

March 29, 2017

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

**Re: California Independent System Operator Corporation  
Docket Nos. ER15-2281-\_\_\_\_\_, ER15-2282-\_\_\_\_\_, and  
ER15-2283-\_\_\_\_\_**

**Energy Imbalance Market Enforcement of Transmission  
Constraints – PacifiCorp  
Informational Filing and Request for Privileged Treatment**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its informational report on the Energy Imbalance Market (EIM) enforcement of transmission constraint for PacifiCorp, pursuant to an order issued by the Commission on November 19, 2015.<sup>1</sup> The Commission noted in its order that if “the enforcement of internal transmission constraints presents reliability or other operational concerns,” the Commission expects the CAISO and PacifiCorp to inform the Commission of the problems, any solutions, and implications for the EIM.

The CAISO is seeking privileged treatment of Attachment A pursuant to 18 C.F.R. § 385.112 and the Freedom of Information Act, 5 U.S.C. 552. Attachment A contains information related to the full network model. Furthermore, the enforcement of transmission constraints should be treated as sensitive information and protected as Critical Energy Infrastructure because it provides details regarding the transmission of energy and the vulnerabilities of the system, and should be withheld from public disclosure.

---

<sup>1</sup> *California Ind. Sys. Operator Corp.*, 153 FERC ¶ 61,206 (2015).

Honorable Kimberly D. Bose  
March 29, 2017  
Page 2

Please contact the undersigned with any questions regarding the foregoing.

Respectfully submitted,

**By: /s/ Anna A. McKenna**

Roger E. Collanton

General Counsel

Anna A. McKenna

Assistant General Counsel

California Independent System

Operator Corporation

250 Outcropping Way

Folsom, CA 95630

Tel: (916) 608-7182

Fax: (916) 608-7222

[amckenna@caiso.com](mailto:amckenna@caiso.com)



# California ISO

## **Energy Imbalance Market Enforcement of Transmission Constraints**

**PacifiCorp**

March 29, 2017

## I. Introduction and Background

On November 19, 2015, the Federal Energy Regulatory Commission (Commission) issued an order, accepting in part, subject to condition, and rejecting in part, Nevada Power Company's and Sierra Pacific Power Company's (collectively, "NV Energy"), and PacifiCorp's (together with NV Energy, "Berkshire EIM Sellers") market-based rate tariff revisions that reflect their participation in the Energy Imbalance Market (EIM) administered by the California Independent System Operator Corporation (CAISO).<sup>1</sup> The Commission allowed the Berkshire EIM Sellers to participate in the EIM at market-based rates on the condition that, (1) the Berkshire EIM Sellers offer their units that are participating in the EIM into the EIM at or below each unit's Default Energy Bid, and (2) the Berkshire EIM Sellers facilitate the CAISO's enforcement of all internal transmission constraints in the PacifiCorp and NV Energy balancing authority areas.

The Commission accepted the market-based rate tariffs, subject to condition, to become effective on the day that NV Energy began participation in the EIM. NV Energy began participating in the EIM December 1, 2015, pursuant to the conditions in the November 19 Order.

The Commission required that the Berkshire EIM Sellers facilitate the CAISO's enforcement of all internal transmission constraints in the PacifiCorp and NV Energy balancing authority areas. The Commission also noted that if "the enforcement of internal transmission constraints presents reliability or other operational concerns," the Commission expects that the CAISO, PacifiCorp, and NV Energy would inform the Commission of the problems, any solutions, and implications for the EIM.

## II. Principles for Enforcing Transmission Constraints

PacifiCorp facilitates the enforcement of all transmission constraints in its two balancing authority areas, PacifiCorp East (sometimes referred to as "PACE") and PacifiCorp West (sometimes referred to as "PACW"), consistent with the same principles the CAISO applies in enforcing transmission constraints within its own balancing authority area. These principles are reflected in Section 27.5.6 of the CAISO tariff. While the responsibility of which transmission constraints are enforced in the EIM remain with the EIM Entity in its role as a

---

<sup>1</sup> *California Ind. Sys. Operator Corp.*, 153 FERC ¶ 61,206 (2015) (November 19 Order).

balancing authority area,<sup>2</sup> PacifiCorp has generally adopted the principles in Section 27.5.6 of the CAISO tariff to manage the enforcement of transmission constraints within its balancing authority areas, as further explained in the “Informational Report” section below.

Section 27.5.6 of the CAISO tariff generally requires that the CAISO manage the enforcement of transmission constraints consistent with good utility practice, to ensure, to the extent possible, that the market model used in each market accurately reflects all the factors that contribute to actual real-time flows on the controlled grid. This is necessary to ensure that the market clearing results are better aligned with actual physical conditions on the controlled grid. CAISO tariff Section 27.5.6 further specifies the conditions under which the CAISO may enforce, not enforce, or adjust a transmission constraint in operating the markets consistent with this overall policy. PacifiCorp has adopted the following specific principles from Section 27.5.6 of the CAISO tariff with regards to how it operates as a balancing authority:<sup>3</sup>

(a) The CAISO may enforce, not enforce, or adjust flow-based Transmission Constraints, including Nomograms and Contingencies, if the CAISO observes that the CAISO Markets produce or may produce results that are inconsistent with observed or reasonably anticipated conditions or infeasible market solutions either because (a) the CAISO reasonably anticipates that the CAISO Market run will identify Congestion that is unlikely to materialize in Real-Time even if the Transmission Constraint were to be ignored in all the markets leading to Real-Time, or (b) the CAISO reasonably anticipates that the CAISO Market will fail to identify Congestion that is likely to appear in the Real-Time. The CAISO does not make such adjustments to intertie Scheduling Limits.

....

(c) The CAISO may not enforce Transmission Constraints, including Nomograms and Contingencies, if it has determined it lacks sufficient visibility to conditions on transmission facilities

---

<sup>2</sup> Pursuant to Section 29.4(a)(1), 29.4(a)(3)(D)-(E), and Section 29.4(b)(1)(B) of the CAISO tariff, each EIM Entity remains individually responsible for reliability of the transmission system they control. The CAISO systems are prepared to enforce any modeled constraints.

<sup>3</sup> See Section 27.5.6 of the CAISO tariff.

necessary to reliably ascertain constraint flows required for a feasible, accurate and reliable market solution.

(d) For the duration of a planned or unplanned Outage, the CAISO may create and apply alternative Transmission Constraints, including Nomograms and Contingencies that may add to or replace certain originally defined constraints.

(e) The CAISO may adjust Transmission Constraints, including Nomograms and Contingencies, for the purpose of setting prudent operating margins consistent with good utility practice to ensure reliable operation under anticipated conditions of unpredictable and uncontrollable flow volatility consistent with the requirements of Section 7.

In order to provide as much clarity and transparency as possible for PacifiCorp's transmission customers, PacifiCorp is adding to its EIM business practice: (1) the principles from the CAISO tariff Section 27.5.6 that apply to PacifiCorp's operations and practices as a balancing authority; and (2) the classifications of reasons for not enforcing transmission constraints. The EIM business practice revisions are currently undergoing internal review and are expected to be published mid-April 2017, for stakeholder comment for 10 business days. PacifiCorp expects to publish the effective version of the revised EIM business practice by the end of April 2017.

### **III. Informational Report**

Pursuant to the November 19 Order, the CAISO and PacifiCorp have been coordinating on the enforcement of transmission constraints in the PacifiCorp West and PacifiCorp East balancing authority areas. On November 1, 2014, when PacifiCorp became the first EIM participant, there were no transmission constraints enforced initially, as PacifiCorp had not developed standard implementation procedures for the EIM, given that they had no prior experience with operating within the context of the EIM. Gradually, as PacifiCorp gained operational experience and understanding of how the EIM was functioning within its balancing authority areas, PacifiCorp started to enforce the constraints beginning March 2015, and the majority of constraints, subject to the exclusion criteria discussed further below, were enforced by the end of 2015. As of today, PacifiCorp supports enforcement of the constraints for all elements, except for those that meet the exclusion criteria detailed below. Attachment A

provides the current list of all constraints that PacifiCorp has modeled in its system. Attachment A also identifies whether each constraint is currently enforced or not, and for those constraints not enforced, a classification of the reason the constraint is not enforced.<sup>4</sup>

Transmission elements defined in PacifiCorp's network model include, but are not limited to, transmission corridors, 500kV lines, 345kV lines, 230kV lines, 161kV lines, 138kV lines, 115kV lines, 69kV lines, 46kV lines, series capacitors, transformers, and phase shifters. As of the date of this report, PacifiCorp's network model consists of a total of 2,052 transmission elements, 558 of which are active and enforced as transmission constraints, and 1,494 elements which have not been activated. Table 1 provides a breakdown of this data.

**Table 1**

Total active elements:	558
Total not activated:	1494
Total elements:	2052

Table 2 below summarizes the percentage of transmission elements that are not enforced as constraints in the PacifiCorp's balancing authority areas and the categories PacifiCorp applies to determine if the element should be excluded from activation:

---

<sup>4</sup> The CAISO treats information related to the full network model and the enforcement of transmission constraints as sensitive and protected pursuant to a Non-Disclosure Agreement. See Section 6.5.10. Accordingly, the CAISO requests privileged treatment of the information provided in Attachment A pursuant to 18 C.F.R § 388.112 as information that is treated as Critical Energy Infrastructure Information exempt from the disclosure requirements under the Freedom of Information Act, 5 U.S.C. 552, and should be withheld from public disclosure. The information contained in those attachments is Critical Energy Infrastructure Information because it provides details regarding the transmission of energy and vulnerabilities on the system that can be useful to a person in planning an attack on the critical infrastructure.

**Table 2**

<b>Category</b>	<b>Percentage</b>
1. Transmission Lines used for Distribution	34.6%
2. Multiple Line Sections	10.0%
3. Phase Shifter Transformers	0.5%
4. Load-Serving/Step-Up Transformers	5.7%
5. Remedial Action Schemes (RAS)	0.2%
6. Radial Transmission	12.0%
7. Transmission Corridors and Intertie	7.7%
8. External	0.1%
9. Pseudo Transmission Lines	1.8%
10. Under Construction	0.1%

The following are the descriptions of the categories PacifiCorp applies to transmission elements to determine if the element should be excluded from activation as a transmission constraint. PacifiCorp has assigned each of the transmission elements based on the predominant characteristics of the elements, although it should be noted that some elements may have characteristics of more than one identified category:

1. Transmission Lines used for Distribution: Distribution lines serve load off of the transmission system on one or more radial lines. This characteristic ensures that the flows on the line will never exceed the load or that the flows on the line will affect the Bulk Electric System (BES). Generation re-dispatch is the only tool available to the EIM to resolve transmission constraints and would not be an effective tool for this category because the flow on the distribution lines always equals the load. Accordingly, constraint activation is not necessary for this category of elements.
2. Multiple Line Sections: A single transmission line between two substations can be split into multiple line segments by load taps or other transmission equipment. In such cases, PacifiCorp rates the transmission line equal to the most limiting element (e.g., a line conductor, relay, series capacitor/reactor, etc.). The market monitors the flow on the transmission line at the “from” and “to”



substations, which designate the ends of the transmission line, and which are rated according to the most limiting element in the transmission line. Accordingly, activating all line segments of a single transmission line is unnecessary and to do so would impose significant operational burden on the balancing authority because of the additional operational monitoring and balancing actions that would be required in the event the market model needs the limits on all of those line segments to be conformed instead of a single segment.

3. Phase Shifter Transformers: On transmission lines that contain phase shifters, the primary means of controlling flow by the balancing authority is through the use of the phase shifter transformer. The CAISO does not incorporate phase shifter transformers into its market re-dispatch capabilities. Because phase shifter control is unavailable to the market but is an important tool for PacifiCorp, it should not be activated as a constraint. Activating such an element would result in the market attempting to unnecessarily dispatch generation to offload the element, when the phase shifter transformer is the best tool available to PacifiCorp for managing changing system conditions.
4. Load-Serving/Step-Up Transformers: Load-serving transformers are not subjected to constraint enforcement because the flow on these devices will always be equal to the load behind the transformer. As such, the EIM does not have the ability to re-dispatch generation to adjust flow on these transformers. Generator step-up transformers are also not subjected to constraint enforcement as they are limited by the maximum generation limit of the resource associated with the generator step-up transformer. For three-winding transformers consisting of a high, low, and tertiary winding, the tertiary winding element is not subjected to constraint enforcement as it is primarily used for discrete auxiliary load or other transmission equipment and because the high or low winding will be subject to constraint enforcement.
5. Remedial Action Schemes (RAS): Some RAS are not able to be effectively modeled in the contingency analysis of the market model because the RAS is more complex than what current modeling capability can accommodate. In the event that a RAS can be properly modeled in the contingency analysis the limit is activated, however some RAS are prohibitively complex to model and remain inactivated as a market constraint. These lines remain protected by the associated RAS.

6. Radial Transmission: Transmission lines that are radial, either to load, generation, or are external to the EIM (but within PacifiCorp's balancing authority areas) where the market does not control the generation on one side of the constraint, cannot or should not be managed through market dispatch. These constraints should not be activated to avoid attempts by the market to correct external constraints that are not part of the EIM.
7. Transmission Corridors and Intertie: These are the elements which are typically operated through a combination of total transmission capability limits or scheduling limits. The base schedules submitted to the market take into account these limits and are therefore not subjected to constraint enforcement.
8. External: These are the line elements that are external to PacifiCorp's balancing authority areas and should not have the constraints enforced.
9. Pseudo Transmission Lines: These are lines which are modeled purely for network model reasons and are not physically present in the balancing authority areas. Examples of these elements include a shunt reactor or series reactor where it is not possible to have real-time flow measurements. These elements should not be activated because the measurement of the device is going to be the same as the line conductor where the device is attached.
10. Under construction: These elements are not operational yet.

In addition to constraints related to physical transmission elements, within the PacifiCorp system there are conditions where the most limiting constraint is not physical but contractual. These scenarios exist primarily within PacifiCorp West and are the result of multiple pseudo-tied loads and resources. PacifiCorp has defined and enforced some of these constraints in the CAISO market model and is working with the CAISO to consider enforcement of additional contractual limitations.

#### **IV. Conclusion**

PacifiCorp and the CAISO have worked together to ensure that all appropriate transmission constraints are enforced, and believe that the exclusion of certain transmission constraints, as explained above, is appropriate, just, and reasonable in order to avoid reliability and operational issues and concerns.

**Informational Filing: Energy Imbalance Market – Enforcement of Transmission Constraint**

**March 29, 2017**

**California Independent System Operator Corporation**

**Attachment A**

***Confidential Constraints Table***

**ATTACHMENT CONSISTS OF PRIVILEGED MATERIAL  
CRITICAL ENERGY INFRASTRUCTURE INFORMATION  
REDACTED PURSUANT TO 18 C.F.R. § 388.112**

## CERTIFICATE OF SERVICE

I 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 29<sup>th</sup> day of March, 2017.

*/s/ Grace Clark*  
Grace Clark