July 8, 2016

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. ER14-1386-000
Energy Imbalance Market – Structural Market Power Informational Report

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its six-month informational status report on the presence of structural market power in PacifiCorp's balancing authority areas due to limits on transmission interties into and between these balancing authority areas under the Energy Imbalance Market (EIM) structure.[1] Consistent with the June 19 order, on July 23, 2014, the CAISO filed to amend its tariff to apply market power mitigation provisions to EIM transfer constraints into EIM balancing authority areas. The Commission approved the CAISO's July 23 tariff amendment agreeing "with CAISO and the Department of Market Monitoring's arguments that applying real-time local market power mitigation procedures on scheduling constraints limiting transfers of energy into and between PacifiCorp's balancing authority areas would be appropriate."

[1] *See California Indep. Sys. Operator Corp.*, 147 FERC ¶ 61,231 at P 216 (2014)(June 19 Order).

Please contact the undersigned with any questions.

Respectfully submitted

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

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California Independent
System Operator Corporation

California ISO

Report on Structural Competiveness of Energy Imbalance Market

July 7, 2016

Department of Market Monitoring

Summary

In its June 19, 2014 Order, the Commission directed the CAISO to provide the Commission with informational status reports every six months for two years following the launch of the EIM on the presence of structural market power in PacifiCorp's Balancing Authority Areas (BAAs) due to limits on transmission interties into and between these areas. The Commission indicated it will use the information in these reports to determine if any action is necessary to address structural market power in PacifiCorp's BAAs under the EIM structure. This report provides an update on structural market competitiveness in the PacifiCorp BAAs through the first 18 months of EIM implementation ending in May 2016.

In December 2015, the EIM was expanded to include NV Energy. Since PacifiCorp and NV Energy are both subsidiaries of Berkshire Hathaway, PacifiCorp and NV Energy are considered as a single entity under the tests for structural market power incorporated in the ISO's market power mitigation procedures. Thus, the additional supply added by the expansion of the EIM to NV Energy does not make the PacifiCorp areas more structurally competitive. As indicated in this report, participation by other non-Berkshire Hathaway entities in the EIM remains very limited.

However, the frequency of potential structural market power in the PacifiCorp BAAs has been dramatically reduced by the additional transfer capacity between the EIM areas and the ISO added with the entry of NV Energy. This new transfer capacity links both PacifiCorp areas to the ISO through the NVE balancing area. This additional transfer capacity has made the entire EIM structurally competitive during most intervals. With the addition of this additional transfer capacity, congestion between the ISO and the various EIM areas has dropped significantly and real-time prices have become more uniform between most ISO and EIM areas. This structural competiveness mitigates the potential for the exercise of market power through both economic and physical withholding during most intervals.

During the limited number of intervals when competitive supply from ISO into the EIM is constrained by congestion on EIM transfer constraints, the ISO's automated real-time market power mitigation procedures are designed to mitigate the potential exercise of market power. The Department of Market Monitoring (DMM) has recommended that the ISO implement enhancements to these procedures to ensure these procedures are triggered in the real-time market when congestion occurred on structurally uncompetitive constraints.[1] The ISO has indicated it will seek to implement these enhancements in the 15-minute market in 2016 and has filed for approval to implement enhancements in the 5-minute market in 2017.

[1] *Comments on Proposed Local Market Power Mitigation Enhancements*, Department of Market Monitoring, June 21, 2016, filed with *Tariff Amendments to Enhance Local Market Power Mitigation Procedures*, California Independent System Operator, June 21, 2016, http://www.caiso.com/Documents/Jun21_2016_TariffAmendment-LocalMarketPowerMitigationEnhancements_ER16-1983.pdf

1 Background

In its June 19, 2014 Order the Commission declined to require that real-time local market power mitigation procedures on transfer constraints between the ISO and EIM areas at EIM start-up, as requested by some intervenors. As explained in the June 19 Order, this decision was based on two factors:

> First, CAISO has not proposed, and we are not persuaded, that market power mitigation on EIM interties is warranted on EIM start-up. Second, PacifiCorp currently has market-based rate authority, which includes authorization to sell energy and ancillary services at market-based rates within its two BAAs.[2] Therefore, implementing real-time local market power mitigation on EIM interties for PacifiCorp's BAAs at EIM start-up could result in unnecessary mitigation.

To help identify any potential for exercise of market power following implementation of EIM, the Commission also took the following two steps. As explained in the June 19 Order:

> First, in the order issued contemporaneously with this order in Docket No. ER14-1578-000, we are directing PacifiCorp to make a market-based rate change of status filing within nine months of the launch of the EIM so that the Commission can assess whether PacifiCorp has structural market power in its BAAs under the EIM structure. Second, in order that the Commission may monitor for the existence of market power at the interties during the pendency of PacifiCorp making a change of status filing and the Commission's review of that filing, we direct CAISO to provide the Commission with informational status reports every six months for two years following the launch of the EIM on the presence of structural market power in PacifiCorp's BAAs due to limits on transmission interties into and between these BAAs under the EIM structure. The Commission will use the information in these reports to determine if any action is necessary to address structural market power in PacifiCorp's BAAs under the EIM structure.

In addition, the June 19 Order went on to add that:

> … CAISO may file with the Commission to implement real-time local market power mitigation on EIM interties if it believes, and can demonstrate, that such mitigation is warranted after the Department of Market Monitoring [DMM] completes its assessment of structural market power in PacifiCorp's BAAs. In that regard, CAISO may propose additional tariff detail regarding its proposed structural market power analysis and how decisions regarding activation/deactivation of market power mitigation on EIM interties will be made. The Commission will evaluate the extent to which the rules regarding real-time local market power mitigation on EIM interties are objective and clearly set forth in the tariff and, based on that, decide whether future determinations regarding market power mitigation on EIM interties should be filed with the Commission.

Based on DMM's initial assessment of structural market power in the PacifiCorp areas, DMM recommended that the ISO file to apply local market mitigation procedures when congestion occurred on transfer constraints into these areas. Pursuant to the June 19 Order, the ISO filed to amend its tariff to apply market power mitigation provisions to EIM transfer constraints into EIM balancing areas on July

[2] *See PacifiCorp*, Docket No. ER97-2801-030, *et al*., (June 29, 2011) (unpublished letter order accepting updated market power analysis and notice of change in status).

23, 2014. In support of this filing, the DMM provided a report on structural competiveness of PacifiCorp's BAAs.[3] In an order on September 22, 2014, the Commission "[agreed] with CAISO and the Department of Market Monitoring's arguments that applying real-time local market power mitigation procedures on scheduling constraints limiting transfers of energy into and between PacifiCorp's balancing authority areas would be appropriate," and approved the proposed tariff revisions.[4]

Pursuant to the June 19 Order, DMM has submitted two informational status reports on structural market power in the PacifiCorp BAAs due to limits on EIM transfer constraints covering the first 6 and 12 months of EIM implementation.[5] This report provides an update on structural market competitiveness in the PacifiCorp BAAs through the first 18 months of EIM implementation ending in May 2016. As noted in the Commission's June 19 Order, the Commission may use the information in this report to determine if any action is necessary to address structural market power in PacifiCorp's BAAs under the EIM structure.

[3] *Assessment of Potential Market Power in Energy Imbalance Market*, ISO Department of Market Monitoring, Updated June 30. 2014. http://www.caiso.com/Documents/Jul23_2014_TariffAmendment_EnergyImbalanceMarketEnhancements_ER14-2484.pdf

[4] September 22, 2014 Order, page 6 ¶13

[5] *Report on Energy Imbalance Market Competiveness*, Department of Market Monitoring , May 29, 2015, http://www.caiso.com/Documents/May29_2015_InformationalReport_StructuralMarketPower_EnergyImbalanceMarket_ER14-1386.pdf

Report on Energy Imbalance Market Competiveness, Department of Market Monitoring , January 6, 2016, http://www.caiso.com/Documents/Jan62016EnergyImbalanceMarket-StructuralMarketPowerInformationalReportER14-1386.pdf

2 Potential structural market power

As indicated in DMM's June 2014 report on the potential structural competiveness of the PacifiCorp BAAs, the potential for structural market power in the two PacifiCorp EIM balancing authority areas depends on a number of factors. Three main factors examined in DMM's June 2014 report include the following:

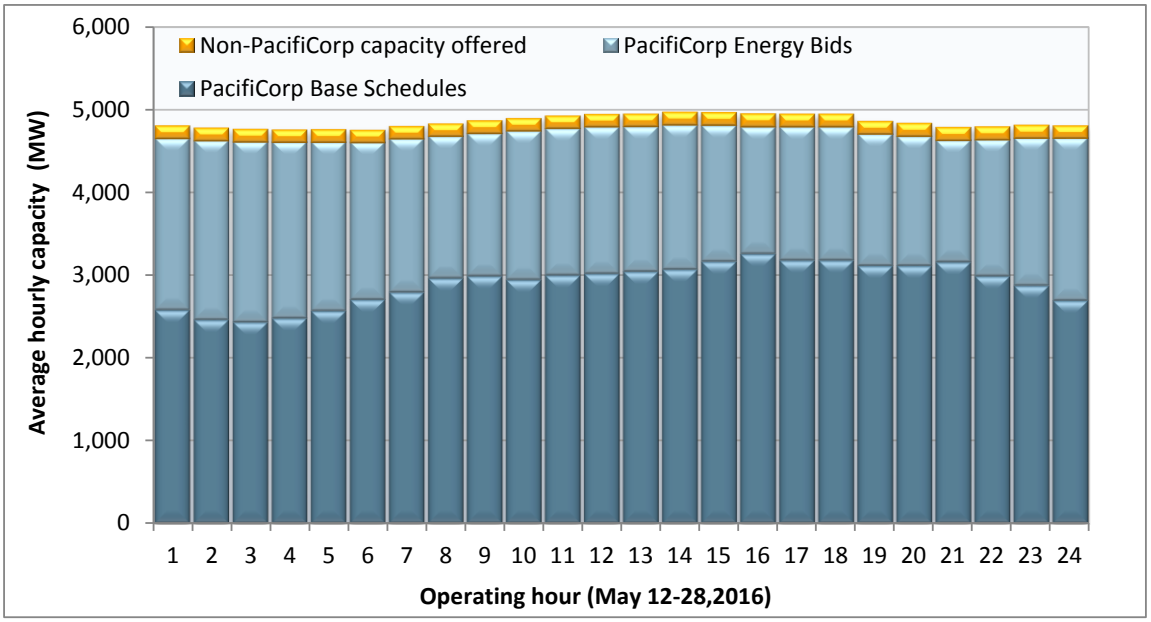
- The amount and ownership of generation participating in EIM.
- Net demand for imbalance energy from other load serving entities and intermittent resources.
- Scheduling constraints between EIM balancing authority areas and the ISO.

Amount and ownership of supply

At this time, almost all capacity bid into the PacifiCorp balancing areas continues to be owned or controlled by PacifiCorp. In 2016, about 175 MW of gas-fired capacity located in PacifiCorp East that is controlled by a non-PacifiCorp entity registered to participate and began submitting energy bids into the EIM. This entity began offering energy for some of these resources in April 2016. Capacity from all non-Pacificorp resources was offered most hours from May 12 to May 29, 2016. Since May 29, capacity from these resources offered in the EIM declined.

Figure 1 shows bids from the May 12 to May 29, when capacity offered was highest. During this period, these resources accounted for about 9 percent of the energy bids (above base schedule) and about 3 percent of the total capacity scheduled or bid into the EIM in PacifiCorp East.

Figure 1. Average hourly supply schedules and bids (Pacificorp East – May 12-29, 2016)



From the perspective of structural market power, the additional supply created by the entry of NV Energy did not directly increase the degree to which supply in the EIM is controlled by different entities. This is because NV Energy and PacifiCorp are both controlled by a single entity (Berkshire Hathaway). However, as discussed later in this report, the entry of NV Energy significantly increased the structural competitiveness of the EIM by significantly increasing the potential for transfers of competitive supply from the ISO into the PacifiCorp areas.

Non-PacifiCorp demand for imbalance energy

The incentive to exercise structural market power in the PacifiCorp balancing authority area may also be limited if the net demand for imbalance energy from other load serving entities and intermittent resources is relatively small. For this report, DMM obtained additional data from the PacifiCorp settlement system on the net demand for imbalance energy from non-PacifiCorp entities which rely on the EIM for balancing energy.

Figures 2 and 3 show the net hourly demand for imbalance energy during 2015 (sorted in descending order of the volume of hourly demand) from non-PacifiCorp entities in PacifiCorp West and Pacificorp East, respectively. As shown in these figures, during 2015 the demand for imbalance energy by non-PacifiCorp entities for balancing energy generally negative -- indicating that non-PacifiCorp loads and resources had a net positive deviation for which they were paid at the EIM LMP.

As shown in Figure 2, the net non-PacifiCorp demand for was imbalance energy positive during only about 5 percent of hours in PacifiCorp West, with a maximum demand of only about 70 MW.

As shown in Figure 3, net non-PacifiCorp demand in PacifiCorp East was positive during only about 20 percent of hours. The maximum demand was about 200 MW, but exceeded 50 MW during only about 5 percent of the hours.

As noted in the next section, these data indicate the net non-PacifiCorp demand for imbalance energy in both PacifiCorp areas is quite low compared to the volume of competitive supply from the CAISO that was available in 2015.

Figure 2. Net demand for imbalance energy by non-Pacificorp entities (Pacificorp West, 2015)

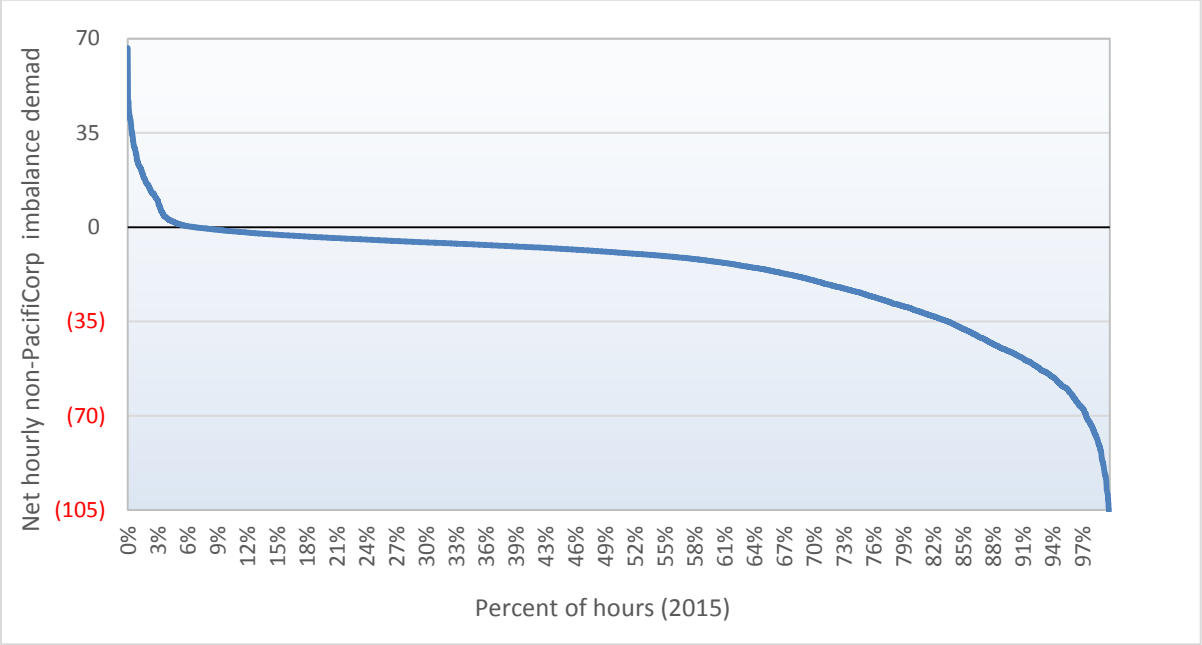
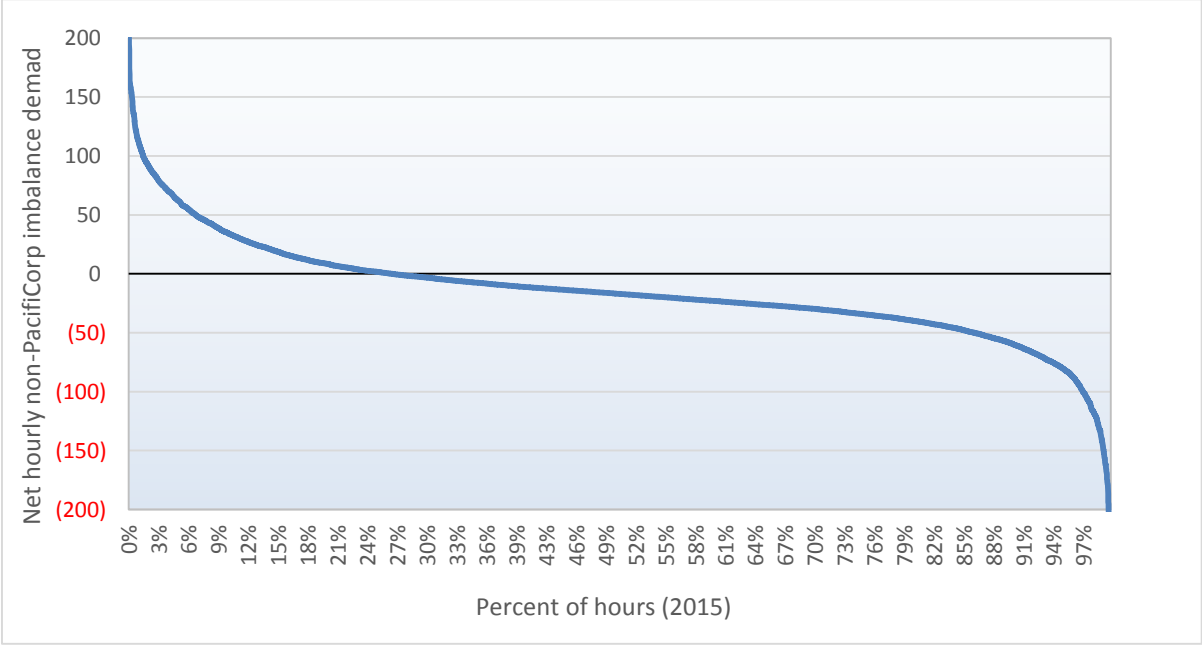


Figure 3. Net demand for imbalance energy by non-Pacificorp entities (Pacificorp East, 2015)



EIM scheduling constraints

The ability and incentive for any entity to exercise market power within the two PacifiCorp BAAs can be limited by competition from transfers from the ISO or other EIM BAAs. In prior reports on EIM performance during the first 12 months of implementation, DMM has shown that scheduling constraints into the PacifiCorp areas have been binding a relatively high percentage of intervals in both the 15-minute and 5-minute markets.[6]

The addition of NV Energy to the EIM in December 2015 has significantly changed the energy imbalance market dynamics. NV Energy added an average of about 860 MW of transfer capacity from the ISO into NV Energy and an average of about 450 MW from NV Energy directly into PacifiCorp East (see Figure 4). Prior to NV Energy joining the EIM, the ISO had no ability to directly transfer power to PacifiCorp East and limited 5-minute transfer capability with PacifiCorp West. As a result, transfer congestion was common between the EIM balancing areas.

With the addition of NV Energy, congestion has rarely occurred between the ISO and the PacifiCorp and NV Energy areas. These trends are illustrated in the following figures:

- Figure 5 show the average final transfers and approximate total transfer capacity between each of the balancing areas in the EIM. The percentages in Figure 5 show the portion of intervals that the transfer between areas was in each direction.
- Figures 6 and 7 show the percentage of intervals in the 15-minute and 5-minute markets during which congestion occurred between each balancing area in the EIM. These figures also show the average transfer (MW) between each area when congestion occurred.

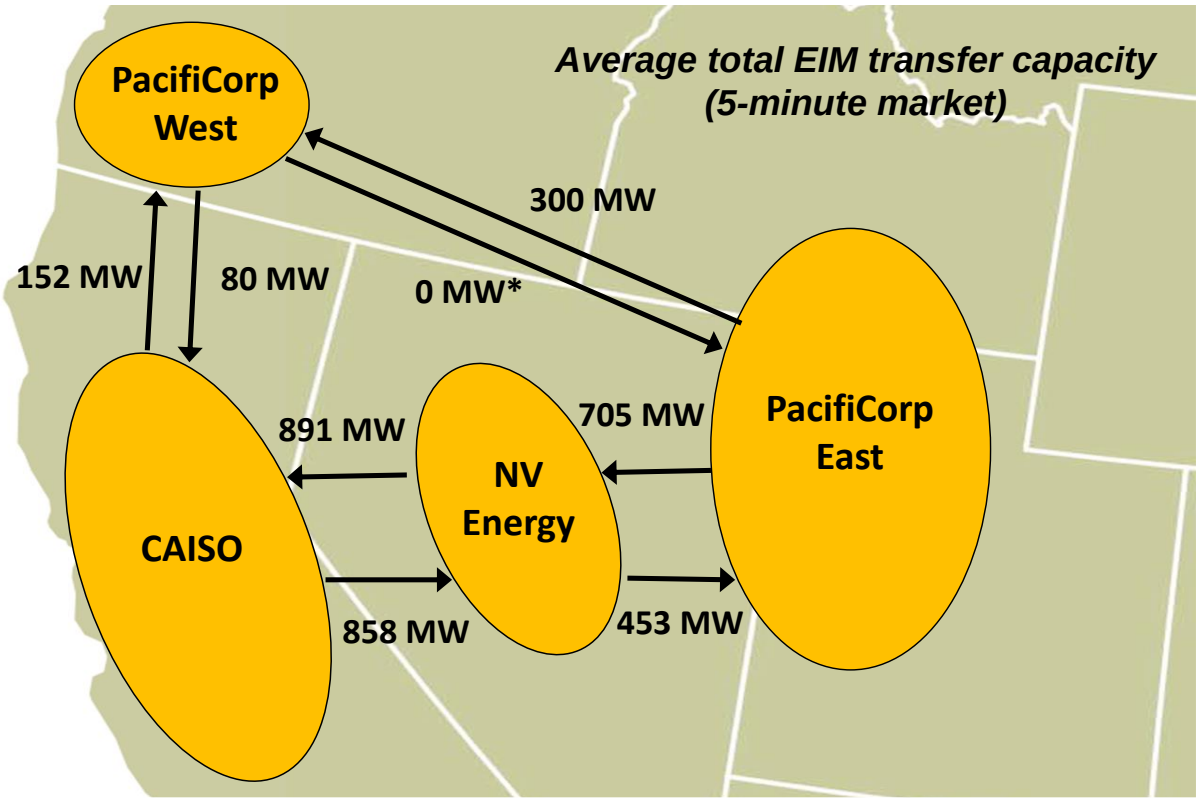
As shown in Figures 6 and 7, the frequency of congestion between EIM areas has been very low (generally less than 3 percent) since the addition of NVE and additional transfer capacity in December 2015. In addition, when congestion does occur, the amount of transfers into each EIM area is also much greater than the net non-PacifiCorp demand for imbalance energy in both PacifiCorp areas (see Figures 2 and 3).

As shown in Figures 5 and 6, with the addition of NV Energy to the EIM, significant transfers can occur from the ISO to each EIM area through either of two loops. The counter clockwise loop from the ISO goes from the ISO's southern area (SP15) through NV Energy to PacifiCorp East and then to PacifiCorp West. The clockwise loop from the ISO goes from the ISO's northern area (NP15) through PacifiCorp West to PacifiCorp East and then to NVE Energy.[7]

[6] F *Report on Energy Imbalance Market Competiveness*, Department of Market Monitoring , January 6, 2016, p.9 http://www.caiso.com/Documents/Jan62016EnergyImbalanceMarket-StructuralMarketPowerInformationalReportER14-1386.pdf

[7] Although there is no transfer capacity from PacifiCorp West to PacifiCorp East in the base EIM model, transfers can occur in the West to East direction in the EIM whenever base EIM schedules in the two PacifiCorp areas creates an base flow from PacifiCorp East to PacifiCorp West. For example, if base EIM schedules creates a 100 MW base flow from PacifiCorp East to PacifiCorp West, then there is effectively 100 MW of transfer capacity in the EIM in PacifiCorp West to PacifiCorp East. This frequently occurs since PacifiCorp East tends to be a lower cost area than PacifiCorp West. In addition, even if base schedules do not create base flow from PacifiCorp East to PacifiCorp West, congestion in the EIM only occurs into PacifiCorp East from PacifiCorp West when EIM prices in PacifiCorp East are higher than EIM prices in PacifiCorp West.

Figure 4. Total average transfer capacity between EIM balancing areas (January – May 2016)



* Although there is no transfer capacity from PacifiCorp West to PacifiCorp East in the base EIM model, transfers can occur in the West to East direction in the EIM whenever base EIM schedules in the two PacifiCorp areas creates a base flow from PacifiCorp East to PacifiCorp West. For example, if base EIM schedules create a 100 MW base flow from PacifiCorp East into PacifiCorp West, then there is effectively 100 MW of transfer capacity in the EIM in PacifiCorp West to PacifiCorp East. This frequently occurs since PacifiCorp East tends to be a lower cost area than PacifiCorp West. In addition, even if base schedules do not create base flow from PacifiCorp East to PacifiCorp West, congestion in the EIM only occurs into PacifiCorp East from PacifiCorp West when EIM prices in PacifiCorp East are higher than EIM prices in PacifiCorp West.

Figure 5. Final net EIM transfers between balancing areas (January – May 2016)

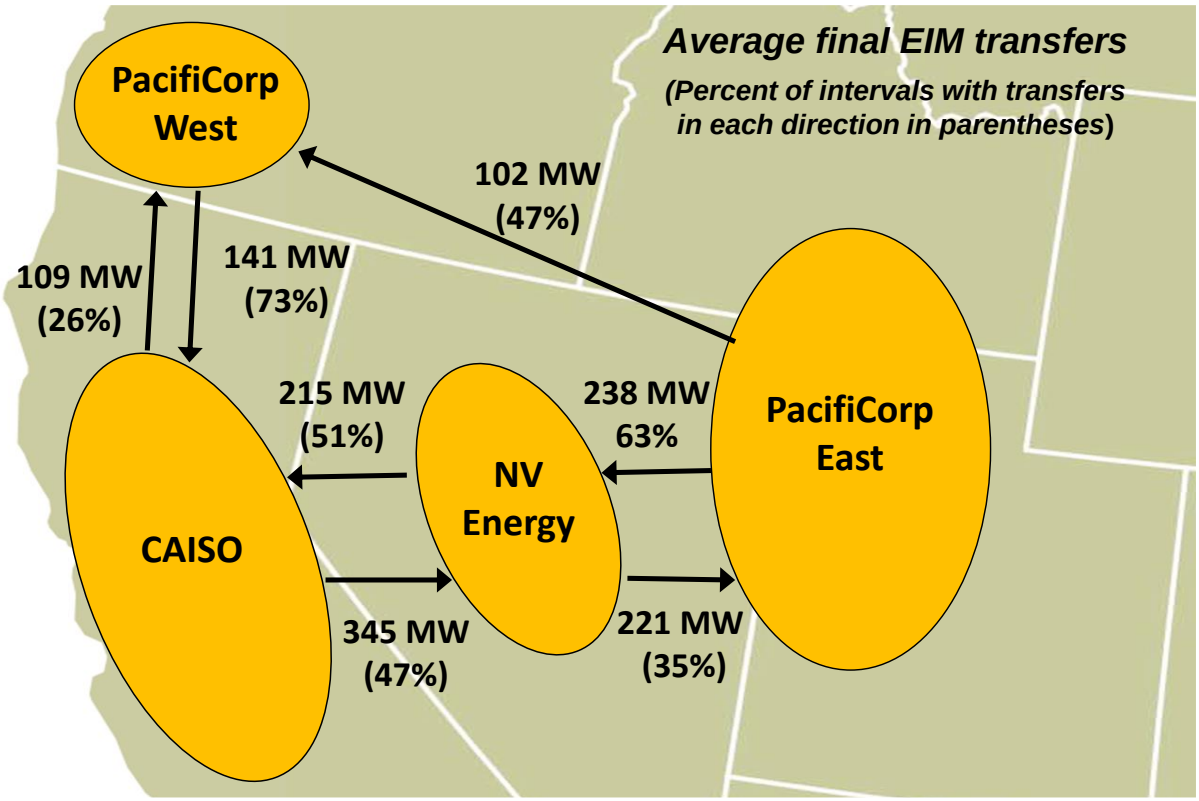


Figure 6. Frequency of congestion - 15-minute market (January – May 2016)

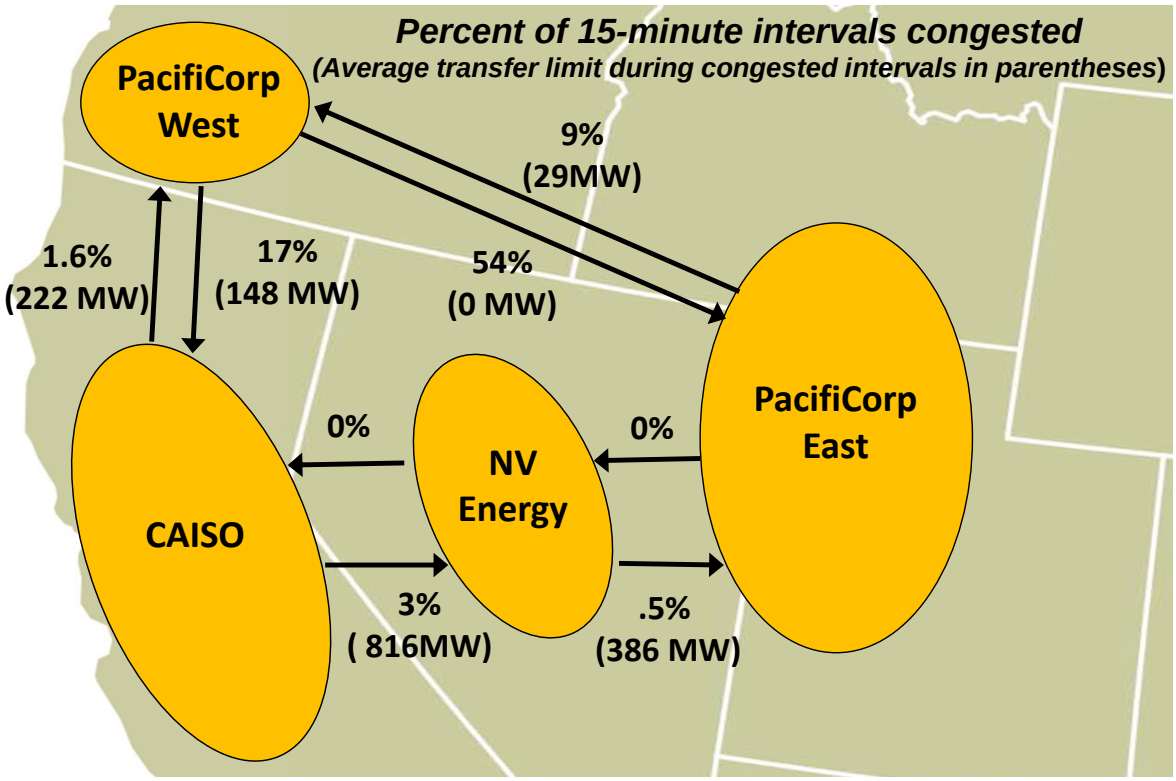
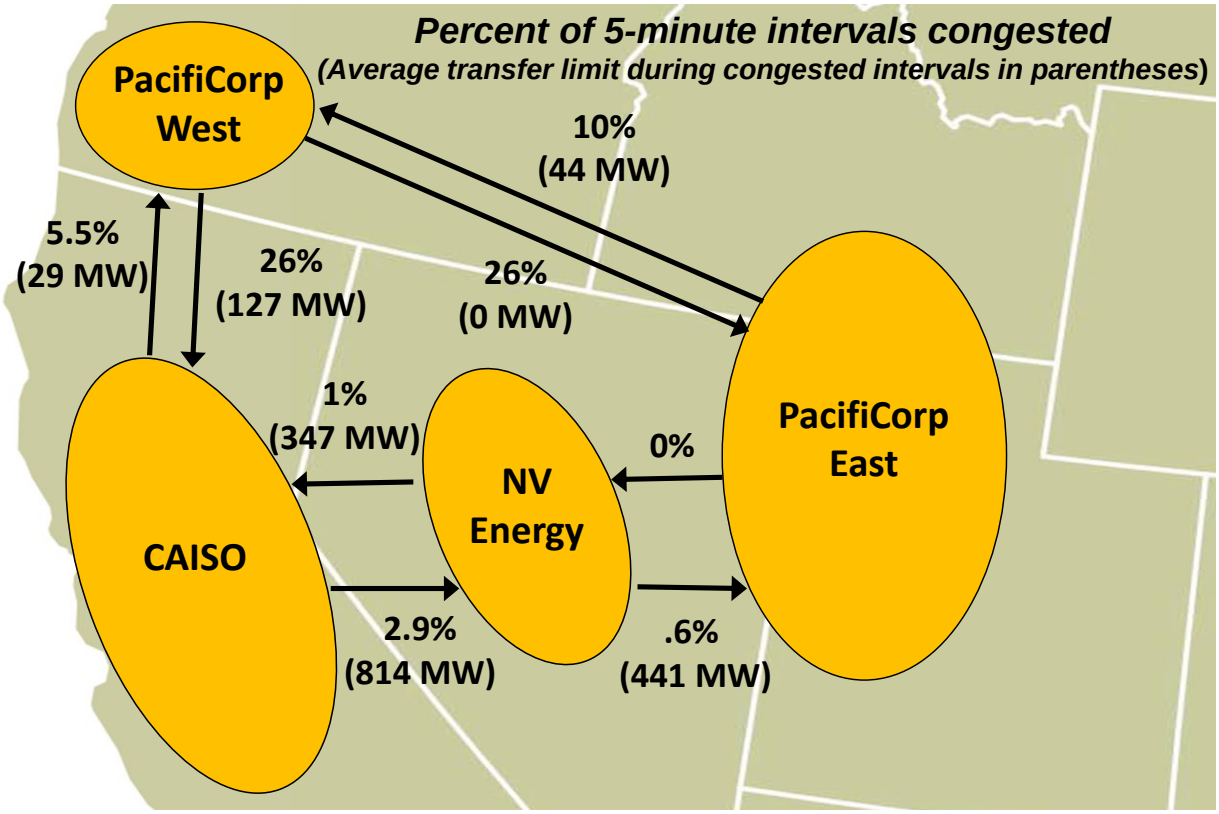


Figure 7. Frequency of congestion - 5-minute market (January – May 2016)



From the perspective of structural market power, the impact of congestion between the ISO and different EIM areas depends on the pattern of congestion and the configuration of EIM transmission. Even though almost all supply in the three EIM areas are considered to be controlled by a single entity (Berkshire Hathaway), these areas can be structurally competitive due to the availability of significant transfers of competitive supply from the ISO in the EIM.

Given the current configuration of EIM transfer constraints, congestion must occur on at least two different EIM transfer constraints in order to limit the transfer of competitive supply from the ISO to any of the current EIM areas. For example, if the only congested EIM transfer constraint is from the ISO into Pacificorp West, then competitive supply from the ISO can be transferred to all three EIM areas in a counterclockwise loop. Similarly, if the only congested EIM transfer constraint is from the ISO into NVE, then competitive supply from the ISO can be transferred to all three EIM areas in a clockwise loop. Under these scenarios, prices throughout all EIM areas and the ISO are based on a single system wide competitive price.[8]

If congestion occurs on two or more different EIM transfer constraints, then the EIM areas into which transfers of competitive supply from the ISO may be limited by congestion depends on the specific transfer constraints that are congested. Provided below are the various scenarios under which the competitive supply from the ISO is limited into EIM areas under the current EIM configuration:

- If transfers are constrained from the ISO into Pacificorp West and from the ISO into NV Energy, then the competitive supply from the ISO is limited into all three EIM areas.
- If transfers are constrained from the ISO into Pacificorp West and from NV Energy into PacifiCorp East, then the competitive supply from the ISO is limited into both PacifiCorp areas (but not NV Energy).
- If transfers are constrained from the ISO into NV Energy and from Pacificorp West into PacifiCorp East, then the competitive supply from the ISO is limited into PacifiCorp East and NV Energy.
- If transfers are constrained only from the NV Energy into PacifiCorp East and from Pacificorp West into PacifiCorp East, then the competitive supply from the ISO is limited only into PacifiCorp East.
- If transfers are constrained only from the ISO into Pacificorp West and from PacifiCorp East into Pacificorp West, then the competitive supply from the ISO is limited only into PacifiCorp West.
- If transfers are constrained from the ISO into NV Energy and from PacifiCorp East in NV Energy, then the competitive supply from the ISO is limited only into NV Energy.

Table 1 shows the percentage of intervals in the 15-minute and 5-minute markets that competitive supply from the ISO was constrained by congestion in each of the three EIM areas.[9] Table 1 also summarizes the percentage of intervals that each EIM area is a net exporter or net importer and the average volume of net imports and exports during these intervals.

[8] Differences in total LMPs in each area can still result due to congestion on competitive constraints within each area, as well as due to the impact of the greenhouse gas constraint when this constraint is binding and has a shadow price.

[9] In practice, DMM identifies intervals in which the supply from the ISO into each EIM area is constrained by comparing ISO and EIM area prices based on the sum of the congestion components for EIM transfer constraints. If the sum of these congestion components for an EIM area is lower than the sum of these components for ISO prices, this indicates that congestion on an EIM transfer constraint is limiting supply from the ISO into the EIM area.

As shown in Table 1, PacifiCorp East and PacifiCorp West were both net importers about two-thirds of intervals. Supply from the ISO into PacifiCorp East (and NV Energy) was limited by congestion during only about 3 percent of intervals. In PacifiCorp West, supply from the ISO was limited by congestion only about 1.6 percent of 15-minute intervals and only 5.5 percent of 5-minute intervals.

Table 1. Summary of EIM transfers and congestion (January – May 2016)

	Net exporter		Net importer		Import congestion from ISO*	
EIM area	Frequency	Average MW	Frequency	Average MW	15-minute	5-minute
CAISO	38%	403	61%	292		
NV Energy	33%	141	67%	259	3.0%	2.9%
PacifiCorp East	69%	276	31%	214	3.0%	3.1%
PacificCorp West	62%	127	38%	133	1.6%	5.5%

* Intervals when supply from ISO was limited due to congestion on EIM transfer constraints.

3 Conclusions

The degree of potential structural market power in the PacifiCorp BAAs has been dramatically reduced by the additional transfer capacity between the EIM areas and the ISO resulting from the entry of NV Energy to the EIM in December 2015. This new transfer capacity links both PacifiCorp areas to the ISO through the NVE balancing area. This additional transfer capacity has made the entire EIM structurally competitive during most intervals. With the new transfer capacity, congestion between the ISO and the various EIM areas has dropped significantly and real-time prices have become more uniform between most ISO and EIM areas. This structural competiveness also mitigates the potential for the exercise of market power through both economic and physical withholding during most intervals.

During the limited number of intervals when competitive supply from ISO into the EIM is constrained by congestion on EIM transfer constraints, the ISO's automated real-time market power mitigation procedures are designed to mitigate the potential exercise of market power. DMM has recommended that the ISO implement enhancements to these procedures to ensure these procedures are triggered in the real-time market when congestion occurred on structurally uncompetitive constraints.[10] The ISO has indicated it will seek to implement these enhancements in the 15-minute market in 2016 and has filed for approval to implement enhancements in the 5-minute market in 2017.

[10] *Comments on Proposed Local Market Power Mitigation Enhancements*, Department of Market Monitoring, June 21, 2016, filed with *Tariff Amendments to Enhance Local Market Power Mitigation Procedures*, California Independent System Operator, June 21, 2016, http://www.caiso.com/Documents/Jun21_2016_TariffAmendment-LocalMarketPowerMitigationEnhancements_ER16-1983.pdf

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 8th day of July, 2016.

/s/ Grace Clark

Grace Clark