respectfully submitted,

By: */s/ Anna A. McKenna*
Roger E. Collanton
General Counsel
Anna A. McKenna
Assistant General Counsel
John Anders
Lead Counsel
California Independent System

[1] The CAISO submits this report pursuant to *California Independent System Operator Corp.*, 149 FERC ¶ 61,194 (2014).

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Energy Imbalance Market Pricing Waiver Report November 1 - 30, 2014

December 15, 2014

ISO Market Quality and Renewable Integration

I. Introduction

On December 1, 2014, FERC granted the California Independent System Operator Corporation's (CAISO) petition for limited waiver of the pricing parameters in sections 27.4.3.2 and 27.4.3.4 of its tariff for 90 days, as they pertain to the Energy Imbalance Market, effective November 14, 2014, as requested.[1] In addition, FERC directed CAISO to submit informational reports as further described herein. The CAISO will be submitting on a monthly basis the requested reports in Attachments A through E, including reports provided by the CAISO's Department of Market Monitoring and PacifiCorp. This report covers the CAISO's reporting requirements for the time period covering November 1 through November 30, 2014.

For this first report, the CAISO is requesting a modest extension to allow it to submit the Department of Market Monitoring's report within seven days of December 15, 2014. The Commission directed the Department of Market Monitoring to submit independent assessments on the causes and solutions identified by CAISO. Because this first reporting requirement came so quickly after the issuance of the Commission's order, the Department of Market Monitoring requires some additional days to fully review and evaluate the CAISO's report and provide an independent assessment.

II. Background

On November 1, 2014, the CAISO fully activated the Energy Imbalance Market (EIM). The Energy Imbalance Market allows balancing authorities outside of the CAISO balancing authority area to voluntarily take part in the imbalance energy portion of the CAISO locational marginal price-based real-time market. PacifiCorp, the CAISO, and market participants participated in market simulations prior to the start of the Energy Imbalance Market on November 1, including parallel production from October 1 to November 1. However, shortly after go live the CAISO began observing challenges that led to artificially high prices in cases where the market application had to resort to the relaxation of transmission constraints or the power balance constraint in order to clear the market.

On November 13, 2014, the CAISO sought a 90-day waiver of the applicability of section 27.4.3.3 and the second sentence of section 27.4.3.4 of its tariff to permit CAISO to address, without suspending the Energy Imbalance Market, those circumstances produced atypically high prices. Those two sections of the tariff provide that when there is a lack of economic bids to clear the fifteen-minute and five-minute markets, the

[1] *California Indep. Sys. Operator Corp.*, 149 FERC ¶ 61,194 (2014) (December 1 Order).

CAISO's market application will price the shortages (and therefore set locational marginal prices) according to the pricing parameters specified in those sections. Specifically, for the purpose of determining how a transmission constraint or system-energy balance constraint will affect the determination of prices in the market, the pricing parameter for the relaxation of the constraint is $1,000/MWh (the maximum energy bid price specified in tariff section 39.6.1.1).

The waiver addresses three sets of transitional conditions in the Energy Imbalance Market that together have caused the transmission and system energy-balance constraints described in tariff sections 27.4.3.2 and 27.4.3.4 to bind more frequently than expected in the weeks since the Energy Imbalance Market began operation on November 1, causing prices in these intervals to be set by the $1,000/MWh bid cap. Because of these transitional conditions, the high prices are not always indicative of actual physical conditions on the system, and reflect challenges in providing timely and complete data to ensure system visibility under the new procedures, exacerbated by limitations on the resources available to PacifiCorp for use in the Energy Imbalance Market and several forced outages of large Energy Imbalance Market participating resources. The CAISO described[2] the transitional conditions that led to the waiver in its petition filed on November 13, 2014, as follows:

1) All possible operational conditions, including interactions between disturbance events and other conditions on the system, were not fully represented, simulated and tested during these earlier market simulations. It was not until actual operations that these circumstances were experienced and the resulting price excursions became apparent. In some cases data issues arise because of errors made in processing such information, and in such intervals the CAISO will have authority to correct prices. But it in some cases, the pricing excursions may be due to the need to adopt better practices generally and not because of an erroneous data processing issue.

2) Limitations on the resources available to PacifiCorp for use in the Energy Imbalance Market. Several resources had not yet received the necessary metering upgrades due to various outage schedule limitations, which has prevented PacifiCorp from making these resources available in the initial pool of resources participating in the Energy Imbalance Market. The CAISO is processing temporary metering exemptions in accordance with its requirements and participation by some additional resources has improved conditions, but other considerations remain. For instance, some resources are subject to multiple ownership rights and have contractual issues that

[2] *See Petition For Limited Tariff Waiver And Request For Expedited Consideration*, California Independent System Operator Corp., filed November 13, 2014, FERC Docket No. ER15-402.

must be resolved to enable their participation in the Energy Imbalance Market. Additionally, third-party resources in PacifiCorp's balancing authority areas have not yet begun participating in the Energy Imbalance Market, which further limits the pool of available resources.

3) The PacifiCorp East and PacifiCorp West balancing authority areas experienced several forced outages of large Energy Imbalance Market participating resources, which led to short term supply deficiencies in the market. While outages are not necessarily uncommon, these outages quickly exacerbated an already tight supply and contributed to price increases in the associated intervals. In addition, while PacifiCorp operations accounted for the outages by responding to system conditions, these actions have not always been communicated in a timely manner to the market. Without such information, the market results would not necessarily reflect physical conditions on PacifiCorp's system. The addition of more participating resources and enhanced operational procedures should mitigate the impact of such outages.

On December 1, 2014, FERC granted the CAISO its waiver request and also directed monthly reports to FERC on the progress of the issues that led to the need for the waiver. The CAISO provides its reports consistent with the order below and in the attachments to this report.

III. Reports

In the December 1 Order, the Commission directed the CAISO to file detailed informational reports on the performance of Energy Imbalance Market at 30-day intervals during the 90-day waiver period. Consistent with the order, this first of such reports is filed 30 days from the effective date of the tariff waiver, December 15, 2014. The Commission stated that these reports should provide detailed supporting data demonstrating progress towards identifying and eliminating the problems giving rise to the waiver petition. Consistent with the December 1 order, the following reports are included in Attachments A through E as follows:

Attachment A: A quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within the CAISO's control. Includes a description of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance problems related to the issues that prompted the CAISO's waiver request. Identifies any remaining deficiencies in CAISO and PacifiCorp processes, procedures, and tools and any additional market issues

related to these pricing concerns that the CAISO considers necessary to sustain stable market operations, along with the CAISO's plan to address such issues.

Attachment B: A quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within PacifiCorp's control. This section includes a description of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance problems related to the issues that prompted the CAISO's waiver request.

Attachment C: Independent assessments from the Department of Market Monitoring on the causes and solutions identified by the CAISO. For this first report, this will be submitted within seven days of the CAISO's first submission.

Attachment D: An exploration of impacts, if any, on non-EIM pricing nodes, including the Mona trading node. Report on whether EIM pricing is adversely impacting non-EIM pricing nodes. The extent to which non-EIM pricing nodes such as the Mona trading node are impacted by EIM pricing within the PacifiCorp Balancing Authority Areas. Identify any such impacts and describe any actions the CAISO is taking or plans to take to address such impacts.

Attachment E: Description of each relaxation event, and a summary of the magnitude and frequency of such events overall. Data on instances where the $1,000/MWh price would have occurred but for this waiver, including the time of the instance, the duration, the cause, and the affected node(s) and load aggregation points.

ATTACHMENT A

Quantitative and qualitative descriptions of market performance related to the issues that prompted the CAISO's waiver request - CAISO.

This attachment includes quantitative and qualitative information for three reporting requirements specified in the Commission's December 1 order. First, section 1 and section 2 provide a quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within the CAISO's control. Second, the tables in section 2 of this attachment provide a descriptions of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance related to the issues that prompted the CAISO's waiver request. Finally, the tables in section 2 of this attachment also report on the measures taken and planned to address the market performance problems, which also identify any remaining deficiencies in processes, procedures, and tools and any additional market issues related to these pricing concerns that the CAISO considers necessary to sustain stable market operations, along with the CAISO's plan to address such issues.[3]

1. Analysis of Impact on Market Performance

In this section the CAISO provides a quantitative and qualitative analysis of the market performance impact of the issues that prompted the CAISO's request for a waiver. Figure 3 and Figure 4 provide daily average price trends in the Energy Imbalance Market organized by market and area. These daily averages reflect all prices in the real-time market, including the price corrected through the price correction process. From November 14 through November 30 the price adjustments pursuant to the waiver are implemented retroactively after the December 1 order was issued. The CAISO has commenced but not completed these retroactive adjustments, which means that prices for this time period may change.

[3] *December 1 Order* at P 25.

Figure 1: Daily average of fifteen-minute market prices in PAC West and PAC East.

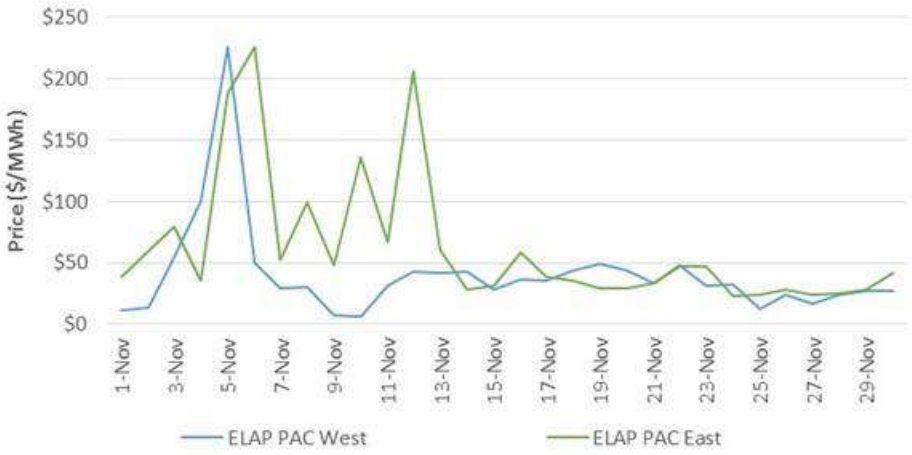


Figure 2: Daily average of five-minute market prices in PAC West and PAC East.

Figure 3 thru 6 report on all market intervals in which the CAISO experienced price excursions, counted by fifteen or five minute market intervals. The data includes pricing for both the PacifiCorp (PAC) West and PacifiCorp East load aggregation points (ELAPs). A fifteen or five minute market interval is counted once if the ELAP price of PAC West area or PAC East area, or both areas exceed $500. The data excludes any price excursions that were already subject to price corrections. Section 35.4 of the CAISO tariff already provides the CAISO authority to correct prices if it detects an invalid market solution or prices due to issues such as data input failure, occurrence of hardware or software failure, or a result that is inconsistent with the CAISO tariff. The CAISO has now completed all the price corrections authorized under its existing tariff authority for the month of November. As described above, the factors that led to the need of the waiver fall outside of the scope of this authority and therefore, this report

only focuses on those intervals that would have been left unadjusted but for the waiver. The report focuses on the ELAP prices because these aggregate prices are representative of pricing in each area -- PAC West and PAC East-- and would reflect short-term imbalance shortage for the aggregate area.

Figures 3 and 4 provide the daily frequency of price excursions in the fifteen- and five-minute markets. For the period of November 1 through November 13, prices were validated through the CAISO's tariff price validation and correction process authority and stand final. For the period of November 14 through November 30 prices are being adjusted per the tariff waiver of this report. This provides a perspective of the final prices that stand unchanged and the volume of prices that may be still adjusted after the December 1 tariff waiver.

Figure 3: Frequency of intervals with ELAP prices exceeding $500 in the fifteen-minute market. PAC West and PAC East.

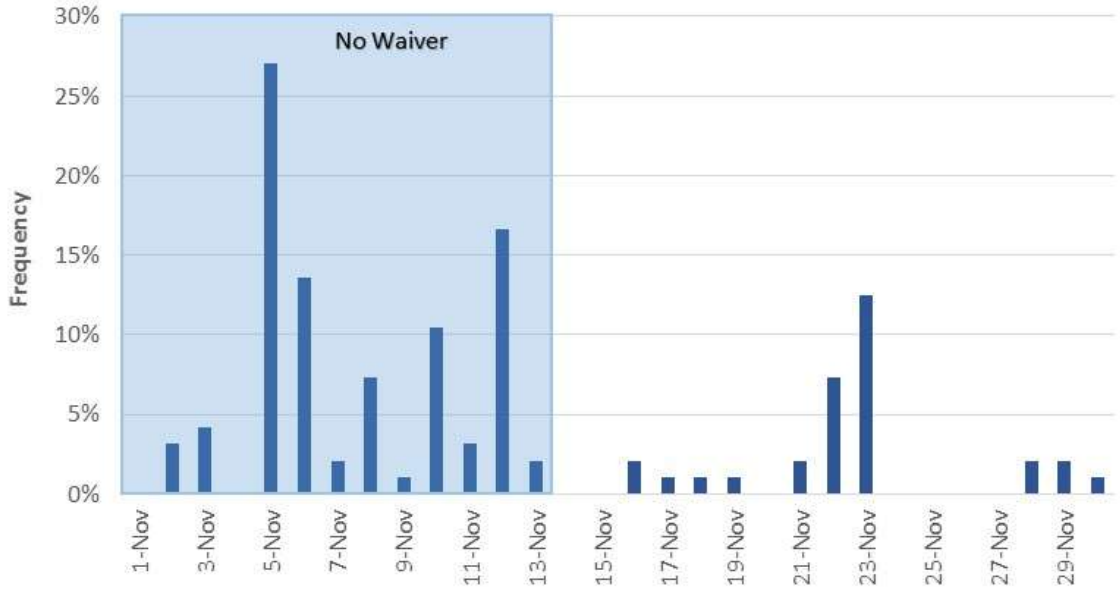


Figure 4: Frequency of intervals with ELAP prices exceeding $500 in the five-minute market. PAC West and PAC East.

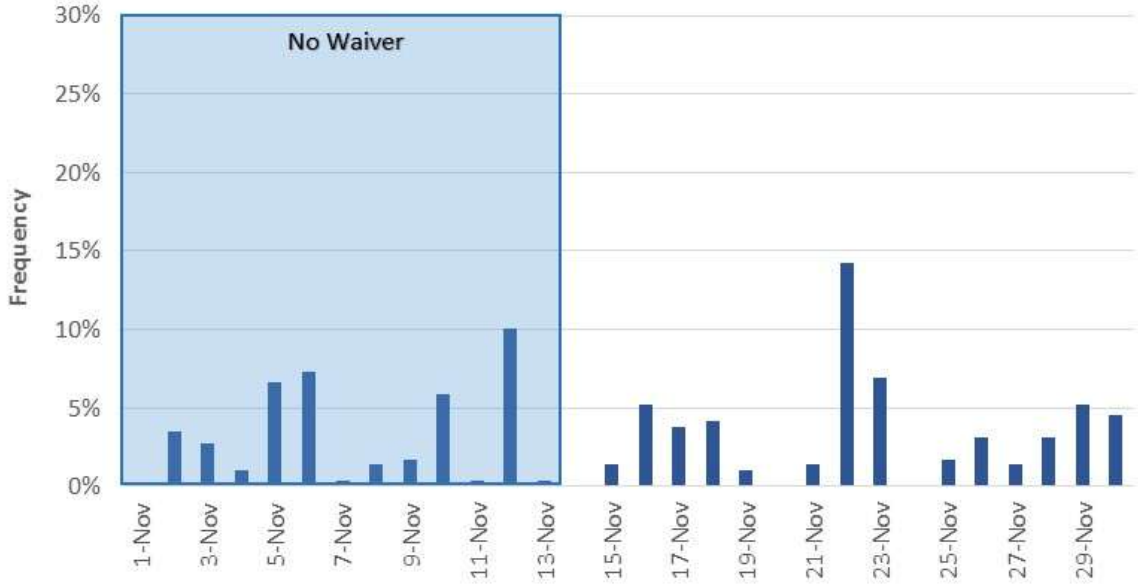


Figure 5 and Figure 6 show the frequency of price excursions for both the fifteen and five-minute market, including the cause for the excursions. In any given market interval, more than one of the illustrated reason may have contributed to the price excursion because there are numerous elements that can impact the market outcome. For example, a given market interval may experience a price excursion due to data alignment, manual dispatches and load changes. For the purpose this report, the CAISO has reviewed each affected market interval and has assigned the interval to a reason category that most afflicted the interval. The categories used in the figures in this section 1, include:

1. *Renewable deviations* for conditions in which wind changes lead to the loss of capacity and for the need to increase generation from other resources.
2. *Load changes* refer to conditions where either the load forecast is adjusted or there is a change in the load bias.
3. *Import/Export changes* is for adjustments and updates to imports and exports as seen by the market.
4. *Resource outage* is for conditions in which an outage results in the loss of capacity available to the market, and for which the market needs to increase generation from other resources. Similar conditions apply for manual dispatches leading to a reduction of available capacity to the market.
5. *Resource data alignment* is for any other condition not captured in the previous five categories. This group accounts for resource deviating from

their dispatch, differences between base schedules and bids or dispatches, and changes between markets.

Figure 5: Reasons for intervals with ELAP prices exceeding $500 in the fifteen-minute market. PAC West and PAC East.

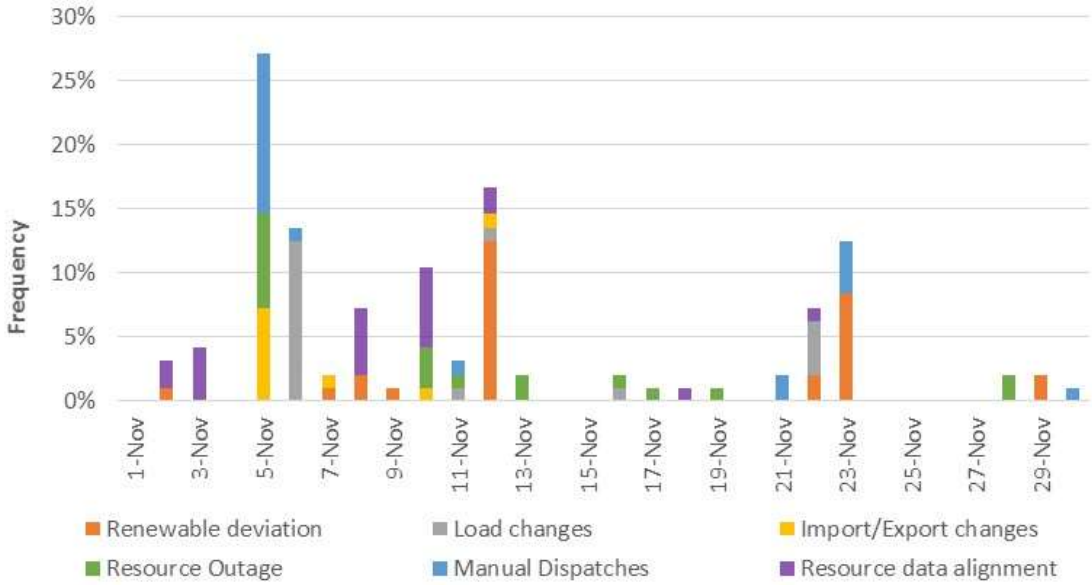
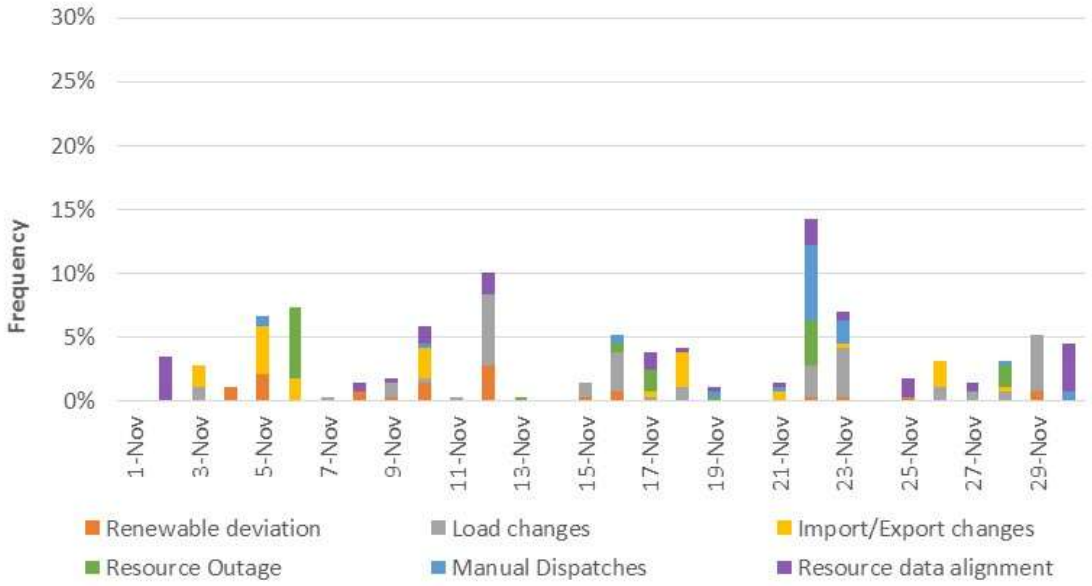


Figure 6: Reasons of ELAP Prices exceeding $500 in the five-minute market. PAC West and PAC East.



The categories used in Figures 5 and 6 are related but not exactly the same as the broader descriptions provided in the tables in section 2 below. In some cases, the descriptions provided in the tables below will create conditions leading to the manifestation of price excursions. For example, in category 1 below includes the issue of timely manner of entering and cancelling outages. This issue also falls in the category of resource data alignment shown in Figure 5 and Figure 6. The descriptions in the tables below link each issue to the relevant category of reasons above to more specifically define the categories of reasons that prompted the need for the December 1 Order tariff waiver.

2. Issues prompting waiver, remedial actions taken, status and outstanding items

Category 1: Outages, derates/rerates management

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Timely entering and cancelling of outages in the market	When resources experience full or partial forced outages, the market must be informed in a timely manner of the outage event and the corresponding measures taken to compensate for the lost megawatt capacity. Delay in informing the market application causes the market application to detect capacity shortages not covered by the unloaded capacity from participating resources. Under such conditions, prompt EIM Entity manual dispatch instructions are needed to increase the generation of available non-participating resources to create room for participating resources to be marginal and to economically set price. When the EIM Entity cancels an outage in a timely manner, it is also important to inform the market that the capacity is available and can be used to clear the Energy Imbalance Market, otherwise the market will perceive that there is capacity shortage to meet the load.	The CAISO provided additional training to the EIM Entity to correct processes and procedures for understanding when and what information is to be correctly entered and canceled in the Outage Management System. The training was provided through verbal and written instructions and guidelines, and clarifications to procedures. Significant progress has been made in the last 30 days. The CAISO continues to monitor and analyze for the timeliness of response to inform the market about any out-of-market manual actions that are taken or are planned to be taken.	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment and Resource outages. As illustrated in those figures, these causal categories have decreased in frequency over time.

2. Base schedule and Bid submission for resources undergoing outages	The timing in which the EIM Entity reports the outage is very important. If the outage occurred before T-75 (*i.e.*, seventy five minutes before the operating hour) and is expected to last during the operating hour T, then both the economic bid and base schedule submission should be adjusted to account for the outage. Otherwise, the assumptions and data used by the market application for the balance test and look-ahead fifteen-minute market are not consistent with real system conditions, which results in less capacity available to the Energy Imbalance Market than what was computed before the start of the operating hour, and high prices are imminent due to limited unloaded economic capacity that is offered in the market.	The CAISO provided the EIM Entity additional market operator training, discussions, clarifications to guide the EIM Entity to follow best practices, and procedures for actions that must be taken depending on the timeframe of the outage: before T-75', before T-40', and after T-40'. The CAISO has provided more information about derates and outages and by enhancing the EIM Entity user interface displays to include greater awareness of the effective resource limits and any disqualified capacity due to derates or full outages. Significant progress has been made in the last 30 days. The CAISO continues to monitor and analyze for timely responses to inform the market about any out-of-market manual actions that are taken or are planned to be taken by the EIM Entity.	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment and Resource outages.
3. Outages of partial or full multi-stage generating resource configurations	Multi-stage generating resources have multiple configurations that must be carefully managed in the real-time market. The configuration characteristics are registered in the master file and are	The CAISO provided the EIM Entity additional training on data modeling and base scheduling and definition of multi-stage generating resource parameters.	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment and Resource outages

	observed and honored by the market application. These include physical registered characteristics such as transition time, minimum up time, and minimum down time and minimum load (Pmin) and maximum output (Pmax) megawatts (MWs) as well as any overlapping MW regions between configurations. If a configuration is out of service, a timely input of the outage is needed to inform the market that the corresponding economic bid or base schedule is not available and another configuration should be used. If the information is not promptly entered or bids don't exist on other configurations then the market has no way to move the resource to other configurations and the whole MW of the plant is lost in the market and price excursions will occur.	The CAISO has seen a lot of improvement in this area but due to the complexity of multi-stage generating resource data modeling there is still room for improvement.	

Category 2: Manual Dispatch

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Timely input of manual dispatch	Since many units are not participating in the market, manual dispatch and other out-of-market actions taken on these units must be recorded by the EIM Entity in the market to inform the market about the availability of these resources and their	The manual dispatch is entered directly in the market tool by the EIM Entity and any software limitations were discussed and explained in detail by the market operator. A review of the process	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment and Manual Dispatches

	movements to respond to events like contingency or outages of other units. Without this timely information, the market can only assume that the participating resources will respond to these various events, which will result in depleting the unloaded capacity of the participating resources and their capability to set economic prices.	and the interaction between the EIM Entity and the EIM Participating Resource Scheduling Coordinator that represents PacifiCorp Energy was conducted to explain and clarify the role of each group in this process and how to achieve a coordinated and timely response.	
2. Flexible ramping sufficiency test	The CAISO performs the flexible ramping sufficiency test on the base schedules, the last test being at 40 minutes before the start of each operating hour. When the EIM Entity fails the test based on the economic bid-in capacity that is being offered to the market, the market application will constrain the failed balancing area and limit it from increasing its import from other balancing areas to prevent the leaning concern. This means that the failed balancing area enters the operating hour depending on its resources and any additional manual changes to available non-participating resources set points or purchases of interchanges within the hour. Any delay in performing the manual dispatches or the additional interchange purchases leaves the market exposed for price excursions due to insufficient bid-in flex capacity.	The CAISO has discussed this issue with the EIM Entity and has clarified the market impact. The CAISO also is considering whether it is necessary to make available a user interface display of the results of the flexible ramping sufficiency test to the balancing group of PacifiCorp similar to the display/report available to grid operation.	This issue may reduce the flexibility of the market to absorb system condition changes and data updates and, consequently, leave the market more susceptible to price excursions by any of the reasons provided in Figures 5 and 6.

Category 3: Wind forecast accuracy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Accuracy of PacifiCorp wind resources forecast	The variable energy resource (VER) forecast, which is mainly wind forecast for the PacifiCorp balancing authority areas, is crucial because it sets the maximum economic megawatt range that the market is allowed to dispatch these resources. The accuracy of the short term VER forecast benefits immensely from the accurate telemetry of the output of the VER resources. The forecast of the wind resources was deviating significantly from the output of the resources even for the next 5-min forecast over a period of many days. This resulted in significant deviations in calculated energy imbalance and sometimes resulted in overgeneration, or undergeneration conditions compared to the hourly base schedule values of these wind resources for the corresponding operating hour. Lastly, in cases where wind resources are participating and being dispatched, the short-term forecast, which is a persistent forecast, may not be accounting for the dispatch instruction.	The CAISO provided an additional unit deviation display as part of the EIM Entity user interface. This display provides the grid operator information in a fast and flexible manner with respect to any differences between any combination of telemetry, state estimation, base schedule, and cleared target operating points. This display helped not only to quickly identify which wind resource is deviating but also the amount of deviation per resource and on aggregate basis per balancing area. PacifiCorp is diligently working with its wind forecast service provider to enhance the forecast quality of the wind resources megawatt output and accounting for participating wind resources that are dispatched based on submitted bids.	This issue may result in instances counted in Figure 5 and 6 as Renewable deviation

Category 4: Interchange schedule variation

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Interchange information within the hour	Interchange information is an essential part of meeting energy imbalance for each balancing authority area. Considering the forward look-ahead time horizon of the fifteen-minute market for almost two hours, and one hour for the five-minute real-time dispatch market, timely information about the interchange schedules is essential. The delay to inform the market application about these interchanges during resources outage times or steep load ramping conditions tightens the market conditions, leading to fake price excursions that sometimes show in the financially binding fifteen-min market interval which is calculated 37.5 minutes ahead of time before the T-20 minutes cut off time for the tags to be submitted and approved for any extra or within the hour interchanges.	Review of the fifteen-minute and five-minute market timelines, and impact of lack of market information about any planned purchase or sale of interchanges before or within the hour was discussed with the EIM Entity, and the pricing impact was clarified. Information was incorporated in business procedures that are used to train PacifiCorp personnel. The CAISO also discussed with the EIM Entity the need to submit planned interchange base schedules for multiple hours in the horizon to provide the short term unit commitment, which has a four and half hours look-ahead horizon, with good projection of the forward hours to enable good market decisions.	This issue may result in instances counted in Figure 5 and 6 as Import/Export changes

Category 5: Load forecast variation

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Load forecast biasing	EIM Entity grid operators have the capability to bias the load forecast for reliability purposes to account for any non-modeled issues causing discrepancy between forecast load and actual load. The setting of the bias is somewhat subjective based on the grid operator's judgment of system operational and reliability needs. This biasing if not done in a coordinated fashion with market operations can create price excursions especially when there is limited flexible ramp capacity available to accommodate small marginal overshoot or undershoot of the bias values. Due to the limited pool of participating resources, the PacifiCorp grid operator will necessarily need to pay extra attention to the bias values to prevent unintended overshoot or undershoot.	The logic for the load bias to maintain reliability was extensively discussed, documented, and used during PacifiCorp grid operator training. The impact of these actions on prices was also discussed and, as explained, the price is a situational awareness signal to indicate the issue of meeting load or balancing the system. The issue of grid operator adjustment for correcting the area control error (ACE) was also discussed in detail and the challenges of operating under market structure and non-market structure was clarified and included in the training material.	This issue may result in instances counted in Figure 5 and 6 as Load changes

Category 6: Resources not following dispatch

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Resources not following dispatch signal	On occasion resources were not closely following the market dispatch signal. This was either because the plant was unavailable and an outage ticket was not	The CAISO provided an additional unit deviation display as part of the EIM Entity grid operator user interface. This display provides the	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment

	entered on-time for the market to consider the outage, or because of some lag time when the plant was not set on automatic generator control to be dispatched directly from market signal. In any of these cases, the deviation from the market dispatch and the lack of the manual instructions to inform the market application when the resource cannot operate to the target operating point, resulted in market conditions that are not reflective of actual system conditions, causing price excursions. In some cases when the plant is dragging its response to the market signal it was necessary for the EIM Entity to make direct phone calls to the plant to start moving up or down to the plant's designated market dispatch signal.	operator, with a fast and flexible depiction of any differences between any combination of telemetry, state estimation, base schedule, and cleared target operating point. This display helped to quickly identify which wind resource is deviating and the amount of deviation per resource and on aggregate basis per balancing authority area. When a resource was observed to be dragging its dispatch, a direct call to the plant was enough to expedite the response if the plant was available or resulted in submission of outage ticket or manual dispatch instruction if the plant had any temporary physical limitations.	

Category 7: Network Model discrepancy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Industrial load base schedules	PacifiCorp has industrial load as part of the conforming load and market load forecast. This created a discrepancy whenever these industrial loads are operating or called upon to curtail. The market is not aware of these non-participating	CAISO and PacifiCorp went through a series of meetings and identified these resources. An action plan was developed to add these non-participating resources to the network model used in the market	This issue may result in instances counted in Figure 5 and 6 as load changes and resource data alignment

	resources that exist in the PacifiCorp energy management system, but not in the market, creating the need to manually bias load to maintain consistency between market model and PacifiCorp's energy management system (EMS) model.	application. These resources are also taken out of the conforming load calculations and PacifiCorp will be submitting average hourly base schedules for these resources like any other non-participating resources.	
2. Distributed energy resources modeling	Distributed energy resources are currently included in the market load forecast as conforming load. These resources have both load and generation components, which net to positive or negative net injection at the load bus. When generating the market sees more load than what the PacifiCorp's EMS is seeing and price excursions occur because of the lack of base schedules for these resources.	CAISO and PacifiCorp went through series of meetings and identified the gross impact of these resources. Action plan was developed to add them to the market network model. These resources are also taken out of the conforming load calculations and PacifiCorp will be submitting average hourly base schedule for them like any other non-participating resources.	This issue may result in instances counted in Figure 5 and 6 as load changes and resource data alignment
3. Telemetry quality issues (net versus gross accounting)	The EIM Entity is sending telemetry values for all PacifiCorp registered resources in the master file. When the quality of the telemetry values is not good, the state estimator solution quality is negatively impacted, which in turn affects the quality of the market solution and the dispatch operating targets of these resources. During the first few weeks of operation the CAISO found that some resources have telemetry measurement that is net of its	The CAISO and PacifiCorp identified all these resources and telemetry issues. Some workarounds are now in place to adjust or correct the sign of the measurement or resolve the gross versus net telemetry measurement, as well as to resolve the zero telemetry for some of the non-participating resources. Much progress was achieved in this area	This issue may result in instances counted in Figure 5 and 6 resource data alignment

	auxiliary loads and others have gross telemetry measurements that do not include the auxiliary load. In addition, certain wind resources and other small non-participating resources did not have telemetry. When these discrepancies are combined together they tend to impact the market solution and prices.	and improvements are underway.	

Category 8: Market model discrepancy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Energy during startup and shutdown	For multi-stage generating resources, the energy of these resources during the startup and shutdown periods when their output is below the PMin is accounted for in energy management system and automatic generation control (AGC). But the market does not account for this energy because it is below the PMin of the resource. This created discrepancy in the base schedule balance test, and the imbalance calculations between market and actual conditions as seen by AGC, which led to performing some load bias during the startup and shutdown of these resources subjecting the market to price excursions.	CAISO is working with PacifiCorp on defining some parameters to best model the startup and shutdown profile of multi-stage generating resources and their ramping time. The CAISO is also looking into adding startup and shutdown profile features to the fifteen-minute market to help model the impact of the energy from such resources during startup and shutdown.	This issue may result in instances counted in Figure 5 and 6 resource data alignment

Category 9: EIM Transfer Limits

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Static and dynamic transfer limit restrictions on California-Oregon Intertie (COI)	The Energy Imbalance Market is designed to have the EIM transfer capacity fully re-optimized in both the fifteen-minute and five-minute market. With respect to the COI, the added restriction of the dynamic five-minute limit which is an incremental limit around the fifteen-minute solution creates at times price excursions. The five-minute dynamic limit constrains the market application from re-optimizing the fifteen-minute EIM transfers decisions between PacifiCorp and CAISO beyond the amount allowed by the five-minute incremental dynamic limit, which can be restrictive especially during the on-peak hours.	PacifiCorp is engaged in ongoing discussions with the Bonneville Power Administration (BPA) to understand the nature and allocation of the dynamic transfer capability on COI. BPA is in the process of conducting a detailed dynamic transfer capability study, which is ongoing work. Any additional five-minute capability will help the five-minute market re-optimize the fifteen-minute decisions that are based on system conditions and information available at approximately 30 minutes prior to the five-minute market.	
2. Five-minute rate-of-change constraints	The rate-of-change constraints are five-minute flow limit constraints that limit the amount of five-minute movement of PAC West balancing authority area participating resources around the corresponding resources' fifteen-minute schedules due to their flow impact on certain paths and flowgates internal to BPA's balancing authority area. This	PacifiCorp is engaged in discussions with BPA to understand the nature and basis behind the five-minute flowgate limits. BPA is reviewing the five-minute limits which are based on historical movement of PacifiCorp West resources before EIM. Any additional five-minute capability	

	restriction on the resources' five-minute movements or the corresponding rate-of-change constraint has created at times price excursions on the impacted resources when the corresponding path or flowgate five-minute limit constraint is binding.	will help the five-minute market re-optimize the fifteen-minute market decisions that are based on system conditions and information available approximately 30 minutes prior to the five-minute market. The CAISO is considering discussing the modeling of these constraints to determine if the current model matches the BPA study assumptions that resulted in setting up the five-minute rate-of-change constraint limits.	

ATTACHMENT B

Quantitative and qualitative descriptions of market performance related to the issues that prompted the CAISO's waiver request - PacifiCorp.

REPORT PROVIDED BY PACIFICORP

Description of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance problems related to the issues that prompted CAISO's waiver request.

In addition to the measures undertaken by the CAISO to address the identified market performance issues described in Attachment A, PacifiCorp has implemented additional measures to address performance of the EIM appropriate for it to undertake as an EIM Entity.

First, PacifiCorp led efforts to coordinate with the CAISO to significantly increase the pool of resources available to participate in the EIM since November 1, 2014. PacifiCorp Energy has received certification, and addressed outstanding metering and contractual issues, for the following PacifiCorp EIM Participating Resources: Huntington Unit 2 (450 MW), Naughton Unit 3 (330 MW), Jim Bridger Units 1-4 (2,147 MW), Gadsby Unit 3 (105 MW), and Gadsby Units 4-6 (120 MW). In the aggregate, PacifiCorp has recently enabled EIM participation for over 3,150 MW of additional resources. PacifiCorp anticipates continuing to add participating resources by addressing remaining metering and contractual issues (the latter due to shared facilities), as scheduled generator outages permit. In addition, PacifiCorp continues to work with other transmission customers who may be interested in participating in the EIM with resources. This effort includes responding to information requests, providing customers with appropriate contacts or resources at the CAISO, and processing applications and certifications pursuant to PacifiCorp's OATT processes, if requested. At this time, PacifiCorp has not certified any third-party transmission customers for participation in the EIM and is not at liberty to disclose the identity of any transmission customers that have made inquiries related to EIM participation, but is nevertheless hopeful that these efforts will result in additional EIM participation.

Second, PacifiCorp has developed and implemented additional tools and displays to provide its Grid Operations personnel with increased visibility and situational awareness

regarding available regulation on a 5- and 15-minute basis which are the critical time intervals for the EIM. Grid Operations' "BAA Ops Tool" features the following new displays which allow grid operators to monitor generator availability, capacity, and ramp capacity: Bid Overview – Generators Price and Ramps, Bid Overview – Generators Start-ups, and Bid Overview – Generators Self Schedules. Further, the display in PacifiCorp's Base Schedule Aggregation Portal ("BSAP") BAA Balance Viewer now features "generation only" and "interchange only" values – in addition to the Aggregated Base Schedule, Demand Forecast, and the difference between the two items – and specifically identifies CRAG and Mona schedules (to address the two interties between PacifiCorp and the CAISO). PacifiCorp's Grid Operations and Commercial and Trading business units also developed additional generation displays that show available generation capacity for all PacifiCorp EIM Participating Resources, and continues to develop similar tools to display aggregated and disaggregated generation values, generation deviations, and interchange deviations, which are expected to be deployed by the end of the first quarter in 2015.

Third, PacifiCorp has (i) provided training on outage entry, including training provided by CAISO personnel, and (ii) required the provision of daily spreadsheets from PacifiCorp EIM Participating Resources that describe any operational issues and the resources' ambient conditions. PacifiCorp continues to coordinate with its outage vendor and the CAISO to improve functionality between its COMPASS outage management system and WebOMS, and also continues to develop a reference guide for outage management as part of this effort, which is expected to be completed by December 31, 2014.

Finally, to ensure that PacifiCorp EIM Participating Resources are following their respective Dispatch Instructions, PacifiCorp has configured real-time generation deviation displays to monitor any deviations between plant output and Dispatch Operating Points issued by the Market Operator. PacifiCorp continues to develop a display to incorporate Fifteen Minute Market and Real-Time Dispatch prices in addition to Transmission Customer Base Schedules, Dispatch Operating Points, and plant output, to track primary settlement statement components and to display for Grid Operations' situational awareness overview, which is expected to be completed by December 31, 2014.

Identification of any remaining deficiencies in CAISO and PacifiCorp processes, procedures, and tools and any additional market issues related to these pricing concerns that CAISO considers necessary to sustain stable market operations, along with CAISO's plan to address such issues.

In addition to the continued work of PacifiCorp described above, PacifiCorp has taken (and continues to take) additional steps to improve its processes and tools to address

identified market performance issues. PacifiCorp Grid Operations has drafted and posted “best practices” procedure documents – and continues to update such documents in real-time as needed (including to reflect additional PacifiCorp EIM Participating Resources) – to aid in personnel’s implementation of critical EIM Entity tasks. In addition to the activities described above, PacifiCorp and the CAISO have developed a series of training modules for PacifiCorp generation and grid operators, which are anticipated to be delivered by the end of January 2015. Such trainings are designed to enhance operator actions, decision making, and understanding of market operations on an ongoing basis.

ATTACHMENT C

Independent assessments from the Department of Market Monitoring on the causes and solutions identified by the CAISO.

This report part of the report will be submitted to the Commission within seven days of December 15, 2014.

ATTACHMENT D:

This attachment provides an exploration of impacts, if any, on non-Energy Imbalance Market pricing nodes, including the Mona trading node.[4] This attachment identifies any such impacts and describes any actions the CAISO is taking or plans to take to address such impacts.

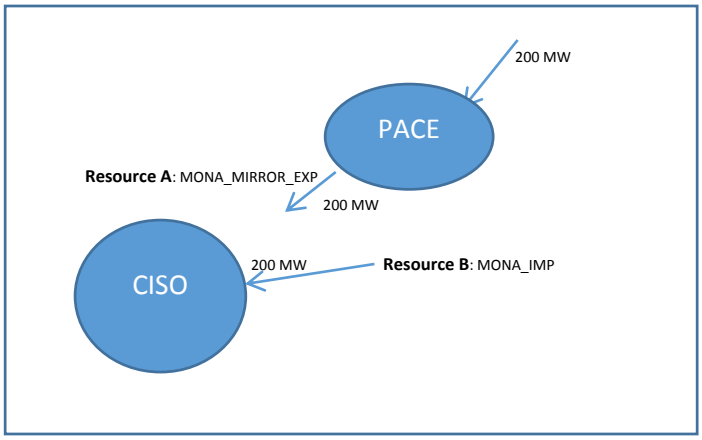
The implementation of the Full Network Model Expansion on October 15 increased the accuracy of the transmission grid modeling from neighboring balancing authority areas, and also allowed for better representation of unscheduled flows effects into the CAISO system. In addition, the implementation of the Energy imbalance Market on November 1, 2014, further enables the CAISO to co-optimize resources across the various areas of the Energy Imbalance Market. Both of these initiatives required that the CAISO also change the way in which the scheduling points are defined so that it can associate the scheduling points with external interties.

With regards to the CRAG and Mona scheduling points, the CAISO had to account for the fact that schedules can be submitted at the locations for purposes of CAISO only transactions or Energy Imbalance Market only transactions. The Crag location is the scheduling point for the Cascade intertie; the Mona location serves as a scheduling point for various southern interties, such as IPPUTAH and Adelanto interties. Prior to the implementation of the full network model, these two scheduling points were modeled with the standard radial link and were considered part of the CAISO balancing authority area. With the implementation of the full network model expansion, this definition changed and with the implementation of the Energy Imbalance Market, the prices at these locations changed notably as the CAISO began accounting for Energy Imbalance Market related congestion.

CRAG and Mona scheduling points are physically located inside PacifiCorp Balancing Authority Areas instead of the CAISO Balancing Authority Area. Mona is located inside PAC East, and CRAG is located inside PAC West. However, these locations continue to serve as scheduling points for imports and exports transacted with the CAISO balancing authority area. This situation requires special treatment for balancing and pricing calculations and leads to a special prices posted on OASIS. The pricing at these locations is based on the following rules to implement the special treatment of CAISO scheduling points CRAG/Mona Interchanges into the balance and price calculations of CAISO and PAC East/PAC West balancing authority areas.

[4] *See December 1 Order* at P 25.

Figure 7: Illustration of Mona Pricing



Assume that Resource A is Mona_Mirror_Exp, Resource B is Mona_IMP. Both of these resources are defined in Master file to have the same scheduling point and intertie definitions (ISO-PACE). The following rules apply:

Resource A,		
BAA	Balance	Price
CISO	**Don't** include MW	Not applicable
PACE	**Include** MW	**Resource LMP**= Price@SP
Resource B,		
CISO	**Include** MW	**Adj_Price@SP=** Price@SP – EIM_PACE – EIM_PACE_PACW – GHG + ∑ MONA ITCs **Resource LMP**= **Adj_**Price@SP SP-TIE Price shall use the **Adj_**Price@SP for the SP price calculations.
PACE	**Don't** include MW	Not applicable

The same above treatment shall be applied to CRAG scheduling point and mirror resource. The Figure above illustrates how an import at Mona scheduling point is mirrored by an export from the PACE balancing authority area with equal megawatt value. The reason for this mirroring is to allow the accounting for the import and associated offsetting export for each balancing authority area separately while the supporting resource(s) for the transaction is modeled at the physical location within PACE balancing authority area or as a separate import to PACE balancing authority area from another balancing authority area.

The table above illustrates that the pricing at Mona for CAISO balancing authority area is adjusted to not include effects of Energy Imbalance Market transfer constraints, GHG pricing, and other constraints pertaining to the EIM area.

The CAISO detected that the pricing at CRAG and Mona over the first few days of implementation were subject to a software defect that resulted in the CAISO pricing to include some of the LMP components pertaining to the mirror resource. The CAISO fixed this issue on November 5, 2014 and has not detected it since.

Currently, the prices at these scheduling points, as posted on OASIS, reflect all the congestion effects from either CAISO or PAC balancing authority areas. However, for CAISO imports and exports, the actual price used for settling the respective schedules at each of these locations as scheduling points for imports and export to and from CAISO balancing authority area, only accounts for the congestion arising from CAISO balancing authority area. The prices posted on OASIS do not reflect that, but the prices provided through the California Market Results Interface (CMRI) application and used for settlements for resources transacting at these scheduling points will reflect only the applicable CAISO BAA congestion.

For example, consider the case of a sample market interval, November 26, hour ending 11 interval 4 for the fifteen-minute market. The shadow price of the IPPUTAH ITC is -$183.29, the Energy Imbalance Market transfer for PAC East is $6.8 and the Energy Imbalance Market transfer for PAC East and PAC West is -$11.88. The system energy price is $35.38 and the greenhouse gas price is $0. The price posted on OASIS for the marginal congestion component at MONA_3_N501 is -$188.37. The congestion component posted on OASIS accounts for all the congestion associated with this location, both from the CAISO and PAC balancing authority areas. This published congestion component is thus calculated as -$183.29 (IPPUTAH ITC)-$11.88(PACW_PACE) +$6.8 (PACE) =-$188.37.

On the other hand, for intertie awards using the Mona point as a scheduling point to transact in the CAISO Balancing Authority Area, the prices posted in CMRI and used for settlements reflect accordingly only the congestion share of -$183.29 arising from IPPUTAH ITC. This price still adheres to the typical congestion calculation used prior to the implementation of the full network expansion and Energy Imbalance Market.

The current data structure used in the OASIS application only supports the display of one entry for the marginal congestion component, and given the nature of the congestion associated with these two scheduling points, either marginal congestion component combination will reflect partial information. Currently the display of the full congestion components -- CAISO and PAC -- does not apply to CAISO schedules. If the entry displayed only the CAISO congestion share, it will still be partial because it will be missing now the congestion portion associated with PAC. The CAISO is working on an enhanced OASIS display that will publish the congestion component breakdown. In this case there will be an entry for the congestion share associated with PAC of -$11.88+$6.8 and another entry with the congestion share associated with CAISO tie of -

$183.29. The CAISO expect that this display will be available in January 2015 and will provide the clarity and minimize the concerns about the pricing for these two locations.

ATTACHMENT E

In this attachment, the CAISO reports on each relaxation event, and a summary of the magnitude and frequency of such events overall.[5] This report provides data on instances where the $1,000/MWh price would have occurred but for the Commission's December 1 Order waiver, including the time of the instance, the duration, the cause, and the affected node(s) and load aggregation points.

The relaxation events affect numerous market intervals as the CAISO real-time markets contain many fifteen and five minute intervals. The information is provided in summary level because the data is significant and detail specific reporting of such events would not be as meaningful. The report focuses on the ELAP prices because these aggregate prices are representative of pricing in each area --West and East-- and would reflect short-term imbalance shortage for the aggregate area.

The information provided in Figures 8-11 is for instances of relaxation that resulted in prices in the neighborhood of the penalty-based price $1000/MWh. However, there are two cases in which there maybe the need to relax certain constraints but prices attained under such events were not based on the $1000/MWh penalty prices. On Case One, the EIM Entity fails the flexible ramping sufficiency test. As specified in section 29.34(n) of the CAISO tariff and section 10.3.2.1 of the Business Practice Manual for the Energy Imbalance Market, if the EIM Entity balancing authority area fails the sufficient ramp test, or is deemed to have failed the test because it failed the capacity (resource plan) test, CAISO will restrict additional EIM Transfer imports into that EIM Entity balancing authority area during the hour starting at T beyond the optimal solution for T-7.5 minutes. The CAISO will enforce the individual EIM Entity balancing authority area flexible ramp requirement in the isolated EIM Entity balancing authority area and will not include that balancing authority area to area group constraints. Also, for the duration of the restricted interval, the market clearing price in the affected EIM Entity balancing authority area will be based on the last economic bid cleared in the applicable fifteen-minute or five-minute interval in the EIM Entity balancing authority area. Therefore, for some intervals, there may be a need to relax the power balance constraint, for example, but the pricing is set pursuant to the procedure described above and not pursuant to the December 1 Order waiver pricing.[6]

[5] *December 1 Order*, at P 26.

[6] The price discovery mechanism under the procedure descried in Section 10.3.2.1 of the BPM for Energy Imbalance Market is, however, essentially the same price discovery procedure used under the December 1 Order waiver.

In Case Two, the CAISO has identified intervals that although there was constraint relaxation, for whatever reason, the price was not determined by the penalty prices for relaxation. The CAISO is still investigating those unusual market outcomes.

Figures 8 through 11 do not reflect the intervals affected by the issues in Case One and Two described above and instead only focus on the intervals that are the subject of the waiver provided in the December 1 Order. Figures 12 through 15 below, however, provide all of the instances in which there was infeasibility observed, distinguished by the various categories discussed above.

The data in this report does not include those cases in which there was infeasibility for over supply conditions as these cases are not reflected in the waiver requested in this proceeding. The penalty prices specified in sections 27.4.3.2 and 27.4.3.4 only pertain to infeasibility cases in which there is under-supply. The penalty prices for the over-supply conditions are specified in section 6.6.5 of the BPM for Market Operations.

Figure 8 and Figure 9 show the summary of instances where power balance constraint relaxations occurred in the fifteen- and five-minute market in the PAC West and East area, respectively. The reported events are also aggregated on a daily basis and depicted with an infeasibility range with the vertical line in blue. The end of the vertical blue line represents the minimum and maximum value of power balance relaxation in each day. The average magnitude of the infeasibility is shown by the red marker on the blue vertical lines. Figure 10 and

Figure 11 provide similar information but for the five-minute market.

Figure 8: Magnitude of power infeasibility in PAC West. Fifteen-minute market.

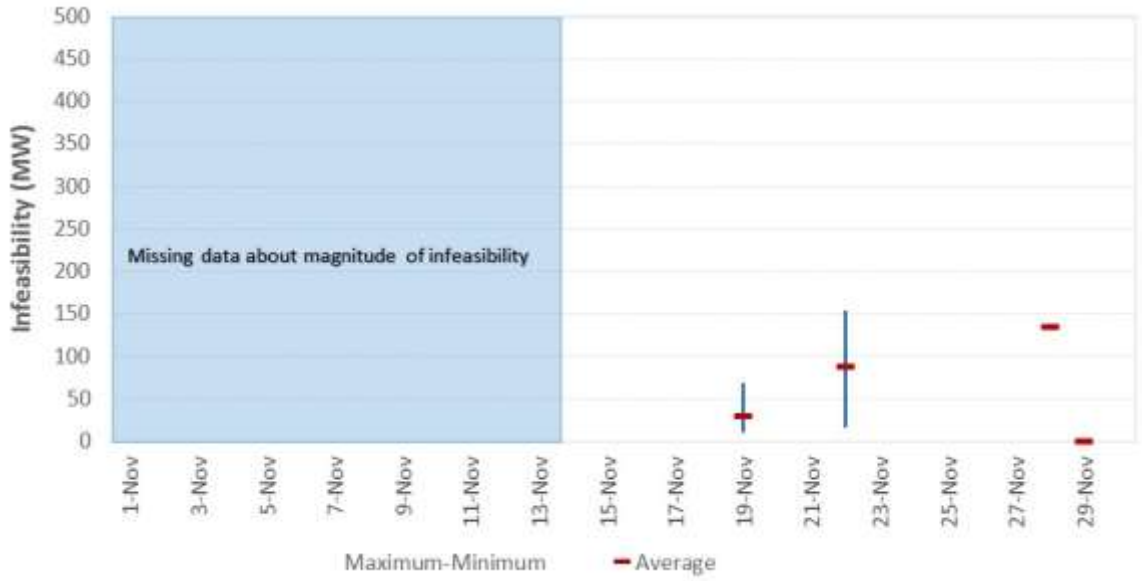


Figure 9: Magnitude of power infeasibility in PAC East. Fifteen-minute market.

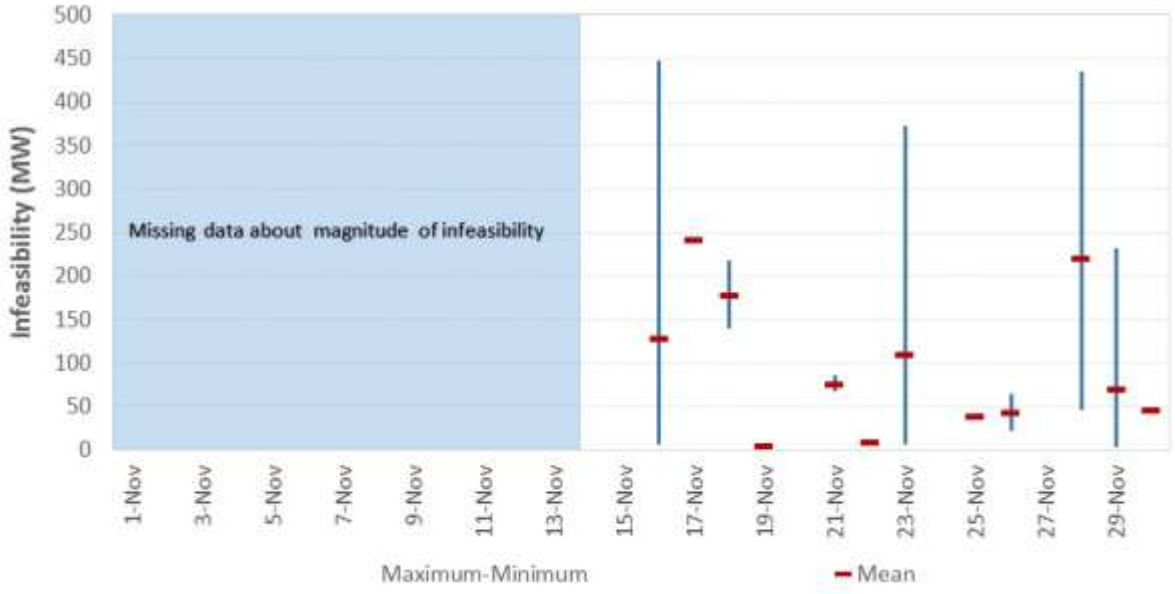


Figure 10: Magnitude of power infeasibility in PAC West. Five-minute market.

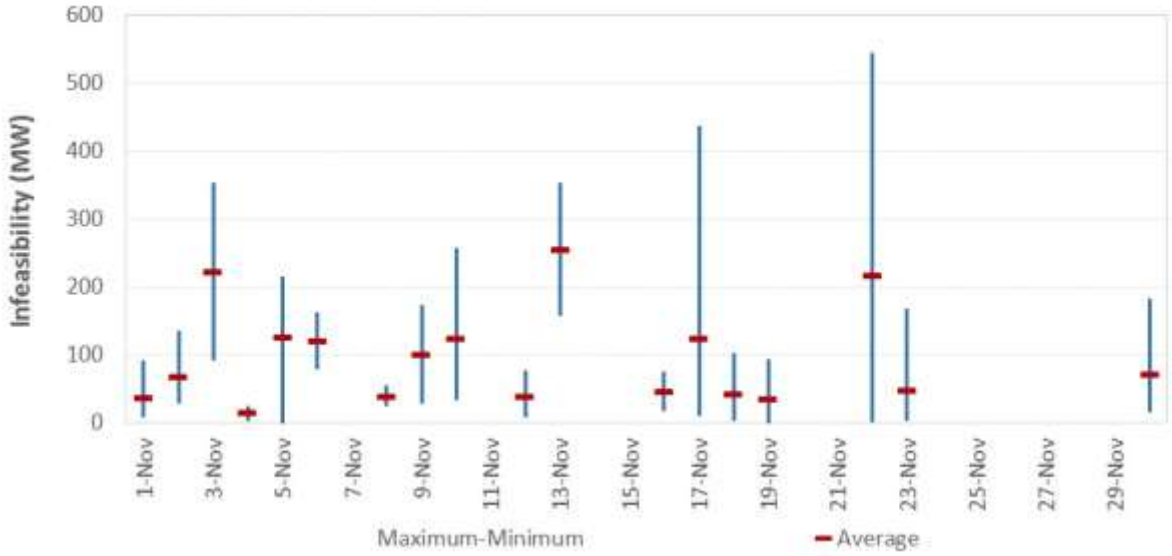
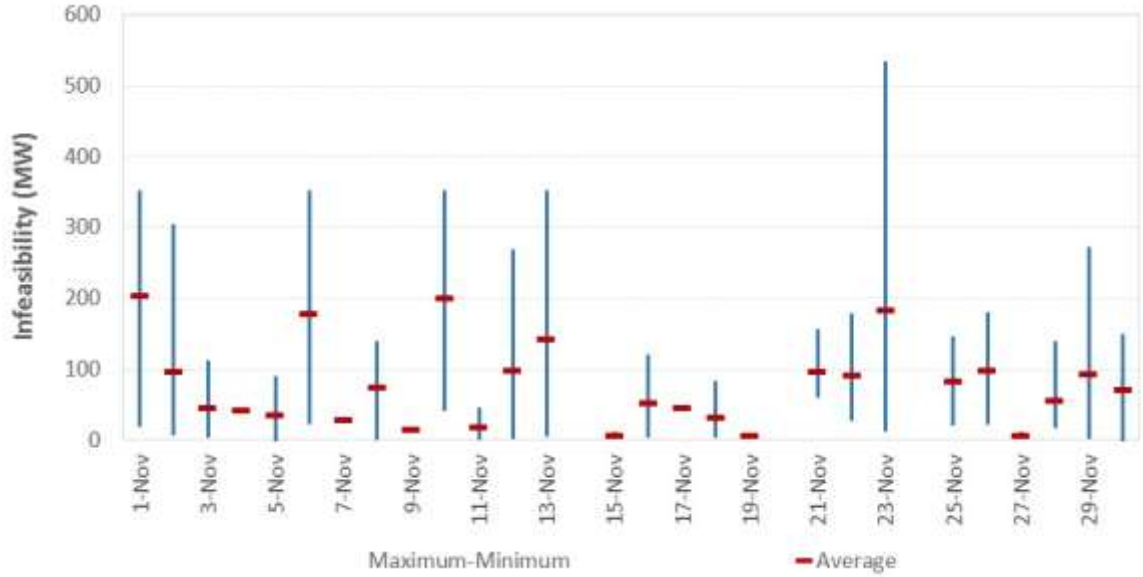


Figure 11: Magnitude of power infeasibility in PAC East. Five-minute market.



For the fifteen-minute market, the magnitude of infeasibility was not preserved in the data system for the period of November 1 through November 13, which impedes to identify the cases with infeasibility and quantify their magnitude. However, such instances are identified by analyzing the cases where prices reached the relaxation-based levels of $1000. Figure 12 through Figure 15 show the frequency of the fifteen- and five-minute markets with infeasibilities, grouped by PAC West and East.

Figure 12: Frequency of fifteen-minute intervals with power infeasibility in PAC West.

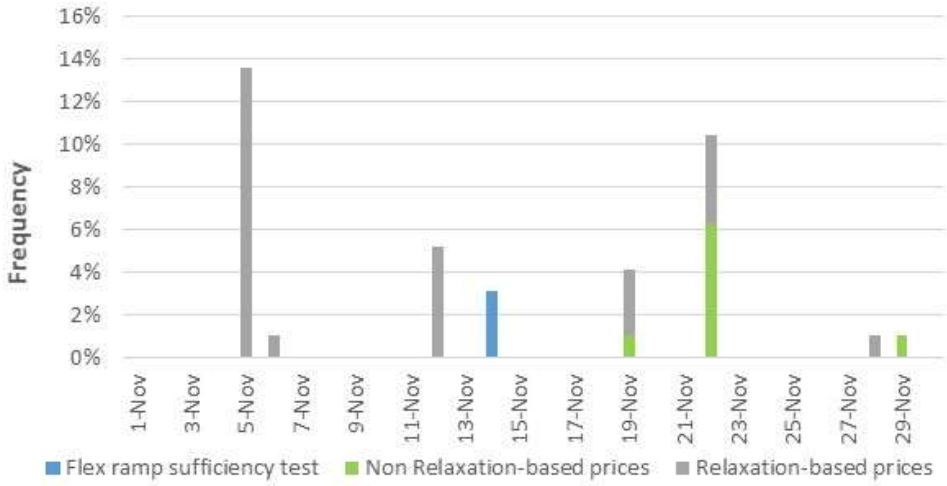


Figure 13: Frequency of fifteen-minute intervals with power infeasibility in PAC East.

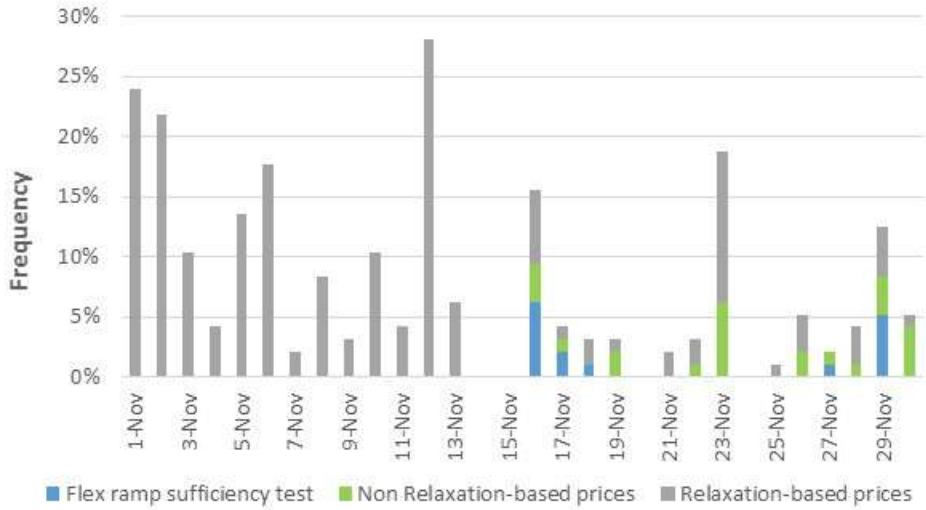


Figure 14: Frequency of five-minute intervals with power balance infeasibility in PAC West.

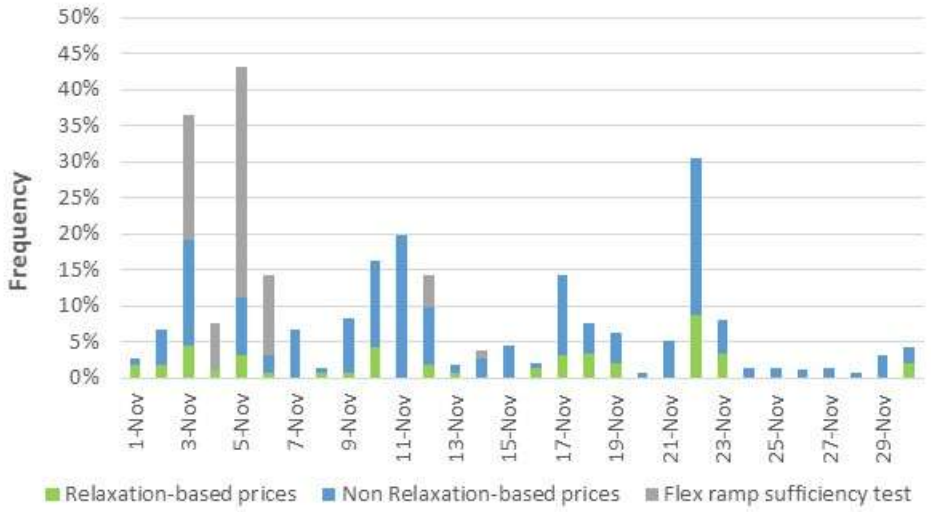
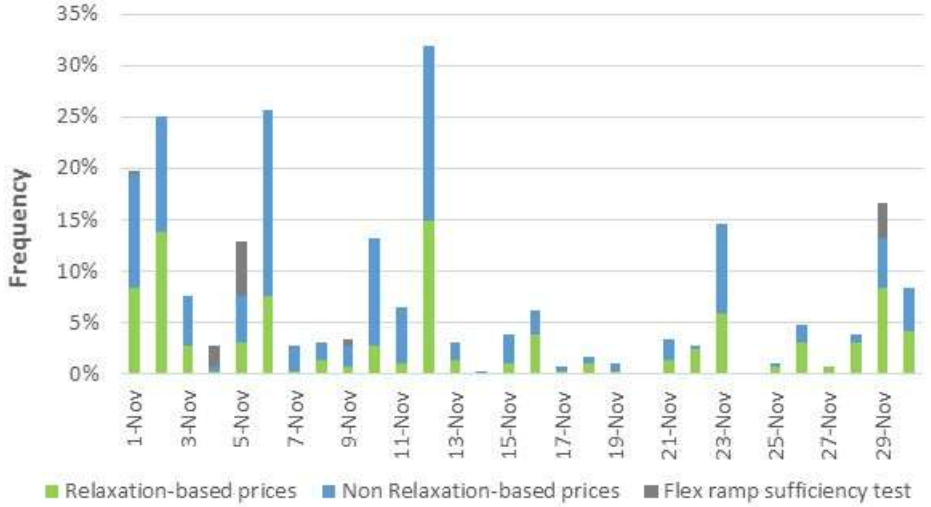


Figure 15: Frequency of five-minute intervals with power balance infeasibility in PAC East.



The imbalance energy transfers may also be subject to relaxation to address infeasibilities; there were few instances only in the PAC East transfer that resulted in relaxation; there were no instances of relaxation of EIM transfers between PAC and CAISO. The summary of these instance are listed in Table 1 and Table 2. All these instances occurred before the period applicable for the waiver associated with this report.

Table 1: Statistics of EIM transfer infeasibilities for PAC East. Fifteen-minute market.

Date	Maximum	Minimum	Average	Count
6-Nov-14	51.4	1.1	26.2	2
10-Nov-14	121.0	121.0	121.0	1
12-Nov-14	126.7	72.0	99.3	2
13-Nov-14	130.9	16.9	76.2	3

Table 2: Statistics of EIM transfer infeasibilities for PAC East. Five-minute market.

Date	Maximum	Minimum	Average	Count
6-Nov-14	65.2	65.2	65.2	1
10-Nov-14	114.3	97.9	106.1	2

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the captioned proceedings, in accordance with 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 15th day of December, 2014.

/s/ Sarah Garcia

Sarah Garcia

Attachment F – January 15, 2015 Report

Tariff Amendment to Implement Transition Period Pricing for Energy Imbalance Market

California Independent System Operator Corporation

January 15, 2015

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

Re: California Independent System Operator Corporation
Docket No. ER15-402___
Informational Report – Performance of Energy Imbalance Market

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its January 15 report on the performance of the Energy Imbalance Market for December 1 – December 31, 2014.[1]

The CAISO also respectfully requests a modest extension to allow the Department of Market Monitoring additional time to review the CAISO's report and provide its independent assessment. The CAISO intends to submit this additional report in about eight days. The Commission directed the Department of Market Monitoring to submit independent assessments on the causes and solutions identified by CAISO.

Please contact the undersigned with any questions.

Respectfully submitted,

By: *<u>/s/ Anna A. McKenna</u>*

Roger E. Collanton
General Counsel
Anna A. McKenna
Assistant General Counsel
John Anders
Lead Counsel
California Independent System
Operator Corporation
250 Outcropping Way
Folsom, CA 95630

[1] The CAISO submits this report pursuant to *California Independent System Operator Corp.*, 149 FERC ¶ 61,194 (2014). Thirty days from the time the CAISO filed its last report is January 14, 2015. The CAISO respectfully requests that the Commission accept this report only one day after date. The additional day was needed to finalize the CAISO analysis.

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Energy Imbalance Market Pricing Waiver Report December 1 - 31, 2014

January 15, 2015

ISO Market Quality and Renewable Integration

I. Introduction

On December 1, 2014, the Federal Energy Regulatory Commission (FERC) granted the California Independent System Operator Corporation's (CAISO) petition for limited waiver of the pricing parameters in sections 27.4.3.2 and 27.4.3.4 of its tariff for 90 days, as they pertain to the Energy Imbalance Market, effective November 14, 2014, as requested.[1] In addition, FERC directed CAISO to submit informational reports as further described herein. The CAISO will be submitting on a monthly basis the requested reports in Attachments A through E, including reports provided by the CAISO's Department of Market Monitoring and PacifiCorp. This report covers the CAISO's reporting requirements for the time period covering December 1 through December 31, 2014.

For this second report, the CAISO is requesting a modest extension to allow it to submit the Department of Market Monitoring's report within approximately eight days of January 15, 2015. The Commission directed the Department of Market Monitoring to submit independent assessments on the causes and solutions identified by CAISO. The Department of Market Monitoring requires some additional days to fully review and evaluate the CAISO's report and provide an independent assessment.

II. Background

On November 1, 2014, the CAISO fully activated the Energy Imbalance Market (EIM). The Energy Imbalance Market allows balancing authorities outside of the CAISO balancing authority area to voluntarily take part in the imbalance energy portion of the CAISO locational marginal price-based real-time market. PacifiCorp, the CAISO, and market participants participated in market simulations prior to the start of the Energy Imbalance Market on November 1, including parallel production from October 1 to November 1. However, shortly after go live the CAISO began observing challenges that led to artificially high prices in cases where the market application had to resort to the relaxation of transmission constraints or the power balance constraint in order to clear the market.

On November 13, 2014, the CAISO sought a 90-day waiver of the applicability of section 27.4.3.3 and the second sentence of section 27.4.3.4 of its tariff to permit CAISO to address, without suspending the Energy Imbalance Market, those circumstances produced atypically high prices. Those two sections of the tariff provide that when there is a lack of economic bids to clear the fifteen-minute and five-minute markets, the

[1] *California Indep. Sys. Operator Corp.*, 149 FERC ¶ 61,194 (2014) (December 1 Order).

CAISO's market application will price the shortages (and therefore set locational marginal prices) according to the pricing parameters specified in those sections. Specifically, for the purpose of determining how a transmission constraint or system-energy balance constraint will affect the determination of prices in the market, the pricing parameter for the relaxation of the constraint is $1,000/MWh (the maximum energy bid price specified in tariff section 39.6.1.1).

The waiver addresses three sets of transitional conditions in the Energy Imbalance Market that together have caused the transmission and system energy-balance constraints described in tariff sections 27.4.3.2 and 27.4.3.4 to bind more frequently than expected in the weeks since the Energy Imbalance Market began operation on November 1, causing prices in these intervals to be set by the $1,000/MWh relaxation parameter. Because of these transitional conditions, the high prices are not always indicative of actual physical conditions on the system, and reflect challenges in providing timely and complete data to ensure system visibility under the new procedures, exacerbated by limitations on the resources available to PacifiCorp for use in the Energy Imbalance Market and several forced outages of large Energy Imbalance Market participating resources. The CAISO described[2] the transitional conditions that led to the waiver in its petition filed on November 13, 2014, as follows:

1) All possible operational conditions, including interactions between disturbance events and other conditions on the system, were not fully represented, simulated and tested during these earlier market simulations. It was not until actual operations that these circumstances were experienced and the resulting price excursions became apparent. In some cases data issues arise because of errors made in processing such information, and in such intervals the CAISO will have authority to correct prices. But it in some cases, the pricing excursions may be due to the need to adopt better practices generally and not because of an erroneous data processing issue.

2) Limitations on the resources available to PacifiCorp for use in the Energy Imbalance Market. Several resources had not yet received the necessary metering upgrades due to various outage schedule limitations, which has prevented PacifiCorp from making these resources available in the initial pool of resources participating in the Energy Imbalance Market. The CAISO is processing temporary metering exemptions in accordance with its requirements and participation by some additional resources has improved conditions, but other considerations remain. For instance, some resources are subject to multiple ownership rights and have contractual issues that

[2] *See Petition For Limited Tariff Waiver And Request For Expedited Consideration*, California Independent System Operator Corp., filed November 13, 2014, FERC Docket No. ER15-402.

must be resolved to enable their participation in the Energy Imbalance Market. Additionally, third-party resources in PacifiCorp's balancing authority areas have not yet begun participating in the Energy Imbalance Market, which further limits the pool of available resources.

3) The PacifiCorp East (PAC East) and PacifiCorp West (PAC West) balancing authority areas experienced several forced outages of large Energy Imbalance Market participating resources, which led to short term supply deficiencies in the market. While outages are not necessarily uncommon, these outages quickly exacerbated an already tight supply and contributed to price increases in the associated intervals. In addition, while PacifiCorp operations accounted for the outages by responding to system conditions, these actions have not always been communicated in a timely manner to the market. Without such information, the market results would not necessarily reflect physical conditions on PacifiCorp's system. The addition of more participating resources and enhanced operational procedures should mitigate the impact of such outages.

On December 1, 2014, FERC granted the CAISO its waiver request and also directed monthly reports to FERC on the progress of the issues that led to the need for the waiver. The CAISO provides its reports consistent with the order below and in the attachments to this report.

III. Reports

In the December 1 Order, the Commission directed the CAISO to file detailed informational reports on the performance of Energy Imbalance Market at 30-day intervals during the 90-day waiver period. Consistent with the order, this second report is filed 30 days from the last report filed on December 15, 2014. The Commission stated that these reports should provide detailed supporting data demonstrating progress towards identifying and eliminating the problems giving rise to the waiver petition. Consistent with the December 1 order, the following reports are included in Attachments A through E as follows:

Attachment A: A quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within the CAISO's control. Includes a description of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance problems related to the issues that prompted the CAISO's waiver request. Identifies any remaining deficiencies in CAISO and PacifiCorp processes, procedures, and tools and any additional market issues

related to these pricing concerns that the CAISO considers necessary to sustain stable market operations, along with the CAISO's plan to address such issues.

Attachment B: A quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within PacifiCorp's control. This section includes a description of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance problems related to the issues that prompted the CAISO's waiver request.

Attachment C: Independent assessments from the Department of Market Monitoring on the causes and solutions identified by the CAISO. For this first report, this will be submitted within seven days of the CAISO's first submission.

Attachment D: An exploration of impacts, if any, on non-EIM pricing nodes, including the Mona trading node. Report on whether EIM pricing is adversely impacting non-EIM pricing nodes. The extent to which non-EIM pricing nodes such as the Mona trading node are impacted by EIM pricing within the PacifiCorp Balancing Authority Areas. Identify any such impacts and describe any actions the CAISO is taking or plans to take to address such impacts.

Attachment E: Description of each relaxation event, and a summary of the magnitude and frequency of such events overall. Data on instances where the $1,000/MWh price would have occurred but for this waiver, including the time of the instance, the duration, the cause, and the affected node(s) and load aggregation points.

ATTACHMENT A

Quantitative and qualitative descriptions of market performance related to the issues that prompted the CAISO's waiver request - CAISO.

This attachment includes quantitative and qualitative information for three reporting requirements specified in the Commission's December 1 order. First, section 1 and section 2 provide a quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within the CAISO's control. Second, the tables in section 2 of this attachment provide a descriptions of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance related to the issues that prompted the CAISO's waiver request. Finally, the tables in section 2 of this attachment also report on the measures taken and planned to address the market performance problems, which also identify any remaining deficiencies in processes, procedures, and tools and any additional market issues related to these pricing concerns that the CAISO considers necessary to sustain stable market operations, along with the CAISO's plan to address such issues.[3]

1. Analysis of Impact on Market Performance

In this section the CAISO provides a quantitative and qualitative analysis of the market performance impact of the issues that prompted the CAISO's request for a waiver.

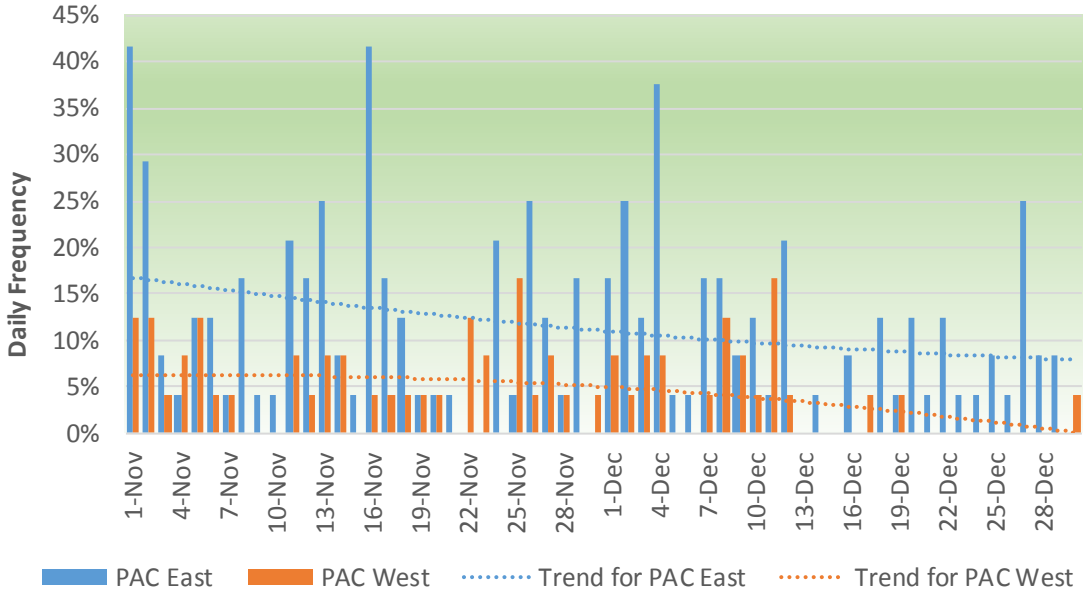
The Energy Imbalance Market is only a part of the real-time market and is not part of the day-ahead market. The CAISO uses the day-ahead market as a reference point for the real-time market. In lieu of the day-ahead market solution, the Energy Imbalance Market the CAISO uses EIM balanced base schedules, which are used to model hourly Balancing Authority Area generation and load before the Energy Imbalance Market runs. The base schedule can be adjusted by seventy five minutes before the applicable hour, (T-75), fifty five minutes before (T-55) and forty minutes before (T-40). The last cycle at T-40 minute will determine the base schedules actually used for the Energy Imbalance Market. The base schedules also serve as a reference for imbalance energy settlements. When the EIM entity opts to use the ISO demand forecasts, the CAISO compares the base schedules –generation and net interchange- with hourly demand forecast and performs a balancing test by EIM Balancing Authority Area and if the EIM entity Balancing Authority Area imbalance is within 1 percent of the forecast, it passes the balancing test. The balancing test is important because it is the

[3] *December 1 Order* at P 25.

starting point from which the Energy Imbalance Market is run. Therefore, if the energy market starts with a significant imbalance, such that even the bid-in capacity is not enough to cover the imbalance, there is the potential for infeasibilities in the fifteen- and five-minute markets for either over- or under-supply. It is important to note that the base schedules are set at one level for the entire hour, while load actually varies within the hour.

Figure 1 shows the trend of balancing test failures for the first two months of operation of the Energy Imbalance Market by area, PAC West and East. There is a downward trend in the frequency of failures from a frequency of failures of 9.2 percent in November to 6.45 percent in December. The average amount of imbalance has been 188 MW and 165 MW in PAC East and West, respectively.

Figure 1: Frequency of balancing test failures in PAC West and East.



As specified in section 29.34(n) of the CAISO tariff and section 10.3.2.1 of the Business Practice Manual for the Energy Imbalance Market, if the EIM Entity balancing authority area fails the sufficient ramp test, or is deemed to have failed the test because it failed the capacity (resource plan) test, CAISO will restrict additional EIM Transfer imports into that EIM Entity balancing authority area during the hour starting beyond the optimal solution for T-7.5 minutes. The CAISO will enforce the individual EIM Entity balancing authority area flexible ramp requirement in the isolated EIM Entity balancing authority area and will not include that balancing authority area to area group constraints. This sufficiency test applies to each PAC West and East area on an hourly basis. Figure 2 shows the trend of test failures for flexible ramping for the first two months of operation of the energy imbalance market. The frequency is obtained by dividing the number of hours failed by 24 hours of a day. Figure 2 shows that there was

a continued reduction in the frequency of failures of the sufficiency test over November and December, from an average of 20 percent to an average of 1.5 percent in the combined PAC West and East areas. However, more recently in late December, there was an increase in failures of the test.

Figure 2: Frequency of flexible ramp sufficiency test failures in PAC West and East.

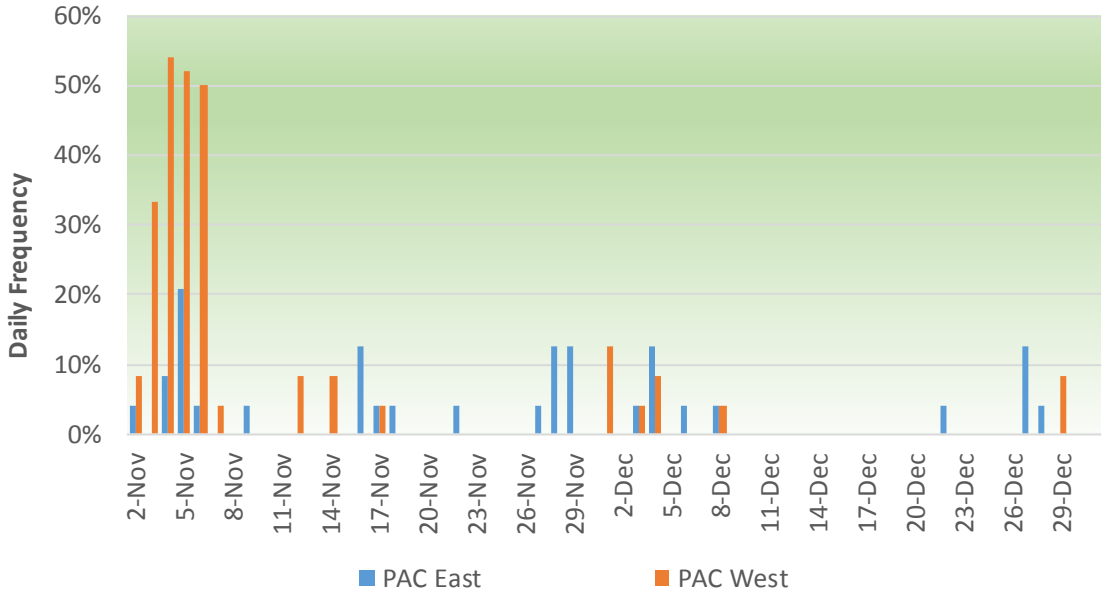


Figure 3 through Figure 6 provide daily average price trends in the Energy Imbalance Market organized by market and area. These trends include pricing for both the PAC West and PAC East external load aggregation points (ELAPs). The report focuses on the ELAP prices because these aggregate prices are representative of pricing in each area -- PAC West and PAC East-- and would reflect short-term imbalance shortage for the aggregate area. These daily averages reflect all prices of the real-time market, including the price corrected through the price correction process and the price adjustments pursuant to the waiver associated with this report[4]. From November 14 through November 30 the CAISO implemented the price adjustments pursuant to the waiver retroactively and is making the relevant adjustments in settlement statements after the December 1 order was issued. After December 1, there are no retroactive adjustments since the logic of the price discovery feature implemented pursuant to the waiver is implemented through the market clearing solution process. These prices, like any other prices, are still subject to the price validation and correction process. Section 35.4 of the CAISO tariff already provides the CAISO authority to correct prices if it detects an invalid market solution or prices due to issues such as data input failure,

[4] Note a separate waiver has been submitted requested relief for period of November 1-November 13. These reports do not reflect any adjustments for this separate waiver request which has not yet ruled on as of the date of this report.

occurrence of hardware or software failure, or a result that is inconsistent with the CAISO tariff. The CAISO has now completed all the price corrections authorized under its existing tariff authority for the month of November and December.

Figure 3: Daily average of fifteen-minute market prices in PAC West.

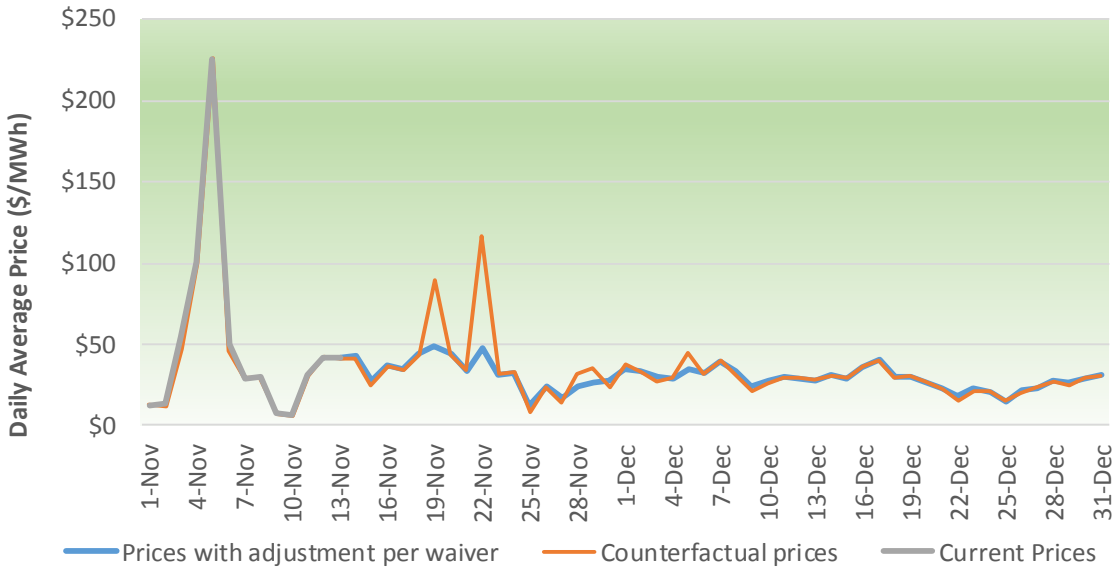


Figure 4: Daily average of fifteen-minute market prices in PAC East.

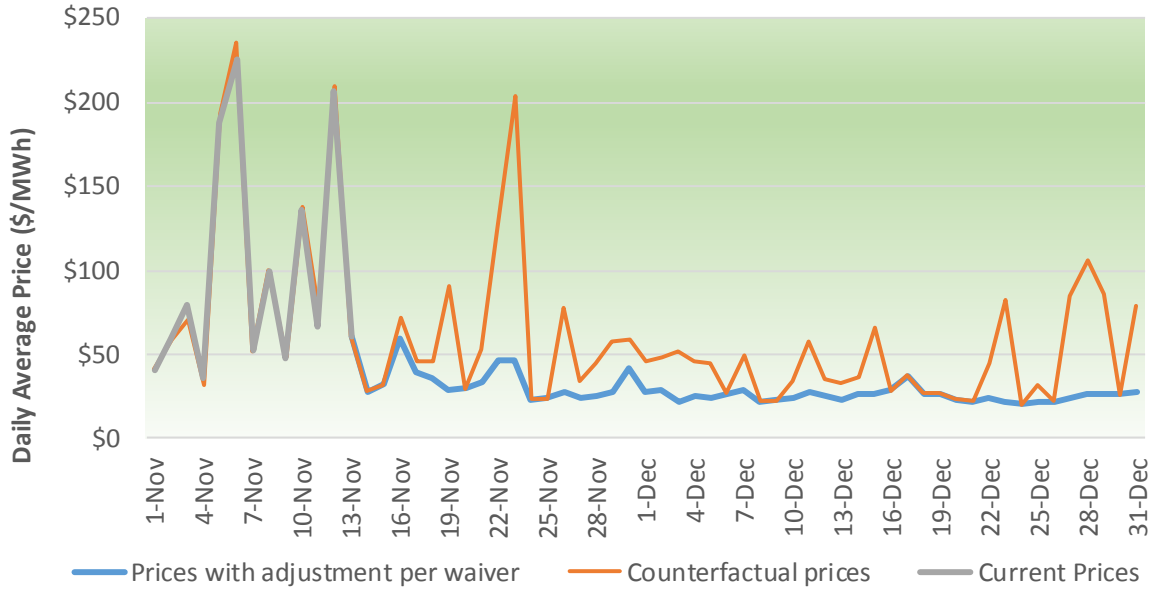


Figure 4 and Figure 5 each compare two trends for the same market and same area, PAC East and West respectively. The line in blue line illustrates daily average prices from November 14 on and represents the actual and final prices after any price corrections or price adjustments pursuant to the December 1 Waiver, which is the subject of this report. Afer November 14,

even when there were power supply infeasibilities, per the December 1 Waiver, this trend reflects prices that are set based on the the marginal economic signal in the market and are not based on constraint relaxation pricing parameters. The price trends for November 1 through November 13 is represented in a different color than the the prices after Novemer 14 because those represent the final prices as of this date, after all price corrections have been made. The prices for the November 1-13 include prices based on the constraint relaxation pricing parameters.

The orange line was constructed to estimate the counterfactual case of what prices would have been if they were based on the constraint relaxation pricing parameters, pegged to the $1000/MWh bid cap. As of December 1, the CAISO adopted the waiver-based pricing in its systems, which means that the market systems produced prices consistent with the pricing mechanism under the waiver and not based on the constraint relaxation pricing parameters. Therefore, the CAISO had to find a way to reconstruct those cases, which it is referring to as the counterfactual case. In other words, the prices represented by the orange line represent the CAISO's estimate of what prices would have been absent the December 1 Waiver. These two lines compare together prices under the December 1 Wavier to what they would have been without that waiver.

The orange line is more volatile and spiky because those prices are calculated based on the $1000/MWh any time there is an observed undersupply infeasibility. Whereas the blue line shows a more stable pricing trend reflecting dispatched economic bids. For the first 13 days of November, the lines in grey and orange track closely to each other but not exactly. The prices represented by the grey line are final as of now and include prices that even though there was infeasibility, for other reasons the prices were not based on the constraint relaxation pricing paramters. In contrast, in the counterfactual case, the CAISO estimated that any interval with infeasibility would produce a price based on the constraint relaxation pricing parameter.

In addition, the prices for the counterfactual case in Figure 4 and Figure 5 were constructed based on the following two factors. First, because the goal of this report is to quantify and explain the price changes associated with the the implementation of the Deccember 1 Waiver, these trends do not include the reconstruction of prices related to price corrections and flexible ramping constraint infeasibility for the following reasons:

i) Price corretions. If there was a price associated with a power balance infeasibility, but the interval was rendered to have an invalid price and was subject to price corrections for other reasons, the CAISO did not estimate the counterfactual price and instead the estimated and counterfactual price is equal to the final and current price. This is based on the premise that had the CAISO not experienced the issue that supported the price correction in the first place, the power balance infeasibility would not have triggered in the first instance. Therefore, the market price would have been based on the tariff-based rules that consider the submitted economic bid prices rather than the penalty prices specified in the tariff; and

ii) Flexible ramp sufficiency test. As specified in section 29.34(n) of the CAISO tariff and section 10.3.2.1 of the Business Practice Manual for the Energy Imbalance Market, if the EIM Entity balancing authority area fails the sufficient ramp test, or is

> deemed to have failed the test because it failed the capacity (resource plan) test, CAISO will restrict additional EIM Transfer imports into that EIM Entity balancing authority area during the hour starting at T beyond the optimal solution for T-7.5 minutes. For the duration of the restricted interval, the market clearing price in the affected EIM Entity balancing authority area will also be based the tariff-based rules that look at the last economic bid cleared in the applicable fifteen-minute or five-minute interval in the EIM Entity balancing authority area. This logic is outside the scope of the waiver of this report and consequently, with or without the waiver, the pricing mechanism will be in place. Therefore, the original price for market intervals that had power balance infeasibilities and that failed the flexible ramp test will remain unchanged as they will not be set by relaxation parameter prices.

Second, the prices reflecting the tariff-based relaxation parameters were reconstructed for both under-supply and over-supply infeasibilitites. This means that when an instance of undersupply was reconstructed, the price was set to the bid cap plus/minus marginal loss component. Similarly, when an oversupply instance was reconstructed, the prices in the conterfactual casewere set to the bid floor relaxation parameter plus/minus marginal loss prices.

An important characteristic of pricing in the CAISO real-time markets during this time period that became more apparent through further investigation after the last report was filed on December 15, 2014, is that in some intervals the market clearing process experienced what is referred to as “degenerate cases” during which the market may be able to clear at multiple pricing run solutions that are equally valid from an economic perspective.

Mitigating price multiplicity has been recently explored and discussed with stakeholders, and the CAISO board has approved market rule changes that eliminate the multiplicity of pricing issue and produce one price that reflects the lack of congestion at the appropriate locations. During such cases, even if the market systems had observed an infeasibilty that would have led to the relaxation of a constraint and triggered the penalty pricing parameters, the pricing run could have landed at a price that was based on the marginal resource economic bid price, which could be different than the price had it been based on the $1000/MWh parameter. The CAISO observed many intervals in which this phenomena occurred, in particular in the five minute real-time dispatch. The CAISO does not correct for these cases and believes these to be optimal from the perspective of the energy market alone. But because of issues this may cause in associated markets such as the congestion revenue rights, the CAISO will be modifying it market rules prospectively to eliminate such occurances. [5]

The counterfactual case represented by the orange line cannot account for the degeneracy and simply represents what prices would have been for those intervals based on the tariff-based constraint relaxation pricing parameters because there was an infeasibility. This is has implications regarding the trends presented in the figures below. For the first 13 days, as

[5] Additional information regarding the stakeholder process and the resulting policy changes is available at: http://www.caiso.com/informed/Pages/StakeholderProcesses/PricingEnhancements.aspx. This will be the subject of an upcoming tariff amendment with the Commission.

discussed above, the CAISO has not yet modified posted prices based on the waiver-type pricing. The CAISO filed for an additional waiver to conduct this pricing adjustment and it is pending before the Commission in FERC Docket No. ER15-817. Without the waiver, the prices as posted would remain as they are. One would expect the counterfactual case represented by the orange line to be close to the posted prices represented by the blue line. This is the case for the fifteen minute markets. However, for the real-time dispatch, the lines diverge because in a number of the intervals posted prices appear to have not been determined based on the $1000/MWh parameter even if there was infeasibility. At this time, the CAISO believes that this was due to the fact that many of the affected intervals were subject to degeneracy. After November 13, however, whether or not there would have been degeneracy in the pricing run, is immaterial, because pricing under the December 1 waiver or degeneracy is based on the last economic bid price signal.

Figure 5: Daily average of five-minute market prices in PAC West.

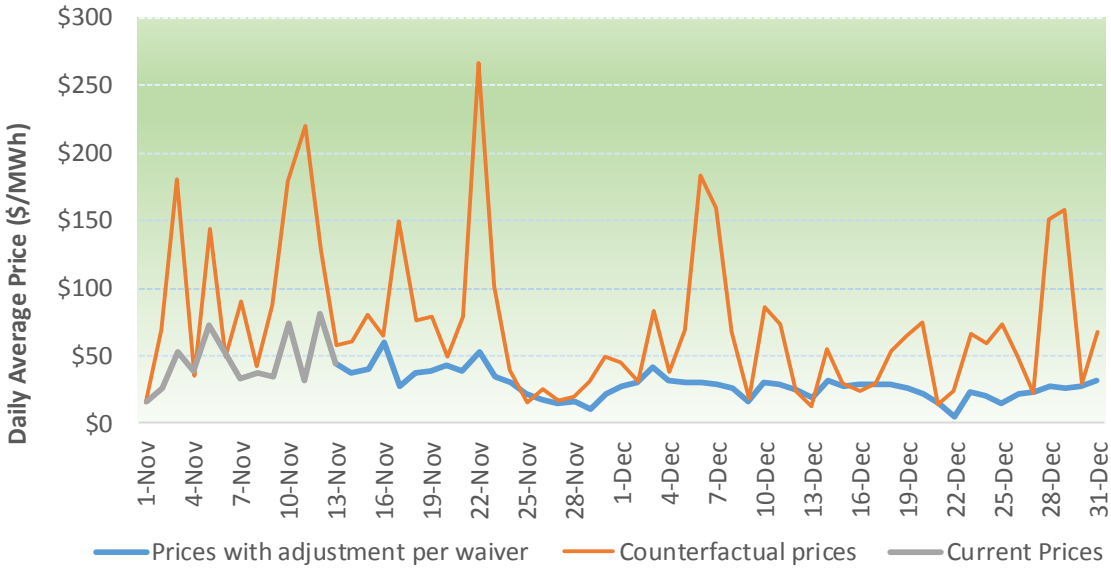
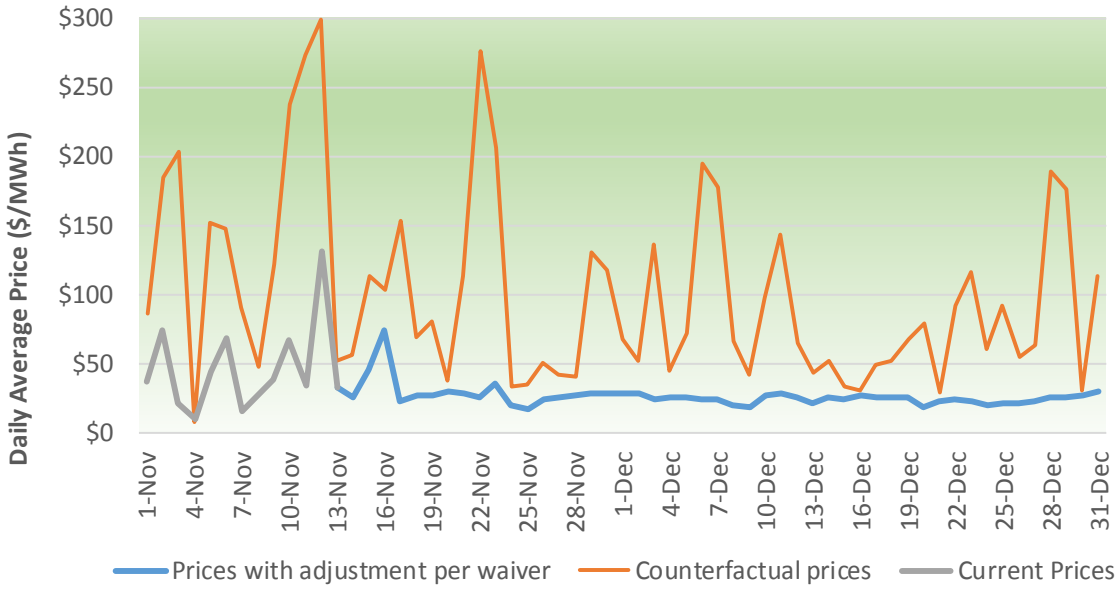


Figure 6: Daily average of five-minute market prices in PAC East.



Overall, PAC East tends to be more volatile and subject to more frequent price excursions than PAC West. This may be due to limited transfers into the PAC East area. In contrast, PAC West does not share such limitations which enable more transfers in and out of the CAISO balancing authority areas to PAC West.

In both PAC East and PAC West, the five-minute real-time dispatch is notably more volatile than the fifteen minute market. This is due to the fact that the fifteen minute market embodies more flexibility as it is further in time than the applicable intervals whereas the five minute real-time dispatch is closer to real-time. In the five minute dispatch, ramping capability is more limited. Figure 7 and Figure 8 provide bi-weekly averages of the prices as modified under the December 1 Waiver and are final as of now. These include price corrections and price adjustments pursuant to waiver of this report. These figures show that the average price for energy in both the PAC East and West areas stabilize around $25/MWh with the December 1 waiver in place.

Figure 7: Bi-weekly average of fifteen-minute market prices in PAC West and East.

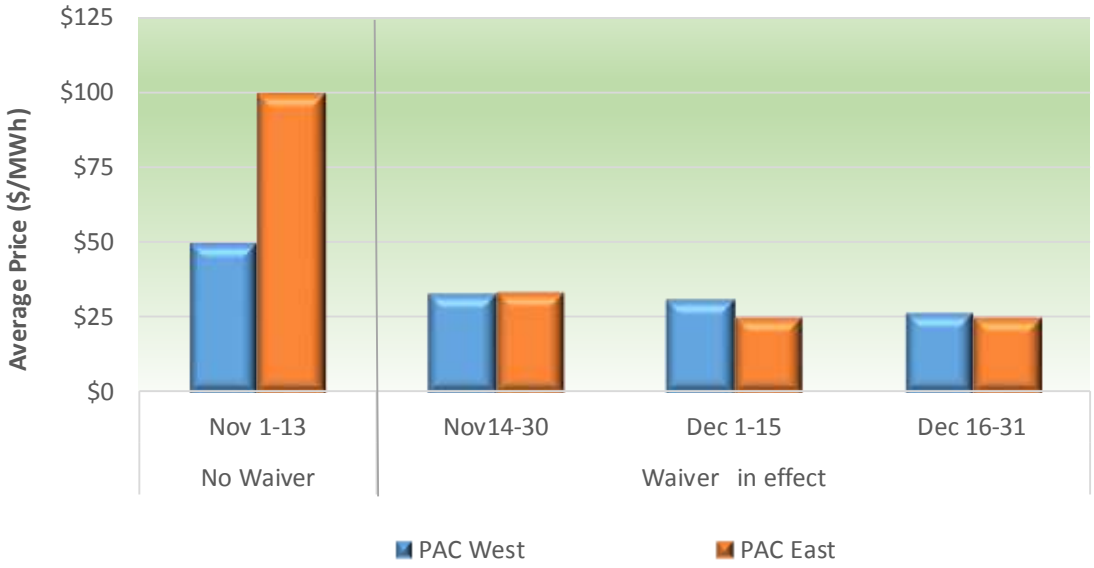


Figure 8: Bi-weekly average of five-minute market prices in PAC West and East.

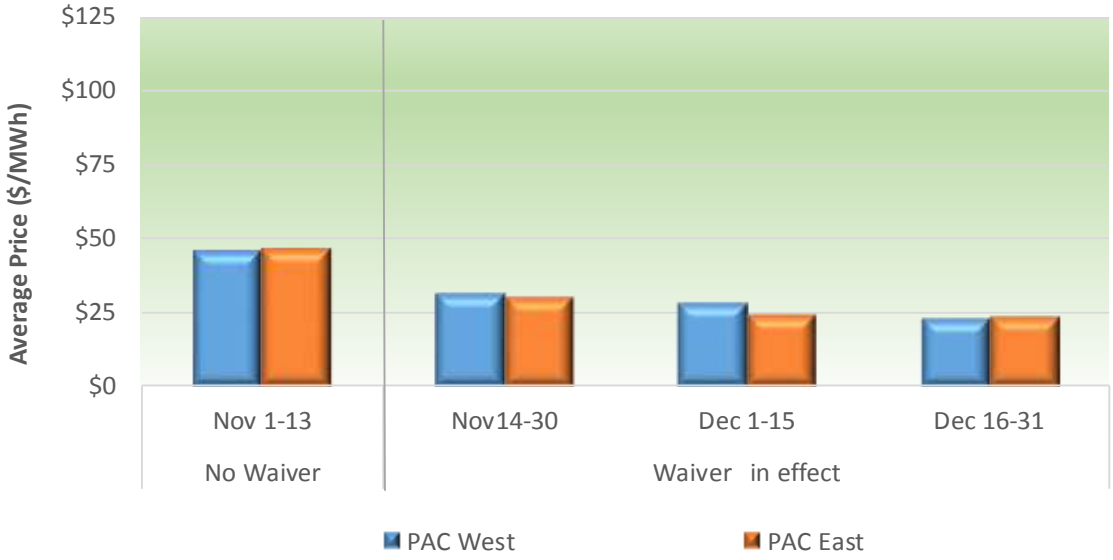


Figure 9 through Figure 12 show the frequency of price excursions for both the fifteen and five-minute market, organized by the reason for the power balance infeasibility. In any given market interval, more than one of the illustrated reason may have contributed to the price excursion because there are numerous elements that can impact the market outcome. For example, a given market interval may experience a price excursion due to data alignment, manual dispatches and load changes. For the purpose this report, the CAISO has reviewed each affected market interval and has assigned the interval to a reason category that most afflicted the interval. The categories used in the figures in this section 1, include:

1. *Renewable deviations* for conditions in which wind or solar changes lead to the loss of capacity and for the need to increase generation from other resources.
2. *Load changes* refer to conditions where either the load forecast is adjusted or there is a change in the load bias.
3. *Import/Export changes* is for adjustments and updates to imports and exports as seen by the market.
4. *Resource outage* is for conditions in which an outage results in the loss of capacity available to the market, and for which the market needs to increase generation from other resources. Similar conditions apply for manual dispatches leading to a reduction of available capacity to the market.
5. *Manual dispatches* is for instances where the introduction of a manual dispatch may cause imbalances, such as max go to manual dispatch may limit the unit up to certain capacity, resulting in the loss of capacity for the market.
6. *Resource data alignment* is for any other condition not captured in the previous five categories. This group accounts for resource deviating from their dispatch, differences between base schedules and bids or dispatches, and changes between markets.
7. *Transfer/Congestion constraints* is for instances where the interplay of EIM transfer constraints or congestion in either PAC or CA balancing authority area may restrict the incremental generation of resources leading to infeasibilities.

Figure 9: Reasons for intervals with ELAP prices exceeding $500 in the fifteen-minute market in November. PAC West and PAC East combined.

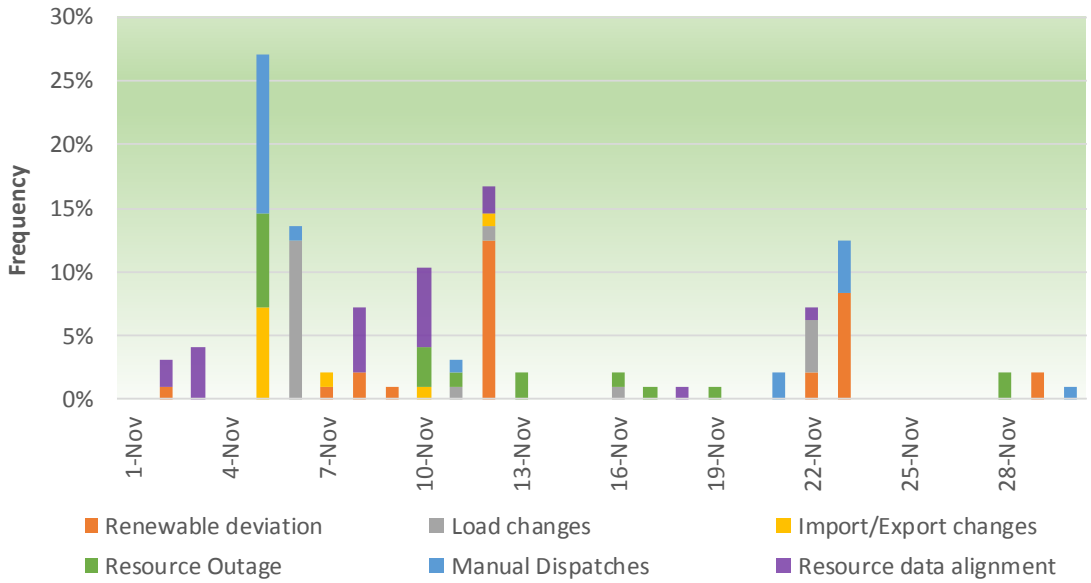
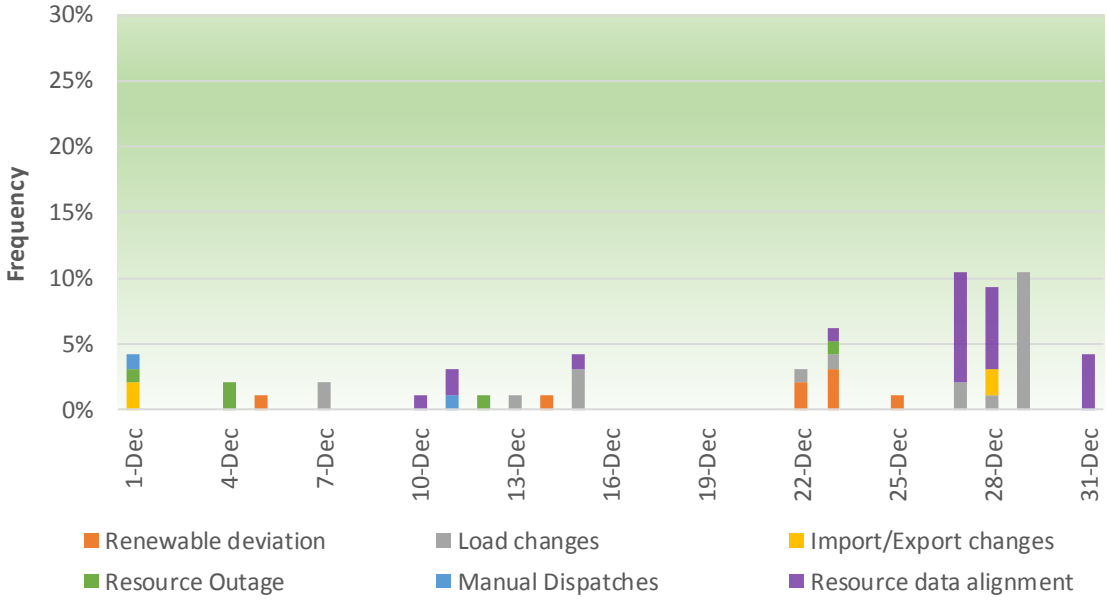


Figure 10: Reasons for intervals with undersupply infeasibility in the fifteen-minute market in December. PAC West and PAC East combined.



For the month of November, as previously reported in the December 15 report, the metrics represent all intervals where there were price excursions above $500/MWh in either PAC West or PAC East, or both, whether or not there were power balance constraint infeasibilities. The sample was chosen as such, because the CAISO presumed that prices exceeding $500 were suspect and possibly in need of price corrections due to some form of an error, or they were due to the relaxation of a constraint and were based on the $1000/MWh pricing parameter. For the month of December and onwards, because the CAISO started employing the December 1 Waiver, prices simply were rarely above $500. Following that same approach would have yielded a very small set of intervals. Therefore, for the December time period it is more appropriate to report the frequency of issues that led to the request for a waiver based on the intervals in which there were power balance infeasibilities (undersupply conditions) as observed through the relaxation of a constraint (power balance or transmission). While these differences present a difference in the type of intervals from which the frequency data was drawn, the data for the two months is still instructive in terms of which of the types of issues that led to the need for the waiver were observed most frequently in each month. The CAISO further reports on the frequency and magnitude of power balance infeasibilities in greater detail in both months in Attachment E of this report in Figure 14 through Figure 21. Those later figures better represent the trends for magnitude of the infeasibilities observed in the markets overall.

Figure 11: Reasons for intervals with ELAP prices exceeding $500 in the five-minute market in November. PAC West and PAC East combined.

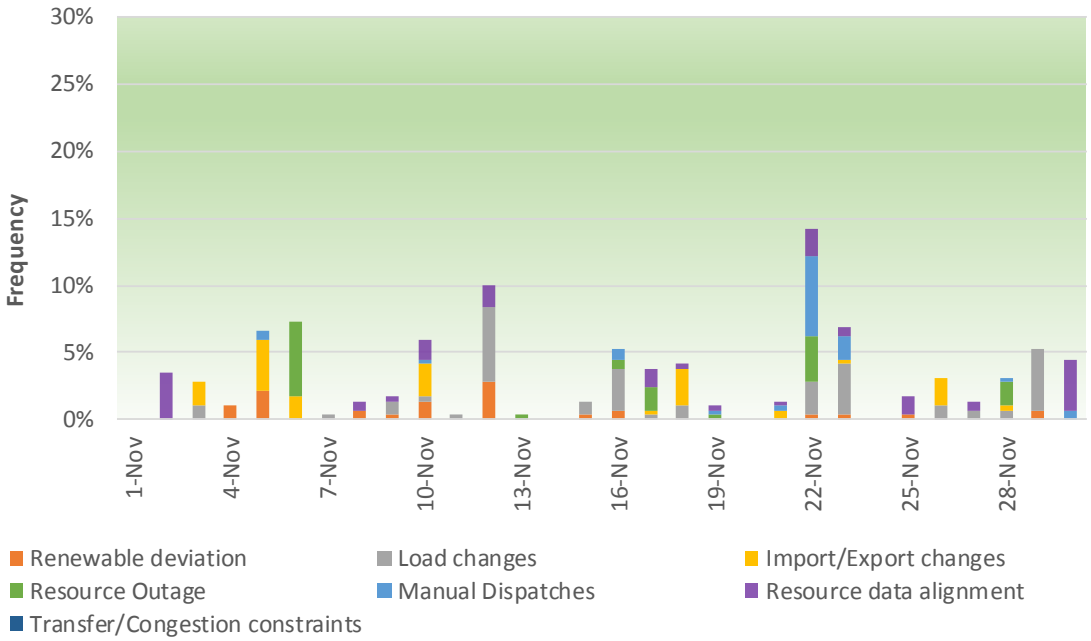
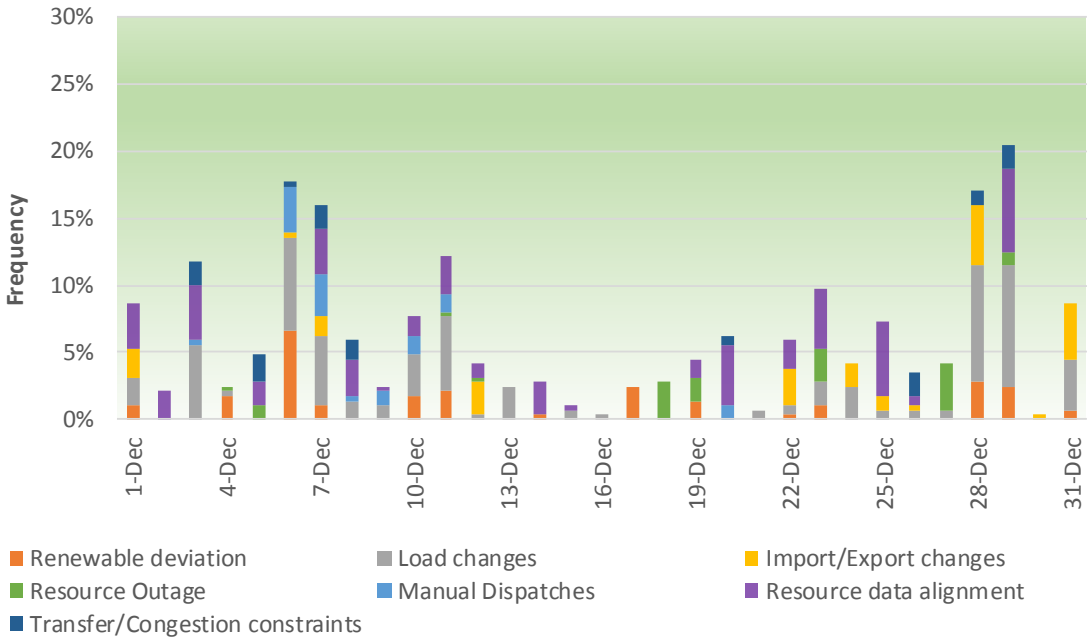


Figure 12: Reasons for intervals with undersupply infeasibility in the fifteen-minute market in December. PAC West and PAC East combined.



The categories used in Figure 9 through Figure 12 are related but not exactly the same as the broader descriptions provided in the tables in section 2 below. In some cases, the descriptions provided in the tables below will create conditions leading to the manifestation of power balance infeasibilities. For example, in category 1 below

includes the issue of timely manner of entering and cancelling outages. This issue also falls in the category of resource data alignment. The descriptions in the tables below link each issue to the relevant category of reasons above to more specifically define the categories of reasons that prompted the need for the December 1 Order tariff waiver.

2. Issues prompting waiver, remedial actions taken, status and outstanding items

Category 1: Outages, derates/rerates management

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Timely entering and cancelling of outages in the market	When resources experience full or partial forced outages, the market must be informed in a timely manner of the outage event and the corresponding measures taken to compensate for the lost megawatt capacity. Delay in informing the market application causes the market application to detect capacity shortages not covered by the unloaded capacity from participating resources. Under such conditions, prompt EIM Entity manual dispatch instructions are needed to increase the generation of available non-participating resources to create room for participating resources to be marginal and to economically set price. When the EIM Entity cancels an outage in a timely manner, it is also important to inform the market that the capacity is available and can be used to clear the Energy Imbalance Market, otherwise the market will perceive that there is capacity shortage to meet the load.	CAISO and PacifiCorp participated in several discussion sessions to clarify the process of entering or cancelling outages including maximum capacity derates, and minimum capacity re-rates. More emphasis was given to multi-stage generating resources due to the complexity of their multiple configurations and additional needed coordination between them. CAISO formalized a production system support plan for Outage Management System to respond quickly to questions or situations encountered by PacifiCorp operator when entering outage tickets. Many issues related to interfaces and timely communication of the outages has been resolved. However, we still see many instances were invalid or un-cancelled outages are behind excessive loss of capacity in the market causing supply shortage	This issue may result in instances counted in Figure 9 through Figure 12 as Resource data alignment and Resource outages. As illustrated in those figures, these causal categories have increased the last week of December where excessive number of planned maintenance was scheduled after the Christmas Holiday.

		and price excursions. These instances are identified and root-cause analysis was conducted. Improvements were made to the process of entering outages in the local PacifiCorp system and the interface to the CAISO outage management system. The CAISO continues to monitor, analyze, and provide feedback to PacifiCorp for continuous improvements.	
2. Base schedule and Bid submission for resources undergoing outages	The timing in which the EIM Entity reports the outage is very important. If the outage occurred before T-75 (*i.e.*, seventy five minutes before the operating hour) and is expected to last during the operating hour T, then both the economic bid and base schedule submission should be adjusted to account for the outage. Otherwise, the assumptions and data used by the market application for the balance test and look-ahead fifteen-minute market are not consistent with real system conditions, which results in less capacity available to the Energy Imbalance Market than what was computed before the start of the operating hour, and high prices are imminent due to limited unloaded economic capacity that is offered in the market.	PacifiCorp has utilized the CAISO new displays to quickly identify discrepancies between base schedules and derated maximum capacity of resources. PacifiCorp has acted on these discrepancies and adjusted the base schedules accordingly. Other than a couple of days in December 4, and 10, a decrease in discrepancy occurrences has been noted. The CAISO continues to monitor and analyze for timely responses to inform the market about any out-of-market manual actions that are taken or are planned to be taken by the EIM Entity.	This issue may result in instances counted in Figure 9 through Figure 12 as Resource data alignment and Resource outages.

3. Outages of partial or full multi-stage generating resource configurations	Multi-stage generating resources have multiple configurations that must be carefully managed in the real-time market. The configuration characteristics are registered in the master file and are observed and honored by the market application. These include physical registered characteristics such as transition time, minimum up time, and minimum down time and minimum capacity (Pmin) and maximum capacity output (Pmax) megawatts (MWs) as well as any overlapping MW regions between configurations. If a configuration is out of service, a timely input of the outage is needed to inform the market that the corresponding economic bid or base schedule is not available and another configuration should be used. If the information is not promptly entered or bids don't exist on other configurations then the market has no way to move the resource to other configurations and the whole MW of the plant is not accounted for in the market and price excursions will occur.	The CAISO provided additional clarification and review of base schedules and coordination with resource parameters. Due to the complexity of multi-stage generating resource data modeling there, this constitutes the majority of outage/derates/re-rates issues causing price excursions. More substantial improvements are yet to be seen in this area. The CAISO continues to monitor, analyze, and provide feedback to PacifiCorp for continuous improvements.	This issue may result in instances counted in Figure 9 through Figure 12 as Resource data alignment and Resource outages

Category 2: Manual Dispatch

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Timely input of manual dispatch	Since many units are not participating in the market, manual dispatch and other out-of-market actions taken on these units must be recorded by the EIM Entity in the market to inform the market about the availability of these resources and their movements to respond to events like contingency or outages of other units. Without this timely information, the market can only assume that the participating resources will respond to these various events, which will result in depleting the flexible unloaded capacity of the participating resources and their capability to set economic prices causing price excursions.	The manual dispatch is entered directly in the market tool by the EIM Entity. There were several occasions reported where manual dispatches are not entered promptly due to outage of resources or fail to startup on time to be consisted with base schedule submission. These instances were identified and discussed with PacifiCorp for continuous improvement and enforcement of this process.	This issue may result in instances counted in Figure 9 through Figure 12 as Resource data alignment and Manual Dispatches
2. Flexible ramping sufficiency test	The CAISO performs the flexible ramping sufficiency test on the base schedules, the last test being at 40 minutes before the start of each operating hour. When the EIM Entity fails the test based on the economic bid-in capacity that is being offered to the market, the market application will constrain PacifiCorp from increasing its import from CAISO to prevent the leaning concern. This means that PacifiCorp enters the operating hour depending on its resources and any	The CAISO has discussed this issue with the PacifiCorp and has clarified the market impact. The CAISO is also collecting and analyzing both wind and load variability in PacifiCorp's two balancing areas. After the resolution of some wind forecasting issues that PacifiCorp is addressing, it will be appropriate for CAISO to assess the flexible ramp requirement for PacifiCorp's two balancing areas based on the collected data for the actual real-time imbalance conditions.	This issue may reduce the flexibility of the market to absorb system condition changes and data updates and, consequently, leave the market more susceptible to price excursions by any of the reasons provided in Figure 9 through Figure 12

	additional manual changes to available non-participating resources set points or purchases of interchanges within the hour. Any delay in performing the manual dispatches or the additional interchange purchases leaves the market exposed to price excursions due to insufficient bid-in flexible capacity.		

Category 3: Wind forecast accuracy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Accuracy of PacifiCorp wind resources forecast	The variable energy resource (VER) forecast, which is mainly wind forecast for the PacifiCorp balancing authority areas, is crucial because it sets the maximum economic megawatt range that the market is allowed to dispatch these resources. The accuracy of the short term VER forecast benefits immensely from the accurate telemetry of the output of the VER resources. The forecast of the wind resources was deviating significantly from the output of the resources even for the next 5-min forecast over a period of many days. This resulted in significant deviations in calculated energy imbalance and sometimes resulted in over-generation, or under-generation conditions compared to the hourly base	PacifiCorp continues to utilize the new unit deviation display that CAISO added to the EIM Entity user interface. This display provides the grid operator information related to differences between any combination of telemetry, state estimation, base schedule, and cleared target operating points for all resources. This display is used by PacifiCorp to quickly identify which wind resource is deviating and the amount of deviation per resource and on aggregate basis per balancing area. PacifiCorp has identified some areas of improvement related to its wind forecast quality and has worked	This issue may result in instances counted in Figure 9 through Figure 12 as Renewable deviation

	schedule values of these wind resources for the corresponding operating hour. Lastly, in cases where wind resources are participating and being dispatched, the short-term forecast, which is a persistent forecast, may not be accounting for the dispatch instruction.	diligently with its wind forecast service provider to implement these changes. Not all changes were implemented to see their impact in December. The CAISO anticipates the next report will show more progress in this area as these changes are to be activated in early January 2015.	

Category 4: Interchange schedule variation

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Interchange information within the hour	Interchange information is essential part of meeting energy imbalance for each balancing authority area. Considering the forward look-ahead time horizon of the fifteen-minute market for almost two hours, and one hour for the five-minute real-time dispatch market, timely information about the interchange schedules is essential. The delay to inform the market application about these interchanges during resources outage times or steep load ramping conditions tightens the market conditions, leading to fake price excursions that sometimes show in the financially binding fifteen-min market interval which is calculated 37.5 minutes ahead of time before the T-20 minutes cut off time for the tags to be	CAISO has re-emphasized the importance of informing the market about any planned purchase or sale of interchanges before the balancing test or within the hour to respond to changing imbalance conditions. The CAISO also re-emphasized the need to submit planned interchange base schedules for multiple hours in the horizon to provide the short term unit commitment, which has a four and half hours look-ahead horizon, with good projection of the forward hours to enable optimal market decisions related to multi-stage generating resources transitions from one configuration	This issue may result in instances counted in Figure 9 through Figure 12 as Import/Export changes

	submitted and approved for any extra or within the hour interchanges.	to another, and startup of fast start resources.	

Category 5: Load forecast variation

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Load forecast biasing	EIM Entity grid operators have the capability to bias the load forecast for reliability purposes to account for any non-modeled issues causing discrepancy between forecast load and actual load. The setting of the bias is somewhat subjective based on the grid operator's judgment of system operational and reliability needs. This biasing if not done in a coordinated fashion with market operations can create price excursions especially when there is limited flexible ramp capacity available to accommodate small marginal overshoot or undershoot of the bias values. Due to the limited pool of participating resources, the PacifiCorp grid operator will necessarily need to pay extra attention to the bias values to prevent unintended overshoot or undershoot.	The logic for the load bias to maintain reliability was extensively discussed, documented, and used during PacifiCorp grid operator training including the impact on prices as a situational awareness signal to indicate an issue in meeting load or balancing the system. There were several instances reported in December when excessive amount of load bias was used to dispatch more capacity when the system is out of flexible ramping capacity. The CAISO has identified these instances and discussed with PacifiCorp that the bias can only cause price excursions without helping system reliability and re-emphasized in the on-going operator training sessions this phenomena.	This issue may result in instances counted in Figure 9 through Figure 12 as Load changes

Category 6: Resources not following dispatch

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Resources not following dispatch signal	On occasions resources were not closely following the market dispatch signal. This was either because the plant was unavailable and an outage ticket was not entered on-time for the market to consider the outage, or because of some lag time when the plant was not set on automatic generator control to be dispatched directly from market signal. In any of these cases, the deviation from the market dispatch and the lack of the manual instructions to inform the market application when the resource cannot operate to the target operating point, resulted in market conditions that are not reflective of actual system conditions, causing price excursions. In some cases when the plant is dragging its response to the market signal, it was necessary for the EIM Entity to make direct phone calls to the plant to start moving up or down to the plant's designated market dispatch signal.	PacifiCorp continues to utilize the new unit deviation display that CAISO added to the EIM Entity user interface. This display is used by PacifiCorp to quickly identify which resource is deviating and the amount of deviation per resource and on aggregate basis per balancing area. When a resource was observed to be dragging its dispatch, a direct call to the plant was enough to expedite the response if the plant was available or resulted in submission of outage ticket or manual dispatch instruction if the plant had any temporary physical limitations. Unit deviations have decreased compared to previous month but they are still present and among the reasons for price excursions, especially when they are combined with a manual dispatch that fixes the resource megawatts in the market but the resource is not following the dispatch.	This issue may result in instances counted Figure 9 through Figure 12 as Resource data alignment

Category 7: Network Model discrepancy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Industrial load base schedules	PacifiCorp has industrial load as part of the conforming load and market load forecast. This created a discrepancy whenever these industrial loads are operating or called upon to curtail. The market is not aware of these non-participating resources that exist in the PacifiCorp energy management system, but not in the market, creating the need to manually bias load to maintain consistency between market model and PacifiCorp's energy management system (EMS) model.	CAISO and PacifiCorp went through a series of meetings and identified these resources. An action plan was developed to add these non-participating resources to the network model used in the market application. PacifiCorp is diligently working on providing telemetry, and register these resource with CAISO so they can be treated as separate resources with the capability to submit base schedules reflecting their actual real-time operation. The issue has impacted the quality of load forecast for several days in December and called for manual load biasing after resulting in some price excursions.	This issue may result in instances counted in Figure 9 through Figure 12 as load changes and resource data alignment
2. Distributed energy resources modeling	Distributed energy resources are currently included in the market load forecast as conforming load. These resources have both load and generation components, which nets to positive or negative net injection at the load bus. When generating the market does not visibility of them and effectively considers more load than what the PacifiCorp's EMS is observing and price excursions occur	CAISO and PacifiCorp went through series of meetings and identified the gross impact of these resources. Action plan was developed to add them to the market network model. Many resources are adjusted already but there are few that awaiting the next network model deployment cycle.	This issue may result in instances counted Figure 9 through Figure 12 as load changes and resource data alignment

	because of the lack of base schedules for these resources.		
3. Telemetry quality issues (net versus gross accounting)	The EIM Entity is sending telemetry values for all PacifiCorp registered resources in the master file. When the quality of the telemetry values is not good, the state estimator solution quality is negatively impacted, which in turn affects the quality of the market solution and the dispatch operating targets of these resources. During the first few weeks of operation the CAISO found that some resources have telemetry measurement that is net of its auxiliary loads and others have gross telemetry measurements that do not include the auxiliary load. In addition, certain wind resources and other small non-participating resources did not have telemetry. When these discrepancies are combined together they tend to impact the market solution and cause price excursions.	The CAISO and PacifiCorp identified all these resources and telemetry issues. Most of the workarounds that were put in place last month are now removed and replaced with the permanent fixes in telemetry or network model updates. There were reported 5-min market cases on December 5 on some telemetry issues corresponding to wind resources but those were resolved.	This issue may result in instances counted in Figure 9 through Figure 12 resource data alignment

Category 8: Market model discrepancy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Energy during startup and shutdown	For multi-stage generating resources, the energy of these resources during the startup and shutdown periods when their	CAISO is working with PacifiCorp on defining some parameters to best model the startup and	This issue may result in instances counted in Figure 9 through Figure 12 as part of the resource data

	output is below the PMin is accounted for in energy management system and automatic generation control (AGC). But the market does not account for this energy because it is below the PMin of the resource. This created discrepancy in the base schedule balance test, and the imbalance calculations between market and actual conditions as seen by AGC, which led to performing some load bias during the startup and shutdown of these resources subjecting the market to price excursions.	shutdown profile of multi-stage generating resources and their ramping time. The CAISO is modeling the transition ramping for multi-stage generating resources and has scoped the requirements to add startup and shutdown profile to the 15-minute market since these features are already in the 5-min market. PacifiCorp is in the process of collecting data to define the startup and shutdown profiles for many of the resources with high PMin values.	alignment
2. Inconsistent base schedule and bid submission for multi-stage generating resources	For multi-stage generating resources, it is important that the base schedules, self-schedule, and economic price curve submission are consistent. If a resource is scheduled to be OFF at a particular hour, then it is expected that the submitted base schedule to be zero, it is not expected, however, for this resource to have a self-schedule at higher configuration for the same hour. Another bid submission inconsistency occurs when the resource's higher configuration bid ends or not submitted for a particular hour forcing the resource to transition to lower configuration with lower PMax value than its submitted base schedule for	CAISO has identified, and analyzed these instances and discussed them in detail with PacifiCorp. PacifiCorp has identified changes to its internal processes and interfaces to mitigate those inconsistencies in the automated bid submission.	This issue may result in instances counted in Figure 10 and 11 as part of the resource data alignment

	that hour, which was used in the balance test calculation. These inconsistencies results in market supply shortages that cause price excursions.		

Category 9: EIM Transfer Limits

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Static and dynamic transfer limit restrictions on California-Oregon Intertie (COI)	The Energy Imbalance Market is designed to have the EIM transfer capacity fully re-optimized in both the fifteen-minute and five-minute market. With respect to the COI, the added restriction of the dynamic five-minute limit which is an incremental limit around the fifteen-minute solution creates at times price excursions. The five-minute dynamic limit constrains the market application from re-optimizing the fifteen-minute EIM transfers decisions between PacifiCorp and CAISO beyond the amount allowed by the five-minute incremental dynamic limit, which can be restrictive especially during the on-peak hours.	PacifiCorp is engaged in ongoing discussions with the Bonneville Power Administration (BPA) to understand the nature and allocation of the dynamic transfer capability on COI. BPA is in the process of conducting a detailed dynamic transfer capability study, which is ongoing work. Any additional five-minute capability will help the five-minute market re-optimize the fifteen-minute decisions that are based on system conditions and information available at approximately 30 minutes prior to the five-minute market.	This restriction on the 5-min dynamic limit on COI issue is counted in Figure 9 through Figure 12 as part of transfer/congestion constraints
2. Five-minute rate-of-change constraints	The rate-of-change constraints are five-minute flow limit constraints that limit the amount of five-minute movement of PAC West balancing authority area	PacifiCorp is engaged in discussions with BPA to understand the nature and basis behind the five-minute flowgate	

	participating resources around the corresponding resources' fifteen-minute schedules due to their flow impact on certain paths and flowgates internal to BPA's balancing authority area. This restriction on the resources' five-minute movements or the corresponding rate-of-change constraint has created at times price excursions on the impacted resources when the corresponding path or flowgate five-minute limit constraint is binding.	limits and possible change in the calculation of those limits... BPA is reviewing the five-minute limits which are based on historical movement of PacifiCorp West resources before EIM. BPA has also asked for more data points to perform a review of the current rate-of-change limits based on actual EIM market data. Any additional five-minute capability will help the five-minute market re-optimize the fifteen-minute market decisions that are based on system conditions and information available approximately 30 minutes prior to the five-minute market. The CAISO is engaged with BPA to provide the requested data points and answer any relevant questions. CAISO is also engaged with both BPA and PacifiCorp to model and implement any limit changes that may result from BPA's limit calculation review effort.	

ATTACHMENT B

Quantitative and qualitative descriptions of market performance related to the issues that prompted the CAISO's waiver request – PacifiCorp

REPORT PROVIDED BY PACIFICORP

Issue	Description	Remedial Actions Taken	Remaining Steps
1. Increase Pool of EIM Participating Resources	PacifiCorp continues to coordinate with the CAISO to increase the pool of owned and third-party resources available to participate in the EIM.	As described in the December 15, 2014 report ("First EIM Report"), PacifiCorp received certification and addressed remaining metering and contractual issues to enable EIM participation for the following additional PacifiCorp EIM participating resources following EIM go-live: Huntington Unit 2 (450 MW), Naughton Unit 3 (330 MW), Jim Bridger Units 1-4 (2,147 MW), Gadsby Unit 3 (105 MW), and Gadsby Units 4-6 (120 MW). No additional EIM Participating Resources have been added since the First EIM Report.	As indicated in the First EIM Report, PacifiCorp anticipates continuing to add participating resources by addressing remaining metering and contractual issues (the latter due to shared facilities), as scheduled generator outages permit. PacifiCorp is currently working on adding its Swift 2 resource, which is a 72 MW hydro resource downstream from Swift 1, an existing participating resource. Adding this resource requires making software adjustments so that the resource is accurately integrated into the network model along with Swift 1. In addition, PacifiCorp continues to work with other transmission customers who may be interested in participating in the EIM with resources. Consistent with the

Issue	Description	Remedial Actions Taken	Remaining Steps
			First EIM Report, at this time, PacifiCorp has not certified any third-party transmission customers for participation in the EIM and is not at liberty to disclose the identity of any transmission customers that have made inquiries related to EIM participation, but is nevertheless hopeful that these efforts will result in additional EIM participation. PacifiCorp continues efforts to model certain of its industrial customer interruptible loads as participating resources. This is necessary because some of PacifiCorp's industrial customer loads have on-site generation and, as a result, this present additional complexity for accurate forecasting and balancing. Adding these elements as participating resources will provide improved operational visibility and will also add approximately 200MW of flex capacity in PACE.
2. Increase System Visibility and	PacifiCorp continues to develop and implement additional tools	As described in the First EIM Report, PacifiCorp created and/or improved certain	As indicated in the First EIM Report, PacifiCorp's Grid

Issue	Description	Remedial Actions Taken	Remaining Steps
Situational Awareness	and displays to provide its Grid Operations personnel with increased visibility and situational awareness regarding available regulation on a 5- and 15-minute basis.	Grid Operations displays to monitor generator availability, capacity, and ramp capacity. PacifiCorp has finalized enhancements to its generator database (Pi) displays to provide Grid Operations with situational awareness when there is a deviation between the Dispatch Operating Target (DOT) and the actual dispatch. Since go-live, PacifiCorp has been participating in reoccurring discussions with the CAISO to evaluate the root cause of remaining infeasible schedules. PacifiCorp has made improvements to its systems that interface with the CAISO's BSAP and SIBR, as well as systems designed for bidding resources in the start-up and shutdown hours for multi-stage resources.	Operations and its balancing agent continue to develop similar tools to display aggregated and disaggregated generation values, generation deviations, and interchange deviations, which are expected to be deployed by the end of the first quarter in 2015. PacifiCorp has analyzed wind forecasting data submitted to the CAISO and DOTs issued by the Market Operator and determined software adjustments can be made that would improve DOTs for wind participating resources. PacifiCorp anticipates completing this software adjustment by January 31, 2015, and will coordinate with CAISO on any identified potential improvements.
3. Improve Training and Systems	PacifiCorp continues to focus on opportunities to provide additional training to personnel and improve systems with increased EIM operational experience.	As described in the First EIM Report, PacifiCorp provided personnel with training on outage entry and requires the provision of daily spreadsheets from PacifiCorp EIM Participating Resources that describe any operational issues and the resources' ambient conditions. PacifiCorp and the CAISO developed a series	PacifiCorp anticipates completing modifications to its COMPASS outage management system by January 31, 2015, and will thereafter provide training to appropriate personnel. PacifiCorp and the CAISO will conduct a "Session B" training

Issue	Description	Remedial Actions Taken	Remaining Steps
		of training modules for PacifiCorp generation and grid operators. PacifiCorp and the CAISO held "Session A" Operator Training December 9-10, 2014, which included modules covering a range of issues relevant to EIM balancing and operations. PacifiCorp continues to coordinate with its outage vendor and the CAISO to improve functionality between its COMPASS outage management system and WebOMS, and developed a reference guide for outage management as part of this effort December 2014.	February 3-4, 2015. Session B will include modules on Master File, infeasibility causes, load conforming, transaction identification numbers, multi-stage generation re-qualifications, and DOT deviations.
4. Improve Internal Processes and Tools	PacifiCorp continues to take additional steps to improve its processes and tools to address identified market performance issues.	As described in the First EIM Report, PacifiCorp's Grid Operations drafted and posted "best practices" procedure documents to aid in personnel's implementation of critical EIM Entity tasks.	PacifiCorp will continue to update these procedure documents in real-time as needed.

ATTACHMENT C

Independent assessments from the Department of Market Monitoring on the causes and solutions identified by the CAISO.

This report part of the report will be submitted to the Commission within seven days of January 15, 2015.

ATTACHMENT D:

This attachment provides an exploration of impacts, if any, on non-Energy Imbalance Market pricing nodes, including the Mona trading node.[6] This attachment identifies any such impacts and describes any actions the CAISO is taking or plans to take to address such impacts.

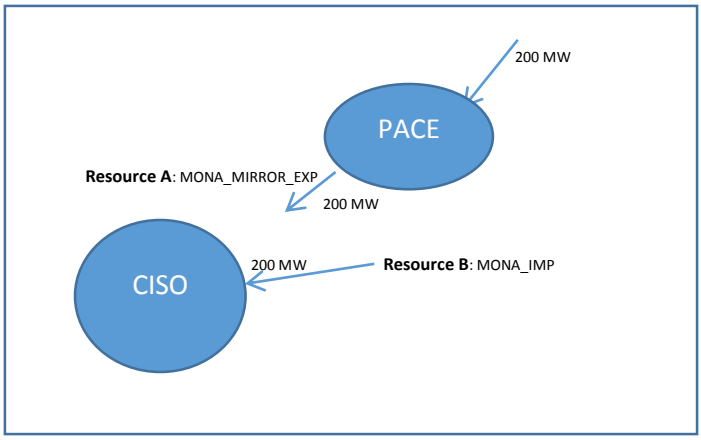
The implementation of the Full Network Model Expansion on October 15 increased the accuracy of the transmission grid modeling from neighboring balancing authority areas, and also allowed for better representation of unscheduled flows effects into the CAISO system. In addition, the implementation of the Energy imbalance Market on November 1, 2014, further enables the CAISO to co-optimize resources across the various areas of the Energy Imbalance Market. Both of these initiatives required that the CAISO also change the way in which the scheduling points are defined so that it can associate the scheduling points with external interties.

With regards to the CRAG and Mona scheduling points, the CAISO had to account for the fact that schedules can be submitted at the locations for purposes of CAISO only transactions or Energy Imbalance Market only transactions. The Crag location is the scheduling point for the Cascade intertie; the Mona location serves as a scheduling point for various southern interties, such as IPPUTAH and Adelanto interties. Prior to the implementation of the full network model, these two scheduling points were modeled with the standard radial link and were considered part of the CAISO balancing authority area. With the implementation of the full network model expansion, this definition changed and with the implementation of the Energy Imbalance Market, the prices at these locations changed notably as the CAISO began accounting for Energy Imbalance Market related congestion.

CRAG and Mona scheduling points are physically located inside PacifiCorp Balancing Authority Areas instead of the CAISO Balancing Authority Area. Mona is located inside PAC East, and CRAG is located inside PAC West. However, these locations continue to serve as scheduling points for imports and exports transacted with the CAISO balancing authority area. This situation requires special treatment for balancing and pricing calculations and leads to a special prices posted on OASIS. The pricing at these locations is based on the following rules to implement the special treatment of CAISO scheduling points CRAG/Mona Interchanges into the balance and price calculations of CAISO and PAC East/PAC West balancing authority areas.

[6] *See December 1 Order* at P 25.

Figure 13: Illustration of Mona Pricing



Assume that Resource A is Mona_Mirror_Exp, Resource B is Mona_IMP. Both of these resources are defined in Master file to have the same scheduling point and intertie definitions (ISO-PACE). The following rules apply:

Resource A,		
BAA	Balance	Price
CISO	**Don't** include MW	Not applicable
PACE	**Include** MW	**Resource LMP**= Price@SP
Resource B,		
CISO	**Include** MW	**Adj_Price@SP=** Price@SP – EIM_PACE – EIM_PACE_PACW – GHG + ∑ MONA ITCs **Resource LMP**= **Adj_**Price@SP SP-TIE Price shall use the **Adj_**Price@SP for the SP price calculations.
PACE	**Don't** include MW	Not applicable

The same above treatment shall be applied to CRAG scheduling point and mirror resource. The Figure above illustrates how an import at Mona scheduling point is mirrored by an export from the PACE balancing authority area with equal megawatt value. The reason for this mirroring is to allow the accounting for the import and associated offsetting export for each balancing authority area separately while the supporting resource(s) for the transaction is modeled at the physical location within PACE balancing authority area or as a separate import to PACE balancing authority area from another balancing authority area.

The table above illustrates that the pricing at Mona for CAISO balancing authority area is adjusted to not include effects of Energy Imbalance Market transfer constraints, GHG pricing, and other constraints pertaining to the EIM area.

The CAISO detected that the pricing at CRAG and Mona over the first few days of implementation were subject to a software defect that resulted in the CAISO pricing to include some of the LMP components pertaining to the mirror resource. The CAISO fixed this issue on November 5, 2014 and has not detected it since.

Currently, the prices at these scheduling points, as posted on OASIS, reflect all the congestion effects from either CAISO or PAC balancing authority areas. However, for CAISO imports and exports, the actual price used for settling the respective schedules at each of these locations as scheduling points for imports and export to and from CAISO balancing authority area, only accounts for the congestion arising from CAISO balancing authority area. The prices posted on OASIS do not reflect that, but the prices provided through the California Market Results Interface (CMRI) application and used for settlements for resources transacting at these scheduling points will reflect only the applicable CAISO balancing authority area congestion.

For example, consider the case of a sample market interval, November 26, hour ending 11 interval 4 for the fifteen-minute market. The shadow price of the IPPUTAH ITC is -$183.29, the Energy Imbalance Market transfer for PAC East is $6.8 and the Energy Imbalance Market transfer for PAC East and PAC West is -$11.88. The system energy price is $35.38 and the greenhouse gas price is $0. The price posted on OASIS for the marginal congestion component at MONA_3_N501 is -$188.37. The congestion component posted on OASIS accounts for all the congestion associated with this location, both from the CAISO and PacifiCorp balancing authority areas. This published congestion component is thus calculated as -$183.29 (IPPUTAH ITC)-$11.88(PACW_PACE) +$6.8 (PACE) =-$188.37.

On the other hand, for intertie awards using the Mona point as a scheduling point to transact in the CAISO Balancing Authority Area, the prices posted in CMRI and used for settlements reflect accordingly only the congestion share of -$183.29 arising from IPPUTAH ITC. This price still adheres to the typical congestion calculation used prior to the implementation of the full network expansion and Energy Imbalance Market.

The current data structure used in the OASIS application only supports the display of one entry for the marginal congestion component, and given the nature of the congestion associated with these two scheduling points, either marginal congestion component combination will reflect partial information. Currently the display of the full congestion components -- CAISO and PAC -- does not apply to CAISO schedules. If the entry displayed only the CAISO congestion share, it will still be partial because it will be missing now the congestion portion associated with PAC. The CAISO is working on an enhanced OASIS display that will publish the congestion component breakdown. In this case there will be an entry for the congestion share associated with PAC of -$11.88+$6.8 and another entry with the congestion share associated with CAISO tie of -

$183.29. The CAISO expect that this display will be available in January 2015 and will provide the clarity and minimize the concerns about the pricing for these two locations.

Updated report:

The CAISO upgraded its OASIS to provide the more granular displays for the Mona and Crag locations on January 8, 2015. However, it is continuing to evaluate the performance of that display and continues to make changes to ensure the greater granularity is provided accurately. The CAISO also is also working towards posting the greater granularity of prices going back to the start of the Energy Imbalance Market later in February 2015.

ATTACHMENT E

In this attachment, the CAISO reports on each relaxation event, and a summary of the magnitude and frequency of such events overall.[7] This report provides data on instances where the $1,000/MWh price would have occurred but for the Commission's December 1 Order waiver, including the time of the instance, the duration, the cause, and the affected node(s) and load aggregation points.

The relaxation events affect numerous market intervals as the CAISO real-time markets contain many fifteen and five minute intervals. The information is provided at summary level because the data is significant and detail specific reporting of such events would not be meaningful. The report focuses on the external load aggregation points (ELAP) prices because these aggregate prices are representative of pricing in each area -- West and East-- and would reflect short-term imbalance shortage for the aggregate area.

Figure 14 through Figure 21 provide summary information on the instances of power balance relaxation for undersupply (shortage) in the fifteen- and five-minute market in the PAC West and East area. Normally, when there are such infeasibilities, it is expected that prices will be based on the constraint relaxation pricing parameter, and prices will be near or at $1000/MWh. However, there are three cases where this would not occur and is reflected in the data supporting the figures in this report. First, as of December 1st consistent with the December 1 tariff waiver, the price is based on the last economic signal consistent with the pricing principles contained in the tariff. Second, as described in more detail in Attachment A, when the EIM Entity fails the flexible ramping sufficiency test prices are calculated using the same approach based on the last economic signal for the duration of the restricted interval. Therefore, it is important to keep in mind that in these intervals, even if there are infeasibilities the market price in the affected EIM Entity balancing authority area will be based on the last economic bid cleared in the applicable fifteen-minute or five-minute interval in the EIM Entity balancing authority area as opposed to the $1000/MWh bid cap.[8] In the last report filed on December 15, 2014, the CAISO noted that there was a third case in which it had observed the power balance constraint was relaxed in the scheduling run, but prices did not reflect the $1000/MWh. The CAISO has since evaluated these cases more closely and as discussed in Attachment A, in some instances the market is in a degeneracy case, and the market clears based on the last economic signal. The CAISO is continuing to

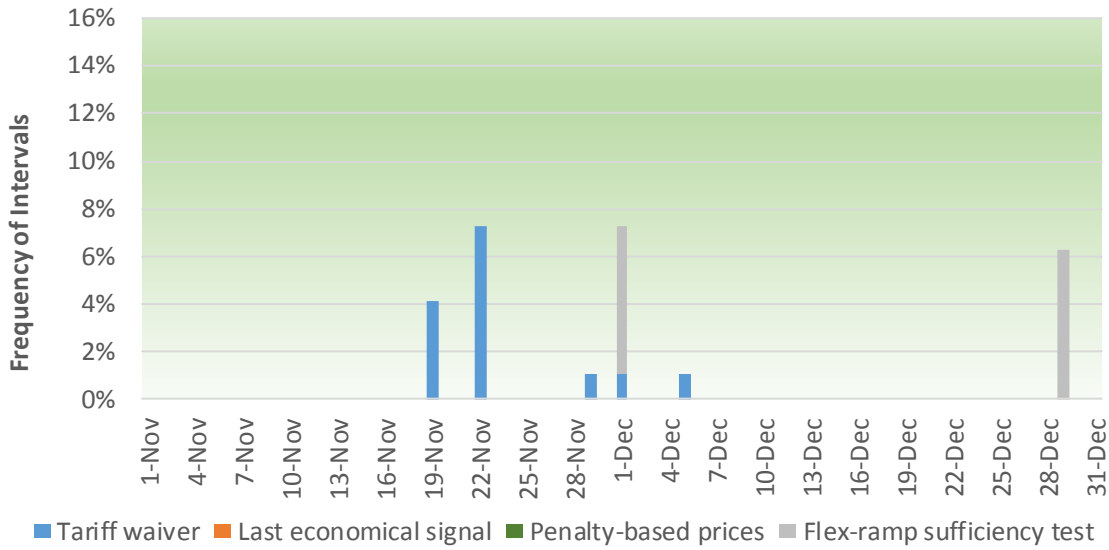
[7] *December 1 Order*, at P 26.

[8] The price discovery mechanism under the procedure descried in Section 10.3.2.1 of the BPM for Energy Imbalance Market is, however, essentially the same price discovery procedure used under the December 1 Order waiver.

investigate these intervals to ensure these events are not due to other abnormalities and are in fact due to degeneracy. As explained in Attachment A, after the implementation of the pricing procedure under the December 1 waiver there is no pricing based on the degenerate cases because the pricing procedure under the December 1 waiver governs over the pricing.

Figure 14 through Figure 21 exclude the intervals that were subject to price corrections because they were invalid. These figures show the frequency of infeasibilities organized by instances in which the prices were set based on 1) the last economic bid price signal as per the tariff waiver, referred to in the figures as "Tariff waiver," 2) the $1000/MWh penalty price parameter, referred to in the figures as "Penalty-based prices" 3) last economical signal from degeneracy referred as "Last economical signal" and 4) the last economic signal but because for those intervals the EIM entity failed the flexible ramping sufficient test, referred to as the "Flex-ramp sufficient test." Each figure of the frequency of infeasibilities is accompanied with a figure the magnitude of infeasibilities. The reported events are also aggregated on a daily basis and depicted with an infeasibility range shown by the vertical line in blue. The ends of the vertical blue lines represent the minimum and maximum values of power balance relaxation in each day. The average magnitude of the infeasibility is shown by the red marker on the blue vertical lines.

Figure 14: Frequency of under-supply infeasibility in PAC West. Fifteen-minute market.



For the period of November 1 through November 13, the data on the magnitude of infeasibility in the fifteen minute market was not preserved in the data system. This impedes the CAISO's ability to identify the cases with infeasibility and quantify their magnitude. However, such instances were conservatively estimated by analyzing the cases where prices reached the relaxation-based levels of $1000.

Figure 15: Magnitude of undersupply infeasibility in PAC West. Fifteen-minute market.

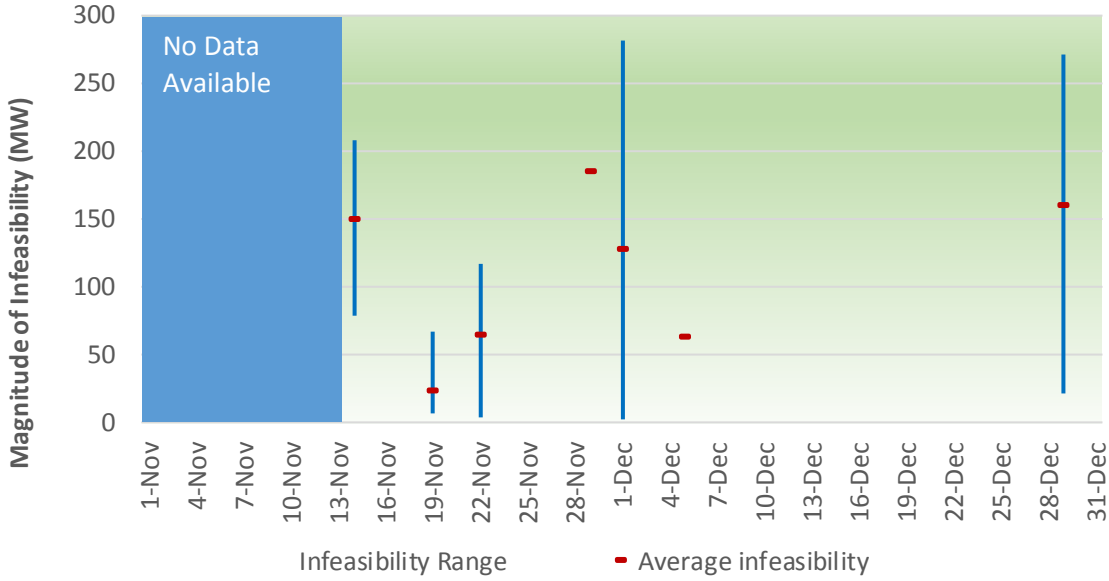


Figure 16: Frequency of undersupply infeasibility PAC East. Fifteen-minute market.

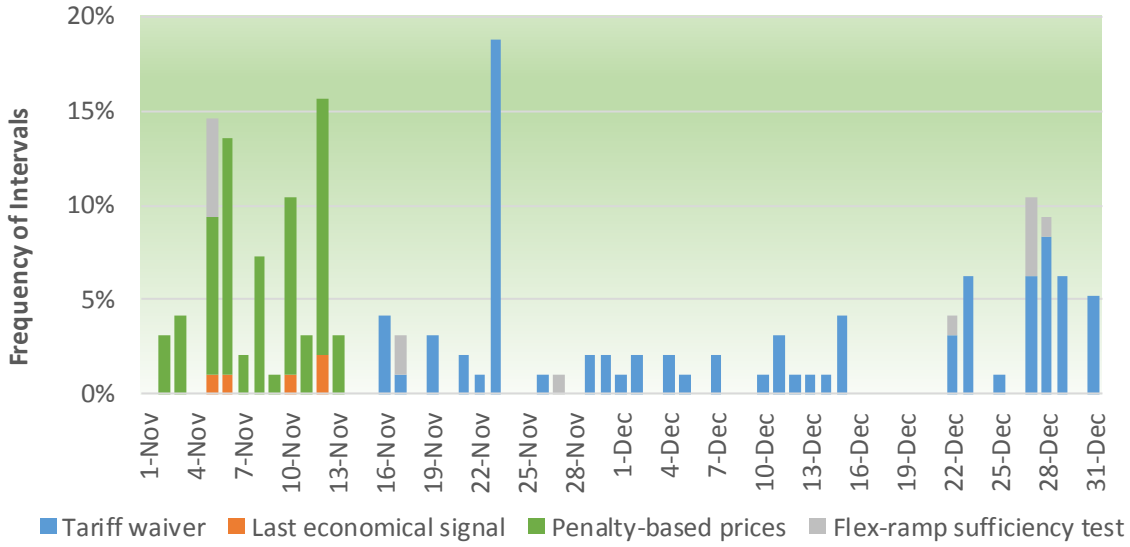


Figure 17: Magnitude of undersupply infeasibility PAC West. Fifteen-minute market.

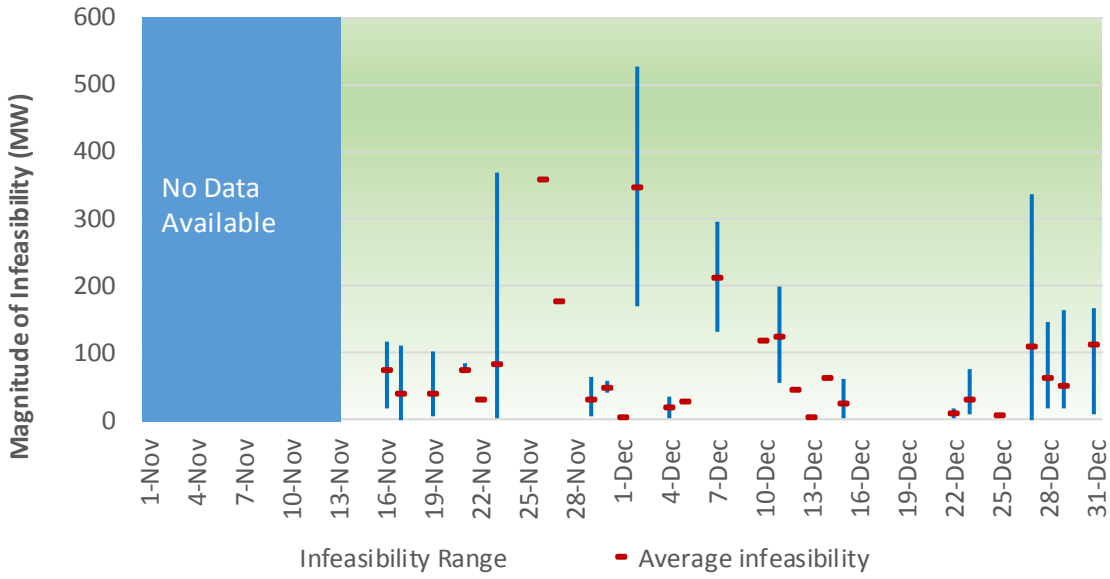


Figure 18: Frequency of undersupply infeasibility PAC West. Five-minute market.

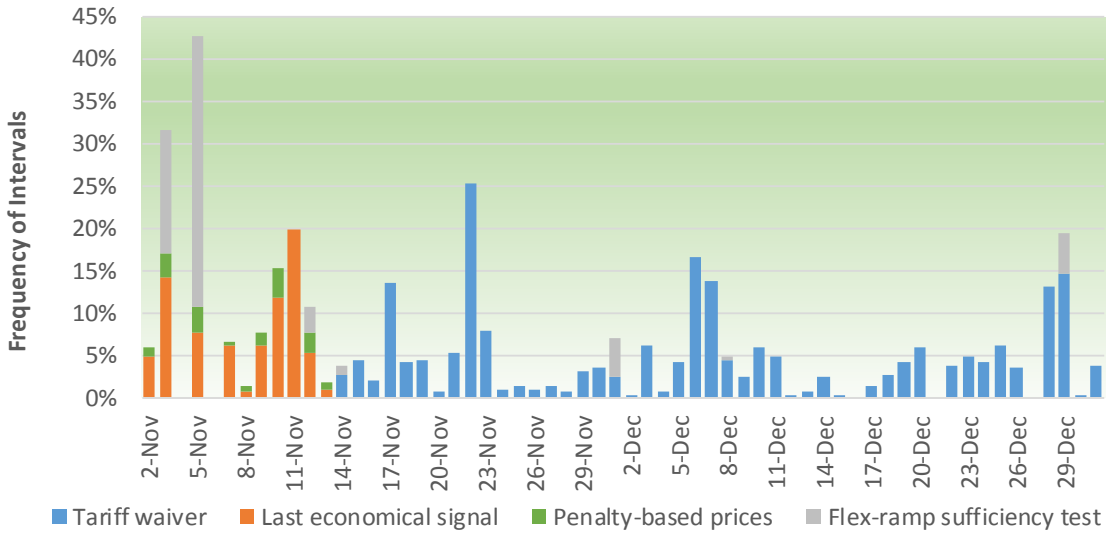


Figure 19: Magnitude of undersupply infeasibility PAC West. Five-minute market.

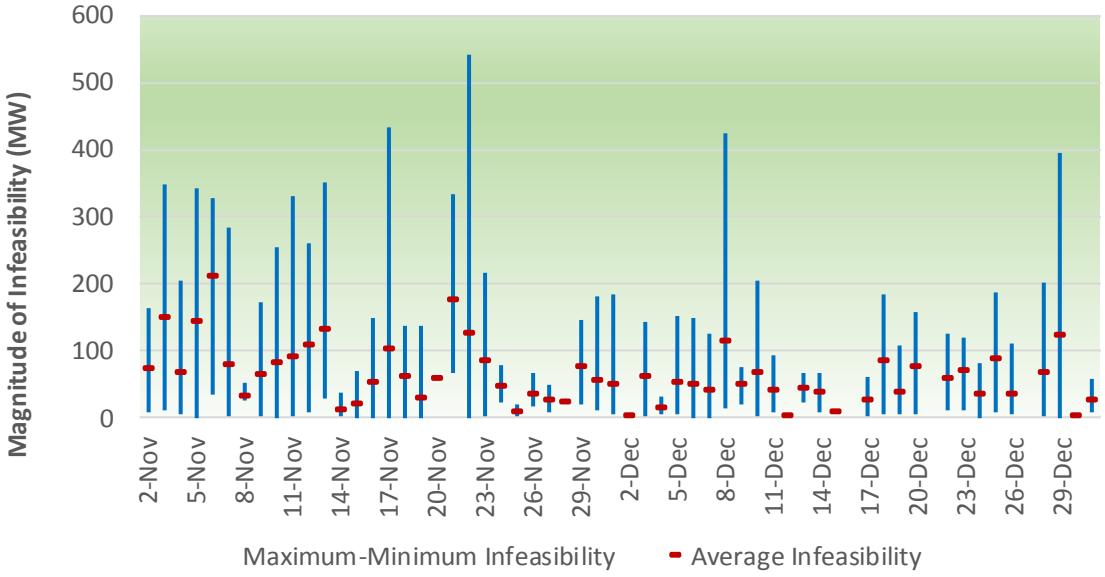


Figure 20: Frequency of undersupply infeasibility PAC East. Five-minute market.

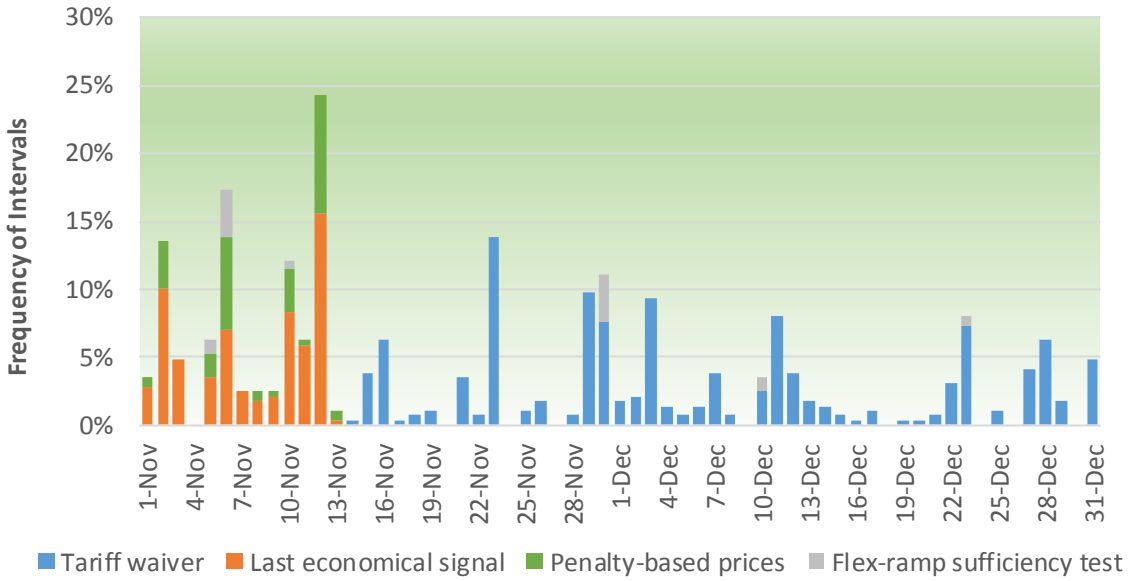


Figure 21: Magnitude of undersupply infeasibility PAC East. Five-minute market.

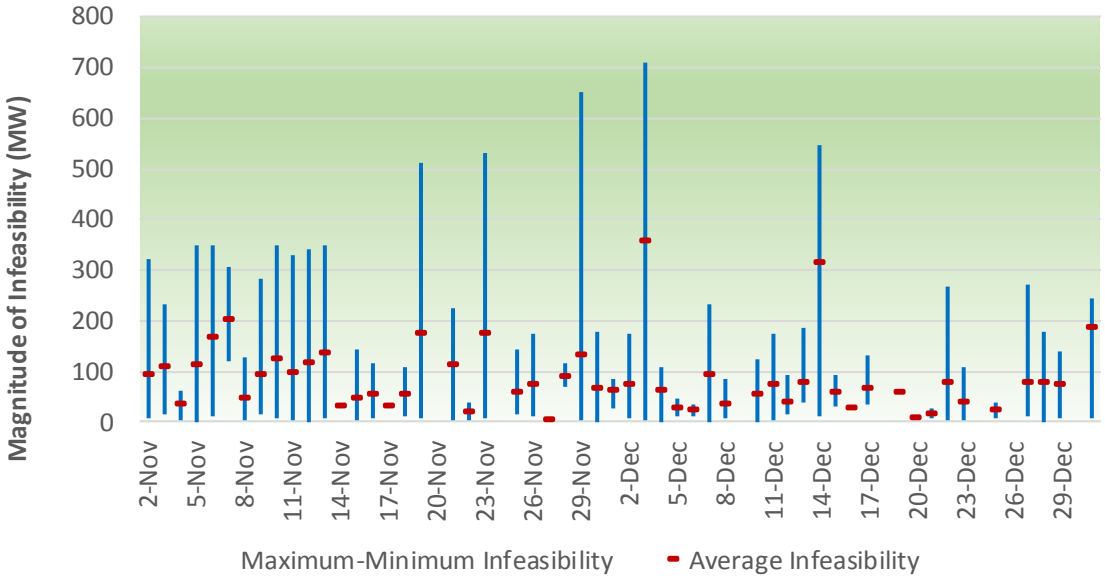


Figure 22 through Figure 25 show the hourly profile of the undersupply infeasibilities for both PAC West and East by market. This profile is provided to identify any patterns during the day where infeasibilities may be more prone to occur, such as the pull-up periods of load. The first two months of operational data, however, show no marked pattern of the frequency of infeasibilities with the time of day. This may be an indication that the drivers of infeasibilities are not system condition related.

Figure 22: Hourly undersupply infeasibilities for PAC West. Fifteen-minute market.

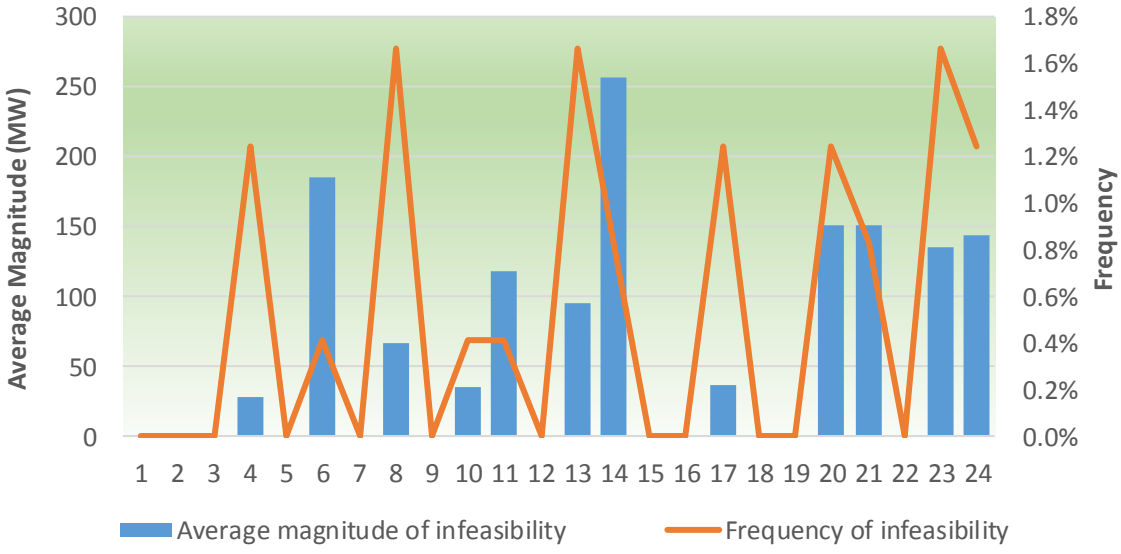


Figure 23: Hourly undersupply infeasibilities for PAC East. Fifteen-minute market.

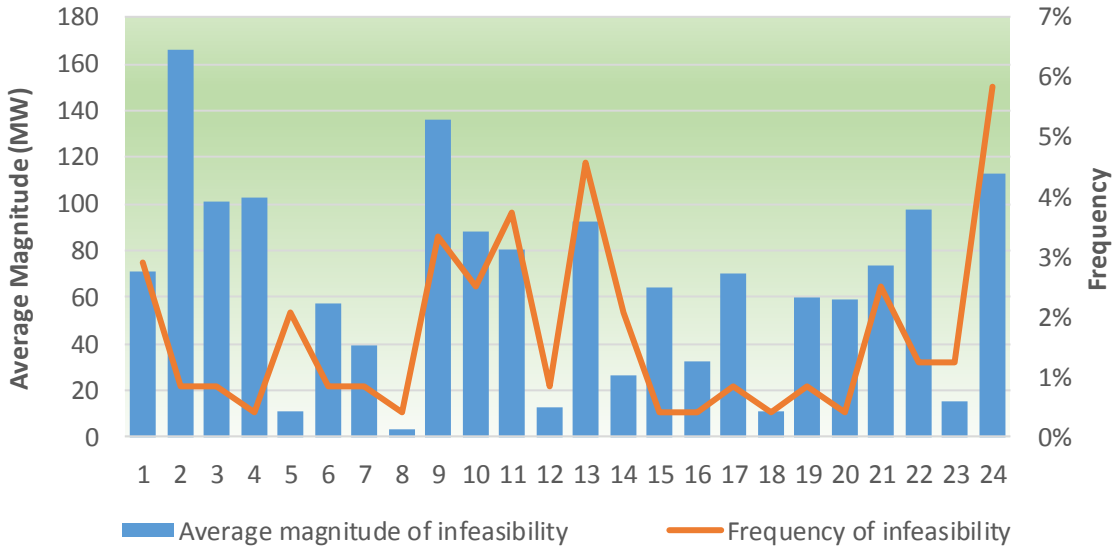


Figure 24: Hourly undersupply infeasibilities for PAC West. Five-minute market.

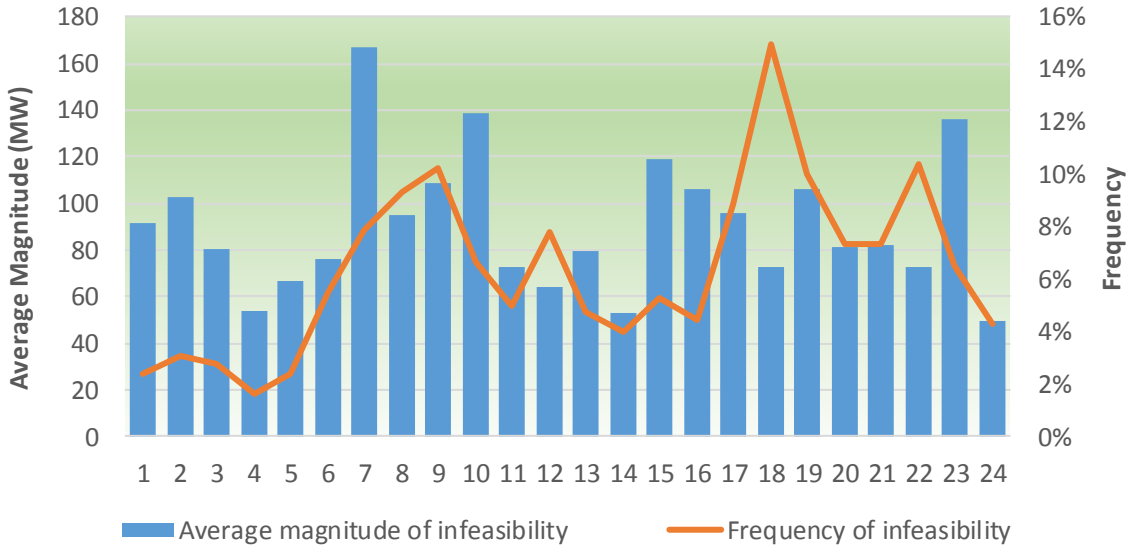
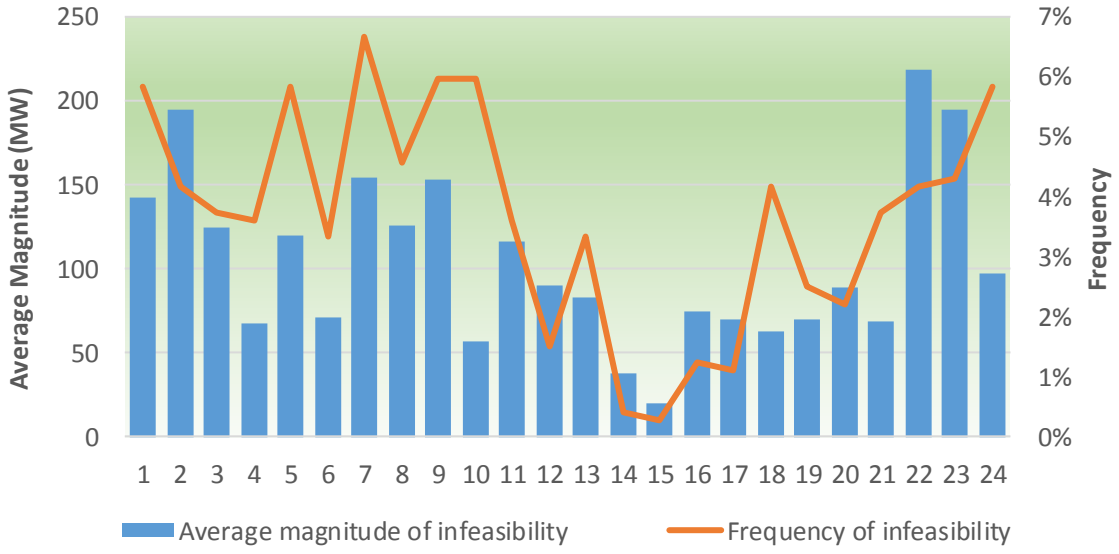


Figure 25: Hourly undersupply infeasibilities for PAC East. Five-minute market.



The imbalance energy transfers may also be subject to relaxation to address infeasibilities; there were few instances only in the PAC East transfer that resulted in relaxation; there were no instances of relaxation of EIM transfers between PAC and CAISO. The summary of these instance are listed in Table 1

Table 2. All these instances occurred before the period applicable for the waiver associated with this report; there were no EIM transfer infeasibilities observed in December.

Table 1: Statistics of EIM transfer infeasibilities for PAC East.

Fifteen-minute market.

Date	Maximum	Minimum	Average	Count
6-Nov-14	51.4	1.1	26.2	2
10-Nov-14	121.0	121.0	121.0	1
12-Nov-14	126.7	72.0	99.3	2
13-Nov-14	130.9	16.9	76.2	3

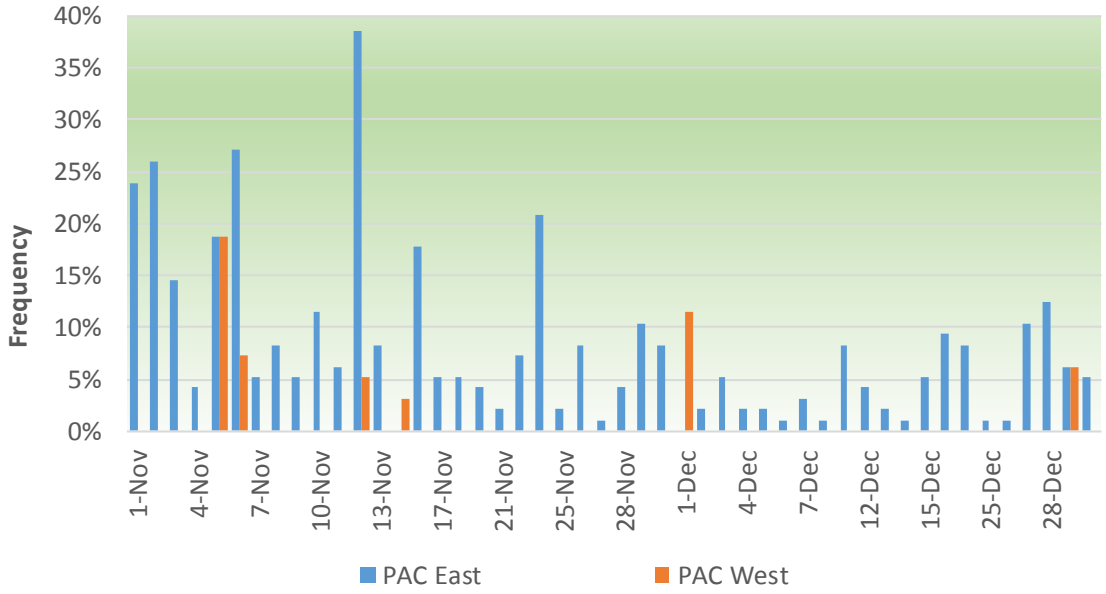
Table 2: Statistics of EIM transfer infeasibilities for PAC East.

Five-minute market.

Date	Maximum	Minimum	Average	Count
6-Nov-14	65.2	65.2	65.2	1
10-Nov-14	114.3	97.9	106.1	2

For completeness, the data in this report also includes those cases in which there was a relaxation of flexible ramp constraint; the data is organized by PAC West and East in Figure 26. The average frequency of infeasibility went down from 6 percent in November to 2.6 percent in December.

Figure 26: Frequency of flexible ramp constraint infeasibility PAC West



Finally, this report also includes information about infeasibility for over supply conditions even though these cases are not reflected in the waiver requested in this proceeding. The penalty prices specified in sections 27.4.3.2 and 27.4.3.4 only pertain to infeasibility cases in which there is under-supply. The penalty prices for the over-

supply conditions are specified in section 6.6.5 of the BPM for Market Operations. The over-supply metrics are provided in Figure 27 through Figure 34.

Figure 27: Frequency of oversupply infeasibility PAC West. Fifteen-minute market.

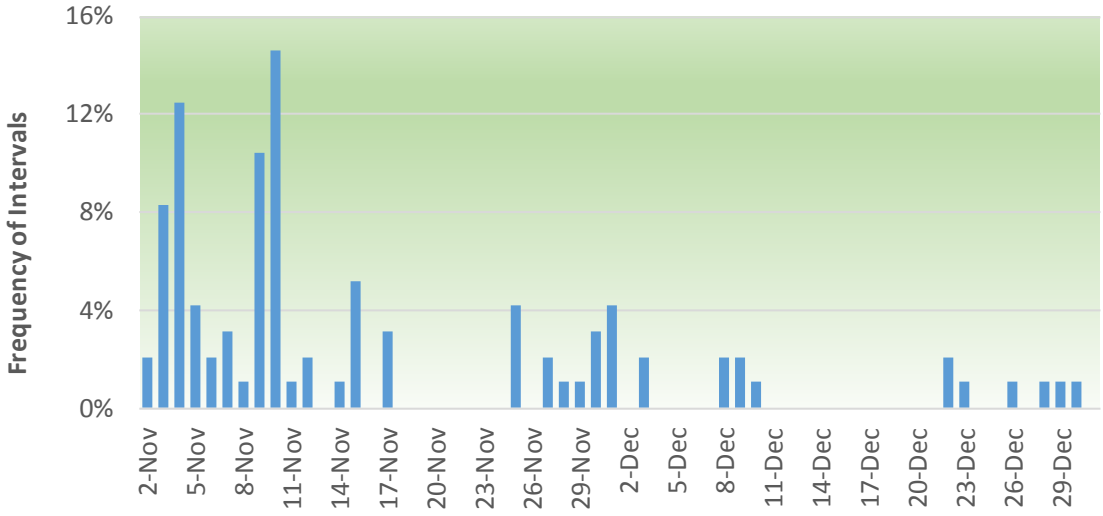


Figure 28: Magnitude of oversupply infeasibility PAC West. Fifteen-minute market.

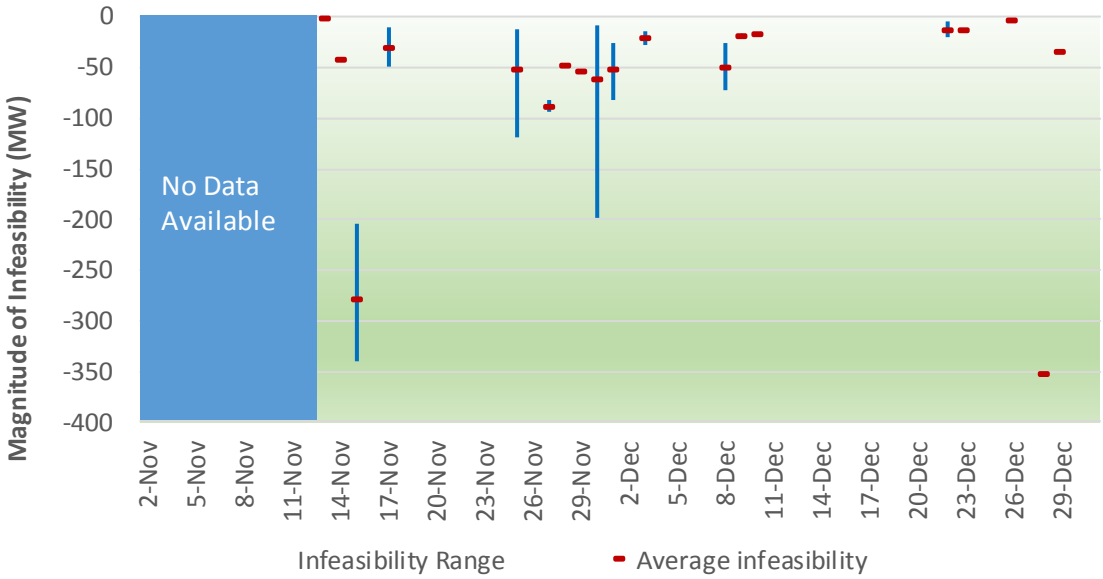


Figure 29: Frequency of oversupply infeasibility PAC East. Fifteen-minute market.

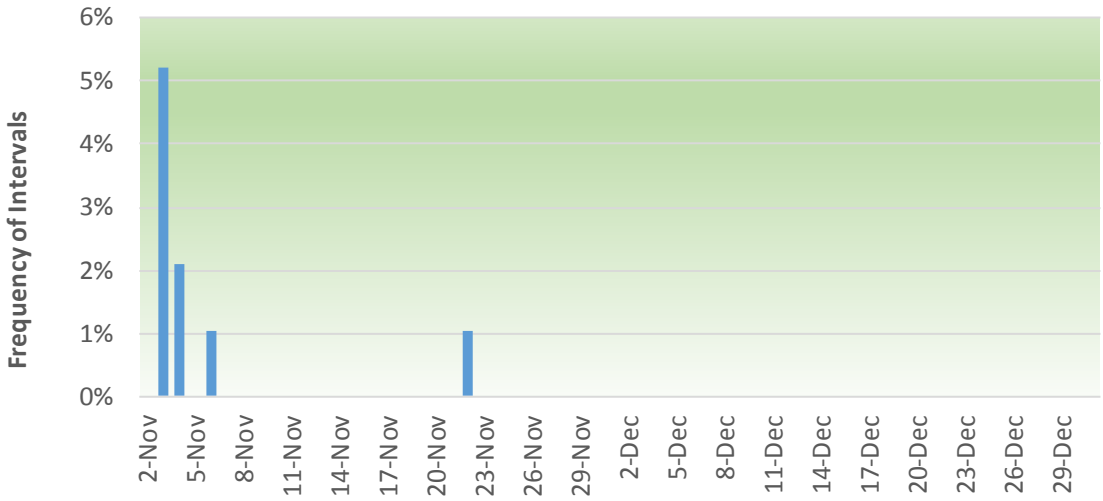


Figure 30: Magnitude of oversupply infeasibility PAC East. Fifteen-minute market.

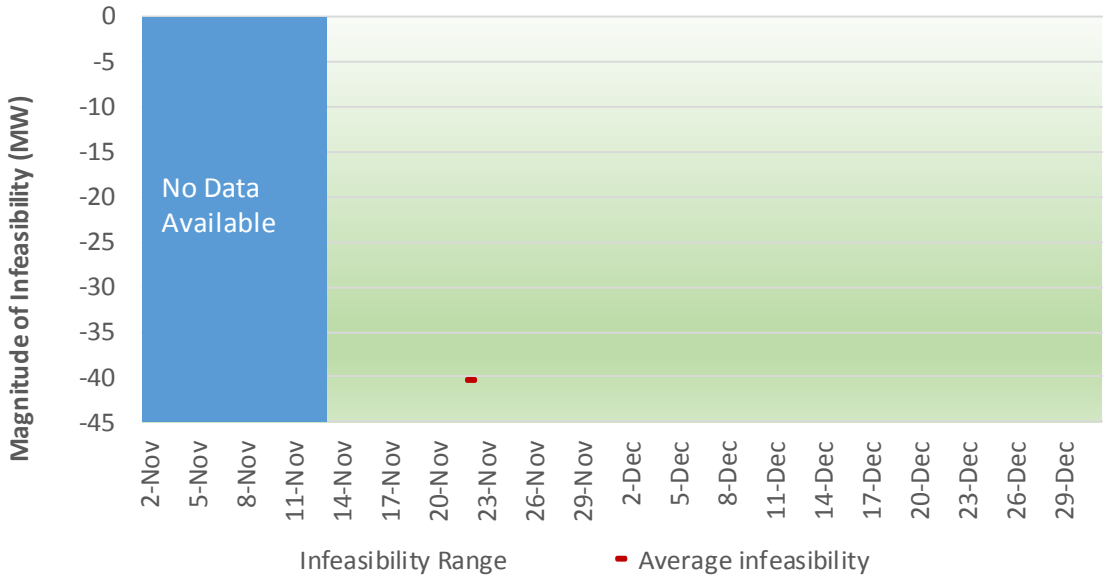


Figure 31: Frequency of oversupply infeasibility PAC West. Five-minute market.

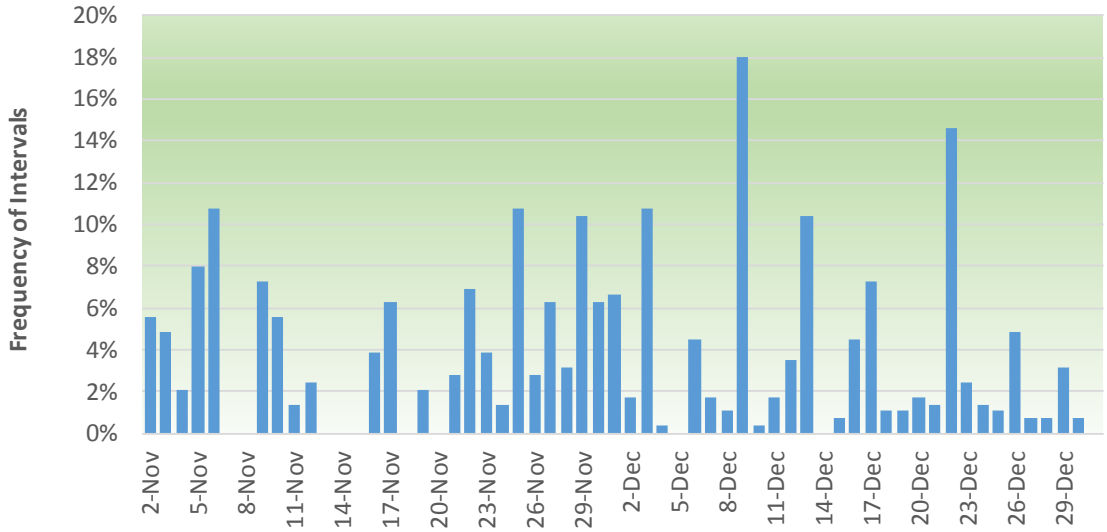


Figure 32: Magnitude of oversupply infeasibility PAC West. Five-minute market.

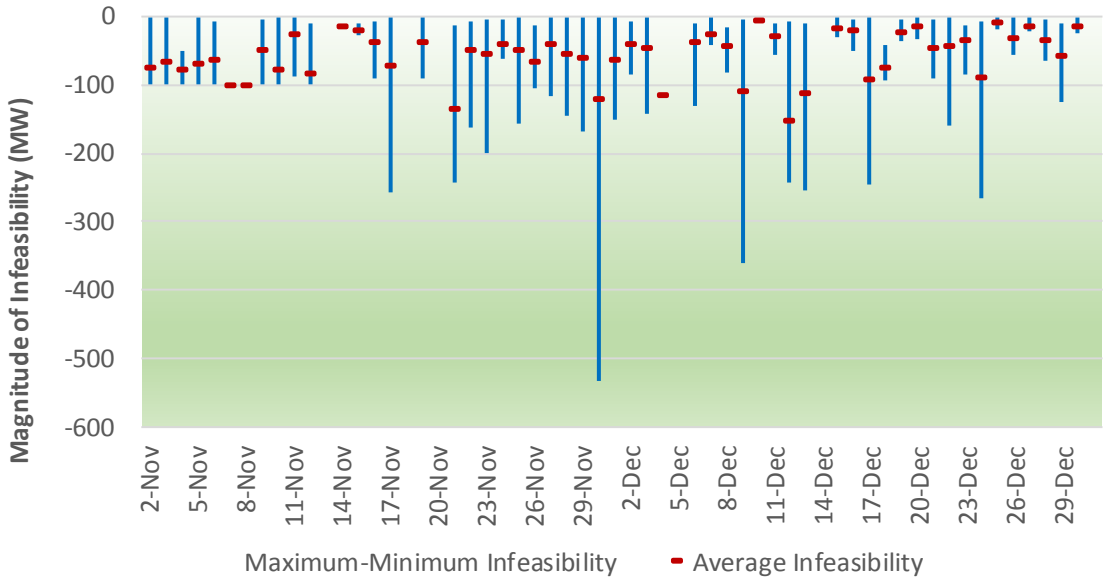


Figure 33: Frequency of oversupply infeasibility PAC East. Five-minute market.

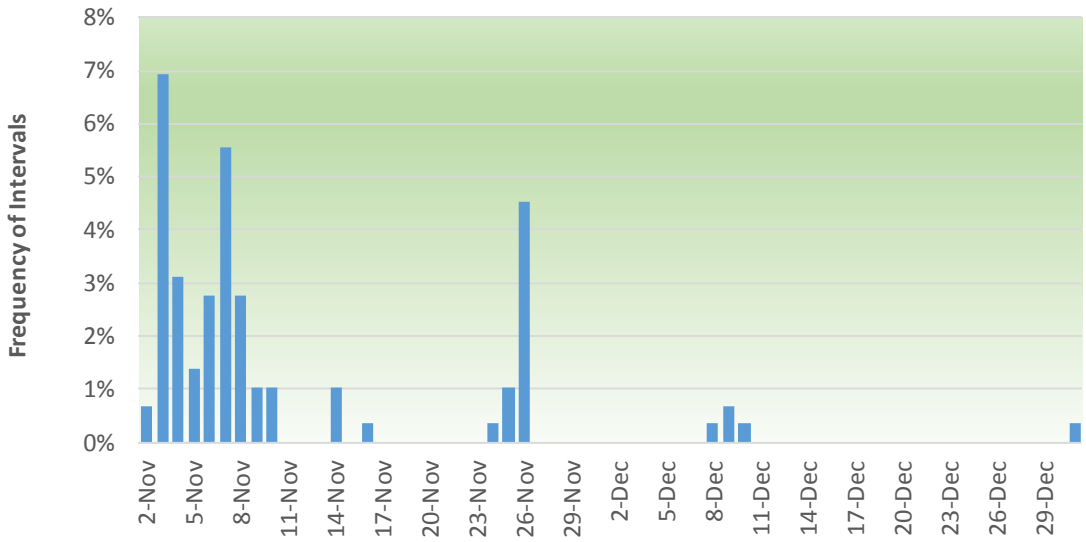
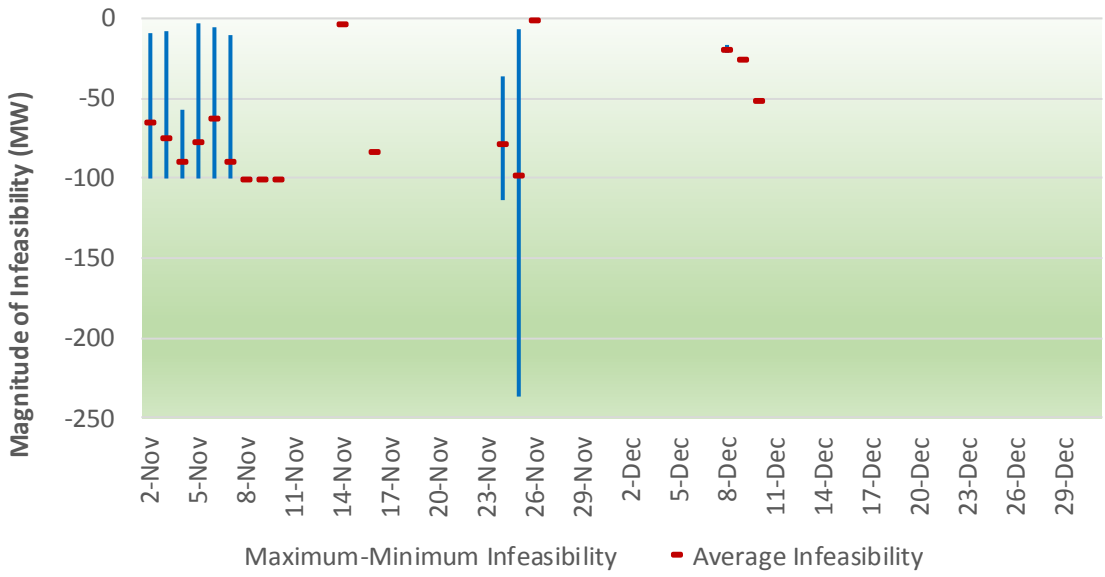


Figure 34: Magnitude of oversupply infeasibility PAC East. Five-minute market.


0
-50
-100
-150
-200
-250
Magnitude of Infeasibility (MW)
2-Nov
5-Nov
8-Nov
11-Nov
14-Nov
17-Nov
20-Nov
23-Nov
26-Nov
29-Nov
2-Dec
5-Dec
8-Dec
11-Dec
14-Dec
17-Dec
20-Dec
23-Dec
26-Dec
29-Dec
Maximum-Minimum Infeasibility
Average Infeasibility

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the captioned proceedings, in accordance with 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 15th day of January, 2015.

/s/ Sarah Garcia

Sarah Garcia