

December 9, 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. ER16-366-000**

Errata to Attachment B

Dear Secretary Bose:

On November 20, 2015, the California Independent System Operator Corporation (“CAISO”) submitted pursuant Section 205 of the Federal Power Act and Sections 35.11 and 35.13 of the Commission’s regulations an Implementation Agreement between the CAISO and Portland General Electric Company, an Oregon Corporation, in the above-referenced docket. The CAISO since discovered that the declaration of Michael K. Epstein (“Declaration”) submitted as Attachment B to the CAISO’s filing included an incorrect reference to the total implementation cost estimate, the net energy for load for PGE, and the PGE implementation fee. These incorrect references, which appear only in paragraphs 21 and 22 of the Declaration, are enumerated below. All other references to these figures in the transmittal letter, the Declaration, and the Implementation Agreement are correct – there is no change to the rate schedule that was filed for acceptance by the Commission.

- Paragraph 21: The references to the total Energy Imbalance Market implementation cost estimate should have been \$19.6 million, not \$19.1 million.
- Paragraph 22: PGE’s most recently reported WECC net energy for load for 2013 should have been 20.8 million MWh, not 31.3 MWh
- Paragraph 22: PGE’s implementation fee should have been \$645,000, not \$970,000.

The Honorable Kimberly D. Bose
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Attached to this letter is a complete and corrected copy of Attachment B. The CAISO apologizes for any inconvenience this error may have caused, and respectfully requests that the Commission include this corrected version of Attachment B in the record of this proceeding.

The CAISO has posted the errata on its website and provided e-mail notice to all parties served with the original filing. Please contact the undersigned with any questions regarding this matter.

Respectfully submitted,

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

**California Independent System)
Operator Corporation)** **Docket No. ER16-366-000**

**DECLARATION OF MICHAEL K. EPSTEIN
ON BEHALF OF THE
CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION**

I, Michael K. Epstein, state as follows:

1. I am employed as Director of Financial Planning for the California Independent System Operator Corporation (the "CAISO"). My business address is 250 Outcropping Way, Folsom, California 95630. I am responsible for the CAISO's budget preparation and management; long term planning; accounting for the FERC refund case; market cash settlements; and audit coordination for all the CAISO's settlement and operations activities. As part of my duties at the CAISO, I oversee the development of the CAISO's grid management charge.
2. I received both an MBA and a BA with a major in accounting from the University of Southern California in Los Angeles, California. Prior to my current position, I was the Controller of the CAISO from 1997 - 2009. From 1994 – 1997, I was Vice President (Finance) of Siskon Gold Corporation, a publicly-traded mining company located in Grass Valley, California. From 1989 -1994, I was Controller of the Grupe Company, a privately held diversified real estate company located in Stockton, California. From 1985-1989, I was Controller of Brush Creek Mining and

Development Company located in Auburn, California. Prior to that, I was a Certified Public Accountant in the practice of public accounting with both local and international accounting firms.

3. The purpose of my declaration is to provide cost support for the fixed implementation fee that the CAISO proposes to charge Portland General Electric Company (“PGE”) for the development and implementation of the energy imbalance market under the Implementation Agreement that the CAISO is filing today.

The Implementation Fee

4. The implementation fee is based on the CAISO’s estimate of the start-up cost of implementing an energy imbalance market that could ultimately accommodate the entire Western Electric Coordinating Council (“WECC”), should the WECC utilities all choose to participate.
5. As explained below, the CAISO estimates that the total start-up cost for the energy imbalance market would be \$19.6 million. (Throughout this declaration, I am rounding millions to a single decimal point.) The CAISO would not incur this entire cost up front, however. Rather, the CAISO would incur the costs incrementally as the imbalance energy activity from additional balancing authority areas is incorporated into the market.
6. This total cost comprises eleven components: licenses, \$12.1 million; energy management system upgrades, \$1.0 million; data storage, \$2.0 million; hardware upgrades, \$500,000; production software modification, \$1.0 million; and network configuration and mapping, \$500,000;

integration, \$500,000; testing, \$1.5 million; system performance tuning, \$250,000; training and operations readiness, \$150,000; and project management, \$100,000.

Licenses

7. To estimate the license costs, the CAISO used the costs for its existing licenses for software systems development for scheduling infrastructure, integrated forward market, real time market and market quality system, and settlements software. The total base fees for the contracts covering these services are \$4.5 million. The fees in certain cases include a provision for a fee increase for each specified increment of additional CAISO peak demand. The details for these contracts are confidential, so I will need to describe the process without identifying the specific data.
8. Because the information on peak loads was not readily available, the CAISO decided to estimate costs by applying the 10% incremental cost to annual net energy for loads. The definition of “net energy for load” is posted on the WECC website. It comprises imports plus generation less exports with specific exclusions. Net energy for load is reported to WECC annually by each balancing authority area and used by WECC to allocate its reliability costs to each balancing authority area. The net energy for load (which I will hereafter refer to as load) for each balancing authority area is included with WECC’s billing to the balancing authority area for reliability costs. It is the most consistent and available data on all balancing authority areas in WECC. The CAISO used the 2013 load,

- which was included in the 2015 billing, for this allocation. The 2013 annual load for the CAISO was 232.3 million MWh. Using this data, the CAISO estimated the increment in CAISO load that would occasion a specific amount of additional license costs.
9. The WECC load, exclusive of the CAISO, is 636.2 million MWh. The CAISO calculated that this is a particular multiple of the load increments used in the license contracts. The CAISO calculated the product of this multiple and the increased costs associated with the contractual increment. Using this methodology, the CAISO estimates the license costs for implementing a WECC-wide energy imbalance market would be 27 times \$450,000, or \$12.15 million.

Data Storage

10. The CAISO will need to procure additional data storage to account for the expanded data requirements associated with integrating all WECC balancing authority areas into CAISO systems. The storage will provide the required highly available and redundant storage as well as cover long term archiving.
11. The storage for current CAISO production requires 200 terabytes at a cost of approximately \$7.5 million. The CAISO estimates that it will require a 10% increase for additional storage and faster retrieval, which would equate to \$750,000 at the same rate. Additional cabinets and ports will cost \$500,000 and licensing for databases, monitoring, storage, backups, etc. will be \$750,000, for a total cost of \$2.0 million.

Hardware Upgrades

12. Hardware upgrades will be necessary to meet the market timeline requirements, including 5 minute dispatch. These upgrades include servers and supporting network systems to provide the needed availability, reliability, and performance.
13. The CAISO currently uses about 100 servers. The CAISO estimates that it will need an additional 10%, or ten servers, with an estimated cost of \$30,000 each, for a total of \$300,000. The CAISO also estimates \$200,000 of networking and data acquisition costs for a total hardware upgrade cost of \$500,000.

Network Configuration and Mapping, Integration, System Performance Tuning.

14. The CAISO will need to include the other energy imbalance market balancing authority areas into the CAISO's network model and market model. It must also (1) integrate system interfaces to enable data exchange between systems to meet business and system requirements and (2) measure and analyze performance in a non-production environment and mitigate any identified performance issues to ensure that production performance is as expected.
15. The CAISO project management team determined the costs of these activities in consultation with the relevant directors and managers of the affected departments by estimating the level of effort required based on an extrapolation from the level of effort necessary for similar past activities. The staff consulted has extensive experience in estimating costs in this

area. In particular, the CAISO in 2009 completed a \$200 million implementation of a new market design and annually thereafter has carried out software implementation, modification and redesign projects averaging about \$20 million each.

Energy Management System Upgrades, Production Software Modification, and Testing

16. To build the energy imbalance market for the entire WECC region, the CAISO will need to improve the existing energy management system, which currently supports the CAISO control area with a peak demand of 50,000 MW. These system improvements would enable the CAISO to integrate the imbalance energy for the additional balancing authority areas within the four second data resource time.
17. The CAISO will also require production software modifications to support new inputs and outputs associated with the energy imbalance market, including base schedules.
18. Following the system integration described above, the CAISO will need to conduct testing to ensure that it meets all energy imbalance market business and system requirements.
19. The CAISO project management team determined the costs of these activities in consultation with the relevant directors and managers of the affected departments by estimating the resources (contractors and consultants) needed based on an extrapolation from the resources that the CAISO has required for recent software changes and modifications.

As described above, the staff consulted has extensive experience in estimating costs in this area.

Training and Operations Readiness, and Project Management

20. Similarly, CAISO project management personnel determined the costs of these activities in consultation with the relevant directors and managers of the affected disciplines by estimating the level of effort required based on an extrapolation from the level of effort necessary for similar past activities. As described in paragraph 14 above, the staff consulted has extensive experience in estimating costs in this area.

Derivation of Implementation Fee

21. Having determined that the total cost of implementing the WECC-wide energy imbalance market would be \$19.6 million, the CAISO proceeded to develop a rate that could be used for individual participants. To do so, the CAISO divided the \$19.6 million total cost by the 636.2 million MWh of non-CAISO net energy for load in the WECC, for a rate of \$0.031/MWh.
22. Finally, to determine the PGE fee as established in the Implementation Agreement, the CAISO applied the rate to PGE's most recently reported net energy for load for 2013 of 20.8 million MWh, for a rounded total of \$645,000.

Comparison of PGE Fee to Generic Rate

23. Although the CAISO intends to base the implementation fee on a generic rate that would reasonably allocate the costs of an WECC-wide energy imbalance market to all potential participants, the CAISO thought it

worthwhile to compare PGE's fee based on the \$0.031/MWh rate with an estimate of the specific costs of expansion of the existing energy imbalance market to include PGE. Using the same process described above, the CAISO estimated the costs (in thousands) that appear in the following table:

Software license costs	\$450
Network configuration and mapping	\$70
Integration	\$50
Testing	\$25
Training and operations readiness	\$25
Project Management	\$25
Total	\$645

24. As is readily apparent, although the total costs are the same, the proportion of the total PGE-specific costs that each component represents differs from proportion of the WECC-wide costs that the component represents. For example, the CAISO will incur no additional storage costs or EMS upgrade, but to integrate PGE, the CAISO will need to incur the majority of total production software costs up front. Although the PGE-specific costs are the same as the PGE fee based on the generic rate, the CAISO cannot determine at this time if this will be the case with regard to all future participants. Nonetheless, the CAISO has concluded that the generic fee represents the most equitable methodology of allocating the costs of a WECC-wide energy imbalance market.

I hereby certify under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief:

Executed on: December 8, 2015

/s/ Michael K. Epstein
Michael K. Epstein