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April 18, 2014

***VIA ELECTRONIC FILING  
AND OVERNIGHT DELIVERY***

Public Utility Commission of Oregon  
3930 Fairview Industrial Dr. S.E.  
Salem, OR 97302-1166

Attn: Filing Center

**RE: Docket UM \_\_\_\_\_  
PacifiCorp's Application for Deferred Accounting and Prudence Determination  
Associated with the Energy Imbalance Market**

PacifiCorp d/b/a Pacific Power submits for filing an original and five copies of its Application for Deferred Accounting and Prudence Determination Associated with the Energy Imbalance Market. Confidential information is provided under OAR 860-01-0070.

It is respectfully requested that all formal data requests to the Company regarding this filing be addressed to the following:

By e-mail (preferred): [datarequest@pacificorp.com](mailto:datarequest@pacificorp.com)

By regular mail: Data Request Response Center  
PacifiCorp  
825 NE Multnomah Street, Suite 2000  
Portland, OR 97232

Please direct informal inquiries to Bryce Dalley, Vice President, Regulation, at (503) 813-6389.

Sincerely,

R. Bryce Dalley  
Vice President, Regulation

Enclosures

## CERTIFICATE OF SERVICE

I certify that I served a true and correct copy of PacifiCorp's Application on the parties listed below via electronic mail in compliance with OAR 860-001-0180.

UE 263

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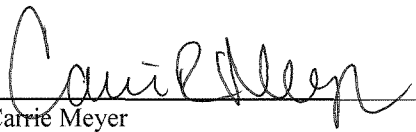
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Dated this 18<sup>th</sup> of April, 2014.

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Carrie Meyer  
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**BEFORE THE PUBLIC UTILITY COMMISSION  
OF OREGON**

UM \_\_\_\_\_

In the Matter of

PACIFICORP d/b/a PACIFIC POWER

Application for Approval of Deferred  
Accounting and Prudence Determination  
Associated with the Energy Imbalance Market.

**APPLICATION FOR DEFERRED  
ACCOUNTING AND PRUDENCE  
DETERMINATION**

1

**I. INTRODUCTION**

2

In February 2013, PacifiCorp d/b/a Pacific Power (PacifiCorp or Company) and the California Independent System Operator Corporation (CAISO) announced a partnership to enhance coordination of the electric transmission grid in the West through a new Energy Imbalance Market (EIM). The EIM is the culmination of several years of effort to develop a viable energy imbalance market in the West and is a significant achievement. In the EIM, resources will be economically dispatched in real-time (every five minutes) across PacifiCorp's and the CAISO's balancing authority areas (BAAs) to ensure that supply matches demand. The EIM is expected to provide benefits for PacifiCorp's customers by reducing intra-hour balancing and reserve costs. To participate in the EIM and achieve the expected customer benefits, PacifiCorp will incur EIM-related costs. These costs include one-time capital and operation and maintenance (O&M) costs to implement the EIM (start-up costs), annual O&M costs, and variable O&M costs. The target date for operation of the EIM to begin is October 1, 2014.

15

Recognizing the unique and transformative nature of the EIM, PacifiCorp requests that the Public Utility Commission of Oregon (Commission) review PacifiCorp's decision to participate in the EIM, contemporaneously with EIM implementation. Through this

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17

1 application, PacifiCorp requests an order under ORS 757.259(2)(e) and OAR 860-027-0300  
2 authorizing the Company to defer start-up costs and annual O&M costs from the date of this  
3 application until these costs are incorporated in base rates in PacifiCorp's next general rate  
4 case and a determination that the Company's decision to participate in the EIM is prudent.  
5 This application is supported by the testimony of Mr. Stefan A. Bird, who discusses the  
6 Company's decision to participate in the EIM and sponsors the Company's economic  
7 analysis.

8 Concurrently with this docket, the Company will convene a collaborative process  
9 with Oregon stakeholders to explore the development of a balancing account to reflect the  
10 variable cost and benefits of EIM in rates, including the variable O&M costs. The Company  
11 plans to make a separate filing to address these issues no later than thirty days after the  
12 Federal Energy Regulatory Commission (FERC) issues an order authorizing revisions to the  
13 Company's Open Access Transmission Tariff (OATT) and the CAISO's tariff implementing  
14 the EIM in a manner that does not adversely affect the benefits for the Company's customers.  
15 The Company requested an order from FERC by June 20, 2014.<sup>1</sup>

## 16 II. NOTICE

17 Communications regarding this application should be addressed to:

PacifiCorp Oregon Dockets  
825 NE Multnomah Street, Suite 2000  
Portland, OR 97232  
oregondockets@pacificorp.com

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<sup>1</sup> *PacifiCorp's Filing for Revisions to OATT to Implement the Energy Imbalance Market*, FERC Docket No. ER14-1578 (March 25, 2014).

1 In addition, the Company requests that all data requests regarding this application be  
2 sent to the following:

3 By email (preferred): [datarequest@pacificorp.com](mailto:datarequest@pacificorp.com)  
4 By regular mail: Data Request Response Center  
5 PacifiCorp  
6 825 NE Multnomah Street, Suite 2000  
7 Portland, OR 97232

8 Informal questions may be directed to R. Bryce Dalley, Vice President, Regulation, at  
9 503-813-6389.

### 10 **III. BACKGROUND**

11 The EIM is a five-minute market administered by a single market operator, the  
12 CAISO. The EIM uses an economic dispatch model to issue instructions to participating  
13 generating resources to meet the load for the entire EIM footprint, which will initially be  
14 comprised of PacifiCorp's and the CAISO's BAAs. Market participants voluntarily bid their  
15 resources into the EIM. The market operator, in addition to providing dispatch instructions,  
16 generates locational marginal prices to be used for settlement of the energy imbalances. A  
17 locational marginal price is the marginal cost of supplying the next increment of electricity at  
18 a specific geographic location on the grid. Energy imbalance is the difference between the  
19 forecast load or generation and interchange and the actual load or generation and interchange.  
20 The benefits of an EIM include (1) the economic efficiency of an automated dispatch,  
21 (2) savings due to diversity of loads and variable resources in the expanded footprint, and  
22 (3) reduced operational risk from enhanced system reliability.

23 Industry leaders in the West have explored and promoted the energy imbalance  
24 market concept for the last several years. The Western Electricity Coordinating Council  
25 launched a major initiative and study effort in 2010. Late in 2011, commissioners from  
26 12 western state commissions formed a group (PUC-EIM Group) to explore issues related to

1 an energy imbalance market in the West. Also, the Northwest Power Pool, through its  
2 Market Assessment and Coordination Committee Initiative (NWPP MC), has been actively  
3 working to advance an understanding of an energy imbalance market and other long-term  
4 market improvement initiatives. PacifiCorp has provided longstanding support for these and  
5 other West-wide market efforts. Throughout these various processes, PacifiCorp's goal has  
6 remained the timely implementation of market improvements that provide benefits to  
7 customers.

8 In spring 2012, the CAISO publicly provided an EIM framework concept based on its  
9 existing real-time market to provide a low-cost, low-risk, voluntary market to allow parties to  
10 capture benefits associated with an energy imbalance market. The proposal prompted  
11 PacifiCorp's interest in participating in the EIM with the CAISO.

12 PacifiCorp decided it was reasonable to move forward with the CAISO to participate  
13 in the EIM for a variety of reasons. By developing the EIM using the CAISO's existing real-  
14 time market, PacifiCorp would be able to take advantage of the CAISO's existing systems to  
15 timely achieve customer benefits associated with the EIM. It is more cost-effective, more  
16 efficient, and involves less risk to expand these existing systems to include PacifiCorp's  
17 transmission facilities and resources than it would have been to create a new platform. As  
18 described in more detail below, the EIM is expected to enhance reliability, more efficiently  
19 integrate renewable resources, and reduce costs for customers.

20 By participating in the EIM, PacifiCorp expands the CAISO's security-constrained,  
21 least-cost dispatch for most of California to include PacifiCorp's six-state platform, including  
22 additional portions of California, as well as Idaho, Oregon, Utah, Washington, and  
23 Wyoming.

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#### IV. PROPOSED SCHEDULE

The EIM is targeted to begin operation on October 1, 2014. Accordingly, PacifiCorp requests an order on this application by September 1, 2014. To facilitate this schedule, PacifiCorp respectfully requests that a prehearing conference be held as soon as possible.

#### V. DEFERRAL OF COSTS

PacifiCorp respectfully requests authorization to defer the start-up costs and annual O&M costs related to EIM for future recovery in rates. PacifiCorp's deferral application relies on ORS 757.259(2)(e), which allows deferral of identifiable utility expenses or revenues to match appropriately the costs borne by and benefits received by customers. The deferral will allow the Company to recover in its next general rate case the prudently incurred costs to implement and participate in the EIM. As required by OAR 860-027-0300(3), PacifiCorp provides the following:

##### A. Description of Utility Expense

The Company is requesting to defer two general categories of costs related to the EIM: start-up costs and annual O&M costs.

##### 1. Start-Up Costs

Start-up costs are expected to be approximately \$20 million on a total-company basis, or approximately \$5 million on an Oregon-allocated basis, and include (1) approximately \$16 million in capital costs on a total-company basis (approximately \$4 million Oregon-allocated), and (2) approximately \$4 million in O&M costs on a total-company basis (approximately \$1 million Oregon-allocated). These costs include the following:

- **Upgrading real-time and settlement metering and telecommunication equipment.** PacifiCorp must upgrade its metering and telecommunication equipment to participate in the EIM. Specifically, PacifiCorp must replace, reprogram, and install additional meters to comply with CAISO's operating



1 procedures, to facilitate participation in the EIM and generate settlement  
2 statements within the CAISO market. PacifiCorp must also upgrade some of its  
3 telecommunications equipment to support EIM participation.

- 4 • **Upgrading systems that are necessary to support efficient market operations.**  
5 PacifiCorp must expand, modify, or upgrade its systems to ensure the reliable and  
6 efficient operation of the EIM. Specifically, PacifiCorp will refine its network  
7 model, network management systems, load forecasting tools, generation controls,  
8 outage management system, interval meter data collection and management  
9 systems, settlement systems, and reporting systems. To accommodate the new  
10 settlement procedures for EIM, PacifiCorp upgraded its settlement software and  
11 increased staffing levels to process the EIM settlement data received from the  
12 CAISO.
- 13 • **Implementation costs paid to the CAISO to participate in EIM.** PacifiCorp  
14 will pay an implementation fee to the CAISO to develop the functionality for  
15 PacifiCorp to participate in the EIM, including base schedule aggregation services  
16 for its customers.<sup>2</sup>
- 17 • **Support of EIM development and implementation.** PacifiCorp has incurred  
18 and will incur additional expenses for staffing and contracted support to design,  
19 develop, and implement the EIM.

## 20 2. Annual O&M Costs

21 Starting in 2015, the annual O&M costs are expected to be approximately  
22 \$1.7 million on a total-company basis, or approximately \$425,000 on an Oregon-allocated  
23 basis. The Company's annual O&M costs will fund additional employees and information  
24 technology systems and support necessary to participate in the EIM. The Company proposes  
25 to include the start-up costs and annual O&M costs in the deferred account until later  
26 incorporated in base rates.

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<sup>2</sup> On April 30, 2013, PacifiCorp and the CAISO entered into an Implementation Agreement (IA) for an EIM to be implemented effective October 1, 2014. The IA sets forth the terms under which the CAISO will modify and extend its existing real-time energy market systems to provide energy imbalance market service to PacifiCorp, including transmission customers taking transmission service under PacifiCorp's OATT. On June 28, 2013, the FERC unconditionally accepted the IA, effective July 1, 2013, as requested. *Cal. Indep. Sys. Operator Corp.*, 143 FERC ¶ 61,298 (2013). Subsequently, on February 21, 2014, the CAISO filed a mutually agreed-to amendment to the IA with FERC to account for \$462,800 in additional costs incurred by the CAISO on behalf of PacifiCorp to enable PacifiCorp and its customers to take advantage of existing CAISO systems to aggregate supply and load forecasts into the balanced EIM base schedule required by the EIM design. This filing was accepted by FERC, effective April 23, 2014. *Letter Order Accepting CAISO Filing of Amendment to Implementation Agreement*, Docket No. ER14-1350 (Apr. 8, 2014).

1 **B. Reasons for Deferral**

2 The EIM is expected to become operational and the Company's investment will be  
3 used and useful for Oregon customers by October 1, 2014. The revenue requirement  
4 associated with the EIM would not ordinarily be reflected in rates until the Company's next  
5 general rate case. Under the Commission-approved stipulation in PacifiCorp's 2013 general  
6 rate case, docket UE 263, PacifiCorp may not file its next rate case until 2015 for rates  
7 effective in 2016.<sup>3</sup> In the interim, deferred accounting will allow the Company to match the  
8 benefits that customers will receive from the EIM with the costs to the Company of  
9 providing those benefits.

10 **C. Proposed Accounting**

11 Beginning on the date of this application, PacifiCorp proposes to account for start-up  
12 costs and annual O&M costs in the following manner: (1) for costs ordinarily charged to  
13 FERC O&M accounts (500 to 935), the Company will credit the appropriate O&M  
14 account(s) and debit FERC Account 182.3, Regulatory Assets; and (2) for capital  
15 investments, the Company proposes to defer both the return on and return of by crediting  
16 Oregon retail revenue accounts (Accounts 440 to 444) and debiting FERC Account 182.3.

17 **D. Estimate of Amounts**

18 As noted above, the Company estimates that the start-up costs to implement the EIM  
19 will be approximately \$20 million on a total-company basis (approximately \$5 million  
20 Oregon-allocated). This amount consists of approximately \$16 million in capital costs  
21 (approximately \$4 million Oregon-allocated) and approximately \$4 million in O&M costs

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<sup>3</sup> *In the Matter of PacifiCorp d/b/a Pacific Power Request for a General Rate Revision*, Docket No. UE 263, Order No. 13-474, Appendix A at 5-6 (Dec. 18, 2013).

1 (approximately \$1 million Oregon-allocated). The Company estimates total-company annual  
2 O&M costs of \$1.7 million, or approximately \$425,000 Oregon-allocated.

3 **E. Notice**

4 A copy of the Notice of Application and a list of persons served with the notice are  
5 attached as Exhibit A to this application.

6 **VI. EIM COLLABORATIVE PROCESS**

7 As discussed above, the Company requests that the deferred account include only  
8 those start-up costs associated with EIM implementation, along with annual O&M costs. For  
9 ongoing benefits and costs, including variable O&M costs, the Company will convene a  
10 collaborative process with Oregon stakeholders to explore development of a balancing  
11 account to reflect these amounts in rates.

12 The Company proposes to address the benefits and costs of the EIM through this  
13 deferral application and proposed collaborative process, rather than in the Company's 2015  
14 Transition Adjustment Mechanism (TAM). The uniqueness and complexity of the EIM and  
15 the limited scope of the TAM support this approach. Additionally, because the EIM is new,  
16 its costs and benefits are not yet sufficiently known and measurable to include in the TAM.  
17 The date for commencement of the EIM remains a target date, which is contingent on FERC  
18 approval of amendments to the CAISO's tariff<sup>4</sup> and PacifiCorp's OATT and the successful  
19 completion of EIM market simulation and testing. Finally, as described in Mr. Bird's  
20 testimony, the forecast benefits of the EIM are informed by the amount of transfer capability  
21 available for EIM use on the California-Oregon Intertie (COI). Efforts among PacifiCorp,  
22 the Bonneville Power Administration (BPA), and the CAISO to clarify operational

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<sup>4</sup> The CAISO Operating Agreement and Tariff, dated March 31, 1997, as modified. The CAISO filed amendments to this tariff to implement the EIM on February 28, 2014 (FERC Docket No. ER14-1386).

1 procedures associated with PacifiCorp’s use of its existing transmission rights across the COI  
2 are ongoing. These factors demonstrate the need for more flexibility in Oregon’s EIM  
3 regulatory review process than the TAM allows.

#### 4 **VII. REQUEST FOR PRUDENCE DETERMINATION**

5 In addition to authorizing deferred accounting, the Company requests that the  
6 Commission determine that the Company’s decision to participate in EIM is prudent. This  
7 request is supported by the testimony and exhibits of Mr. Bird filed with this application.

8 Although the Commission does not generally provide prudence determinations before  
9 a utility requests the inclusion of a resource in rates, the Commission does “recognize that  
10 under unique conditions some advance Commission expression regarding certain activities  
11 might be helpful and therefore leave that option open.”<sup>5</sup> The Commission has used its  
12 discretion to provide approval of certain utility investments when unique circumstances so  
13 require.

14 For example, in 2011, the Commission pre-approved a gas reserve contract and  
15 approved the utility’s requested ratemaking treatment for the contract costs.<sup>6</sup> In that case,  
16 Northwest Natural Gas Company (NW Natural) requested an order finding that the utility’s  
17 decision to enter into a gas reserve contract was prudent. NW Natural also requested  
18 authorization to implement deferred accounting to track expenses related to the contract from  
19 the date the contract was effective until the time the expenses were included in rates. The  
20 Commission approved both requests, which allowed NW Natural to proceed with the  
21 contract.

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<sup>5</sup> *In re Requirements of Section 712 of the 1992 Energy Policy Act*, Docket No. UM 573, Order No. 93-1491 at 4 (October 15, 1993).

<sup>6</sup> *In re Northwest Natural Gas Co.*, Docket Nos. UM 1520 & UG 204, Order No. 11-140 (Apr. 28, 2011) (affirmed by Order No. 11-176).

1           In docket UE 219, the Commission approved the Company’s surcharges related to the  
2 removal of dams within the Klamath Hydroelectric Project. As part of the approval, the  
3 Commission reviewed the Klamath Hydroelectric Settlement Agreement (KHSAs) and  
4 concluded that the KHSAs are “in the best interest of customers[.]”<sup>7</sup> Although the expedited  
5 review of the KHSAs was required by Senate Bill 76, this case demonstrates that Commission  
6 review of prudence in advance of a major, unprecedented utility project is feasible and  
7 represents good public policy.

8           In addition to pre-approval of utility resource decisions, the Commission has also  
9 examined the prudence of a utility resource decision in an issue-specific docket, rather than  
10 in a general rate case. In docket UE 248, Idaho Power Company filed to increase rates to  
11 include the costs associated with its Langley Gulch gas-fired generating plant. The  
12 Commission approved a stipulation in which the parties agreed that Idaho Power’s  
13 investment was prudent and supported the proposed rate increase.<sup>8</sup>

14           The Company is requesting a prudence determination even though the Company is  
15 not concurrently requesting that the costs of the EIM be included in rates. In this case, the  
16 uniqueness of the EIM supports the Commission’s determination of prudence at this stage of  
17 the implementation process. As described above, the EIM is the culmination of a lengthy  
18 regional effort to develop a more efficient energy market to provide customer benefits,  
19 including more efficient integration of renewable resources. The EIM is a significant  
20 undertaking, and PacifiCorp’s decision to participate in the EIM is the first of its kind for a  
21 utility in the West. In light of the significance of the EIM, it is reasonable for the

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<sup>7</sup> *Re PacifiCorp*, Docket No. UE 219, Order No. 10-364 at 13 (Sept. 16, 2010).

<sup>8</sup> *In re Idaho Power Co.*, Docket No. UE 248, Order No. 12-358 (Sept. 20, 2012).

1 Commission to examine the prudence of PacifiCorp’s decision to participate in the EIM now,  
2 rather than when the Company seeks to include the costs and benefits of the EIM in rates.

3 **1. Quantitative Benefits**

4 To attempt to quantify the benefits of the EIM, PacifiCorp and the CAISO  
5 collaborated with Energy and Environmental Economics, Inc. (E3) to study the EIM. In a  
6 report dated March 13, 2013 (E3 Report), E3 identified a range of *joint* benefits, based on  
7 model year 2017, of between \$21 million and \$129 million annually, and identified a range  
8 of customer benefits for PacifiCorp of between \$10.5 million and \$54.4 million annually.<sup>9</sup> In  
9 summary, the E3 Report found that the EIM would allow both PacifiCorp and CAISO “to  
10 improve dispatch efficiency and take advantage of the diversity in loads and generation  
11 resources between the two systems,” which will reduce production costs, reserve  
12 requirements, and renewable generation curtailment.<sup>10</sup> The benefits identified by E3 include:

- 13 • **Interregional dispatch savings** by realizing the efficiency of combined five-  
14 minute dispatch, which would reduce “transactional friction” (*e.g.*, transmission  
15 charges) and alleviate structural impediments currently preventing trade between  
16 the two systems;
- 17 • **Intraregional dispatch savings** by enabling PacifiCorp’s generators to be  
18 dispatched more efficiently through the CAISO’s automated system (nodal  
19 dispatch software), including benefits from more efficient transmission  
20 utilization;
- 21 • **Reduced flexibility reserves** by aggregating the two systems’ load, wind, and  
22 solar variability and forecast errors; and
- 23 • **Reduced renewable energy curtailment** by allowing balancing authorities to  
24 export or reduce imports of renewable generation when it would otherwise need  
25 to be curtailed.

26 Following the E3 Report, PacifiCorp conducted its own cost-benefit analysis, described in  
27 Mr. Bird’s direct testimony, which confirmed the expected net benefits of the EIM.

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<sup>9</sup> The E3 Report is included with Mr. Bird’s direct testimony as Exhibit PAC/104.

<sup>10</sup> E3 Report at 6.

1           **2.       Qualitative Benefits**

2           In addition to the quantitative benefits presented in the E3 Report, the EIM is also  
3 expected to provide qualitative benefits on a region-wide basis, particularly related to  
4 reliability. Under the EIM, the CAISO can manage the combined system using economic  
5 five-minute dispatch, and the pool of resources available to respond to events is expanded,  
6 thereby increasing the diversity of resources available to provide imbalance energy. The  
7 EIM will improve situational awareness across the EIM footprint by giving PacifiCorp and  
8 the CAISO access to a wider view of system operations in real-time and forward-looking  
9 operational intervals. Transmission operators will have an enhanced system representation  
10 and monitoring capability through the EIM. By automating and coordinating five-minute  
11 dispatch across the footprint, the EIM generates a single security-constrained economic  
12 dispatch solution. Currently, Balancing Authority Areas (BAAs) each create individual  
13 solutions that typically are coordinated only within the BAA or with minimal external  
14 counterparties. This can lead to inefficient results and potentially contradictory adjustments  
15 to the interconnected system. In addition, the EIM manages flows within transmission limits  
16 during dispatch, which will lead to improved congestion management in advance of the  
17 operating intervals. All customers benefit from this increased reliability in both the adequacy  
18 and diversity of supply.

19           The EIM also responds to the Commission’s interest in reducing integration costs  
20 of renewable resources by capturing diversity benefits through the wider geographic  
21 footprint.<sup>11</sup> For example, there is potential for significant weather differences throughout

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<sup>11</sup> See, e.g., *In the Matter of PacifiCorp 2011 IRP*, Docket No. LC 42, Order No. 08-232 (Apr. 24, 2008) (acknowledging PacifiCorp IRP with action item to pursue transmission facilities or contracts to cost-effectively integrate renewable resources); *In re PacifiCorp*, Docket No. UM 1667, Order No. 13-382 at 2 (Oct. 18, 2013) (PacifiCorp’s next smart grid plan should address PacifiCorp’s work integrating renewable resources).

1 the expansive EIM geographic area. This geographic diversity mitigates the intermittency  
2 inherent in many renewable resources.

3 In addition, the EIM provides the potential for renewable resources to be used more  
4 efficiently. Wind may be blowing in an area far from load, but with a wider EIM footprint  
5 that expands beyond the individual BAA, that wind generation can be used to serve energy  
6 imbalances instead of having to be curtailed as oversupply. Finally, different peak periods  
7 within the EIM footprint will allow better utilization of renewable resources to meet peak  
8 loads.

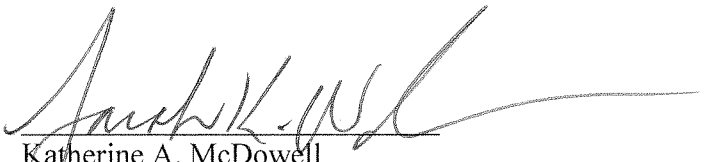
### 9 VIII. CONCLUSION

10 PacifiCorp respectfully requests that the Commission issue the following orders:

- 11 (1) In accordance with ORS 757.259(2)(e), authorizing the Company to defer the  
12 costs described in this application; and  
13 (2) Determining that the Company's decision to participate in the EIM is prudent.

Respectfully submitted this 18th day of April, 2014.

By:



Katherine A. McDowell  
McDowell, Rackner & Gibson PC

Sarah K. Wallace  
Assistant General Counsel  
PacifiCorp d/b/a Pacific Power

Attorneys for PacifiCorp d/b/a Pacific Power



ATTACHMENT A

NOTICE

BEFORE THE PUBLIC UTILITY COMMISSION  
OF OREGON

UM \_\_\_\_\_

In the Matter of

PACIFICORP d/b/a PACIFIC POWER

Application for Approval of Deferred  
Accounting and Prudence Determination  
Associated with the Energy Imbalance Market.

**APPLICATION FOR DEFERRED  
ACCOUNTING AND PRUDENCE  
DETERMINATION**

On April 18, 2014, PacifiCorp d/b/a Pacific Power filed an application with the Public Utility Commission of Oregon (Commission) for an order under ORS 757.259(2)(e) and OAR 860-027-0300 authorizing the Company to defer the costs to implement and participate in the Energy Imbalance Market (EIM) with the California Independent System Operator Corporation from the date of the application until these costs are incorporated in base rates in PacifiCorp's next general rate case. The granting of the Company's request will not authorize a change in rates, but will allow the Commission to consider allowing the deferred amounts in rates in a later proceeding.

In addition, the Company's requests a Commission determination that the Company's decision to participate in the EIM is prudent. To obtain a copy the application, contact the following:

Oregon Dockets  
825 NE Multnomah Street, Suite 2000  
Portland, OR 97232  
E-mail: [oregondockets@pacificorp.com](mailto:oregondockets@pacificorp.com)

Any person may submit written comments to the Commission regarding the application by May 15, 2014.

A copy of this notice will be served on the parties to PacifiCorp's last general rate case in Oregon, docket UE 263.

ISSUED: April 18, 2014.

By:

A handwritten signature in black ink, appearing to read "Sarah K. Wallace", written over a horizontal line.

Sarah K. Wallace  
Assistant General Counsel  
PacifiCorp d/b/a Pacific Power

**REDACTED**

Docket No. UM-\_\_\_\_\_

Exhibit PAC/100

Witness: Stefan A. Bird

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF THE STATE OF OREGON**

**PACIFICORP**

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**Direct Testimony of Stefan A. Bird**

**April 2014**

1 **Q. Please state your name, business address, and present position with**  
2 **PacifiCorp d/b/a Pacific Power (PacifiCorp or Company).**

3 A. My name is Stefan A. Bird. My business address is 825 NE Multnomah Street,  
4 Suite 600, Portland, Oregon 97232. I am Senior Vice President, Commercial and  
5 Trading, for PacifiCorp Energy, a division of PacifiCorp.

### 6 **QUALIFICATIONS**

7 **Q. Briefly describe your education and professional experience.**

8 A. I hold a B.S. in mechanical engineering from Kansas State University. I joined  
9 PacifiCorp Energy and assumed my current position in January 2007. From 2003  
10 to 2006, I served as president of CalEnergy Generation U.S., an owner and  
11 operator of Qualifying Facility and merchant generation assets, including  
12 geothermal and natural-gas-fired cogeneration projects across the United States.  
13 From 1999 to 2003, I was vice president of acquisitions and development for  
14 MidAmerican Energy Holdings Company (MEHC). From 1989 to 1997, I held  
15 various positions at Koch Industries, Inc., including energy marketing, financial  
16 services, corporate acquisitions and project management in the United States,  
17 Mexico, South America, and Europe.

18 In my current position, I oversee the Company's Commercial and Trading  
19 organization, which is responsible for dispatch of the Company's owned and  
20 contracted generation resources and procurement of natural gas and electricity and  
21 wholesale sales to balance the Company's load and resources. I am also  
22 responsible for the Company's integrated resource plan, acquisition of generation  
23 resources, load forecasting, and net power costs modeling.

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**PURPOSE AND SUMMARY OF TESTIMONY**

**Q. What is the purpose of your testimony in this proceeding?**

A. The purpose of my testimony is to provide information in support of PacifiCorp’s application for deferred accounting and a prudence determination associated with the Company’s decision to participate in the energy imbalance market (EIM) with the California Independent System Operator Corporation (CAISO).

**Q. Please summarize your testimony.**

A. I provide background on PacifiCorp’s decision to participate in the EIM and outline the current EIM implementation process. I explain that the Company is seeking a separate prudence determination now to allow the parties an opportunity to review the EIM closer in time to when the Company is making key EIM decisions and because of the unique and potentially transformative qualities of the EIM. I demonstrate the prudence of the Company’s decision to participate in the EIM by highlighting its many advantages and by sponsoring the Company’s cost-benefit analyses.

**EIM BACKGROUND AND IMPLEMENTATION**

**Q. Please describe the EIM.**

A. The EIM is administered by a single market operator, the CAISO, using an economic dispatch model to issue instructions to participating generating resources to meet the load for the entire footprint of the EIM, which will initially be comprised of the CAISO and PacifiCorp footprints. Market participants voluntarily bid their resources into the EIM. The CAISO, in addition to providing dispatch instructions, generates locational marginal prices to be used for

1 settlement of energy imbalances. Energy imbalance is the difference between the  
2 forecast load, interchange, or generation and the actual load, interchange, or  
3 generation. The EIM market simulation and testing is targeted to begin July 8,  
4 2014. The EIM is targeted to become operational on October 1, 2014.

5 **Q. Please explain the need for the EIM.**

6 A. The electric grid in the western United States is managed by 38 separate  
7 balancing authorities (BAs), each responsible for keeping energy supply and  
8 demand in balance at all times within their defined balancing authority areas  
9 (BAAs). Outside California, system operations rely on bilateral energy  
10 transactions and holding additional reserves to ensure power supply matches  
11 demand. The dramatic growth in weather-dependent wind and photovoltaic solar  
12 generation means that significant variations can occur within an hour. The  
13 resulting need to support intermittent renewable resources with flexible reserves  
14 can strain current systems. System management can be improved if operators can  
15 call on a broader array of flexible resources from a diversity of BAAs. Even  
16 without the more dramatic influence of high renewable resource penetration,  
17 dispatch of resources can be optimized in an energy imbalance market,  
18 particularly across large systems with diverse resources and congestion, such as  
19 exists across the PacifiCorp and CAISO footprints. The large regional outages  
20 that have occurred in the West have also heightened the need for improved  
21 situational awareness and responsiveness to improve reliability, which an energy  
22 imbalance market delivers.

1 **Q. How will the EIM benefit Oregon customers?**

2 A. The Company's Oregon customers will benefit from the economic efficiency of  
3 automated dispatch, savings due to diversity of loads and variable resources in the  
4 expanded footprint, more efficient integration of renewable resources, and  
5 enhanced system visibility and responsiveness that improve reliability.

6 **Q. How did the EIM come about?**

7 A. Industry stakeholders in the West have recognized the potential customer benefits  
8 of an energy imbalance market for several years. In 2010, the Western Electricity  
9 Coordinating Council studied the benefits of a potential energy imbalance market.  
10 In late 2011, commissioners from 12 western state regulatory commissions  
11 formed a group (the PUC-EIM Group) to explore issues related to an energy  
12 imbalance market in the West. In response to a PUC-EIM Group request, the  
13 CAISO and Southwest Power Pool, Inc. provided conceptual proposals for an  
14 energy imbalance market in March 2012. CAISO's proposal explained that, by  
15 leveraging its existing market platform, it could offer an energy imbalance market  
16 in the western United States with low up-front risk, low incremental costs  
17 compared to a new infrastructure, and no exit fee. Importantly, CAISO's proposal  
18 also provided the ability for individual BAs to join the EIM in stages. This allows  
19 the EIM to grow incrementally, rather than requiring a critical mass of  
20 participants to develop a new market with greater cost and risk.

21 Additionally, the Northwest Power Pool Market Assessment and  
22 Coordination Committee (NWPP MC) has been exploring an energy imbalance  
23 market and other long-term market-improvement initiatives. PacifiCorp has

1 actively engaged in and provided support for these efforts. The NWPP MC is  
2 currently proceeding to Phase 3, which includes further consideration of an  
3 energy imbalance market.

4 **Q. Please describe the documents PacifiCorp negotiated with the CAISO to**  
5 **facilitate implementation of the EIM.**

6 A. The Company entered into a Memorandum of Understanding (MOU) with the  
7 CAISO on February 12, 2013, which outlined 12 core principles and a high-level  
8 milestone schedule that incorporated a stakeholder process. A copy of the MOU  
9 is attached as Exhibit PAC/101.

10 The Company entered into Implementation Agreement dated April 30,  
11 2013, with the CAISO, which was accepted by the Federal Energy Regulatory  
12 Commission (FERC) effective July 1, 2013.<sup>1</sup> A copy of the Implementation  
13 Agreement is attached at Exhibit PAC/102. The Implementation Agreement sets  
14 forth the terms under which the CAISO will modify and extend its existing real-  
15 time energy market systems to provide energy imbalance market service to  
16 PacifiCorp and its customers, including transmission customers taking service  
17 under PacifiCorp's Open Access Transmission Tariff (OATT). Under the  
18 Implementation Agreement, PacifiCorp agreed to compensate the CAISO  
19 \$2.1 million for its share of the costs of these system changes, software licenses,  
20 and other configuration activities subject to completion of five milestones.

21 The CAISO filed a mutually agreed-to Amendment to the Implementation  
22 Agreement (Amendment) with the FERC February 21, 2014, and the Amendment

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<sup>1</sup> *Cal. Indep. Sys. Operator Corp.*, 143 FERC ¶ 61,298 (2013).



1 was accepted by FERC and made effective April 23, 2014, as requested.<sup>2</sup> Under  
2 the Amendment, PacifiCorp will pay an additional \$462,800 for the CAISO to  
3 expand its existing systems to facilitate PacifiCorp's aggregation of customer  
4 generation and load forecasts required by the EIM. A copy of the Amendment is  
5 attached as Exhibit PAC/103.

6 **Q. Does PacifiCorp's decision to move forward with the CAISO to develop the**  
7 **EIM bind PacifiCorp to participate in the EIM?**

8 A. No. Providing ease of entry with no exit fee was a hallmark of the CAISO EIM  
9 conceptual proposal in March 2012, and this is reflected in the Implementation  
10 Agreement and Amendment. Under Section 2, PacifiCorp has the unilateral right  
11 to terminate its participation in the EIM upon notice of termination to the CAISO.  
12 There is no exit fee. After the EIM goes into operation, termination provisions  
13 will be governed by the CAISO's tariff, which does not include an exit fee.  
14 Specifically, in the CAISO's FERC filing letter, the CAISO indicated that "the  
15 principles and supporting market rules allow for easy entry and exit from the  
16 Energy Imbalance Market with minimal risk if the expected benefits do not  
17 materialize for participants."<sup>3</sup>

18 **Q. Has the Company engaged its customers, regulators, and other stakeholders**  
19 **in its decision to participate in the EIM?**

20 A. Yes. In April 2013, PacifiCorp began its EIM stakeholder process. PacifiCorp  
21 held webinars to identify the issues affecting its customers, requested feedback  
22 from stakeholders, and provided responses to written comments received.

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<sup>2</sup> *Letter Order Accepting CAISO Filing of Amendment to Implementation Agreement*, Docket No. ER14-1350 (Apr. 8, 2014).

<sup>3</sup> *CAISO EIM Filing*, Docket ER 14-1386 at 13 (Feb. 28, 2014).

1 PacifiCorp also held an EIM workshop on July 30, 2013, which was widely  
2 attended by transmission customers, representatives from state public utility  
3 commissions, and industry trade groups. PacifiCorp published two versions of its  
4 draft EIM entity proposal and solicited comments from stakeholders. On  
5 November 27, 2013, PacifiCorp transitioned to an EIM tariff stakeholder process,  
6 which offered the opportunity for stakeholders to provide multiple rounds of  
7 written comments. Additionally, PacifiCorp held a stakeholder meeting on  
8 January 21, 2014, to review the proposed revisions to its OATT, and posted  
9 several versions of its OATT for comment before filing with FERC on March 25,  
10 2014.

11 **Q. What other outreach efforts has PacifiCorp made in support of EIM?**

12 A. PacifiCorp's management and regulatory department met with the staff and  
13 commissioners of PacifiCorp's state public utility commissions. PacifiCorp has  
14 met with other utilities interested in PacifiCorp's EIM implementation experience  
15 and has sent representatives to numerous regional conferences to present on the  
16 EIM. PacifiCorp has also been actively involved in the stakeholder processes  
17 initiated by the CAISO and Bonneville Power Administration (BPA), respectively.

18 **Q. Has the Company filed testimony in other venues regarding the costs and**  
19 **benefits of its decision to pursue the EIM?**

20 A. Yes. On March 25, 2014, PacifiCorp filed revisions to its OATT at FERC to  
21 implement the EIM, including supporting testimony from Ms. Natalie L. Hocken,  
22 PacifiCorp's Senior Vice President, Transmission and System Operations.<sup>4</sup>

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<sup>4</sup> *PacifiCorp's Filing for Revisions to OATT to Implement the Energy Imbalance Market*, FERC Docket No. ER14-1578, Exh. No. PAC-1, Testimony of Natalie L. Hocken (March 25, 2014).

1 Ms. Hocken's testimony describes PacifiCorp's transmission system, an overview  
2 of PacifiCorp's efforts to expand market opportunities in the West, the basis for  
3 PacifiCorp's decision to pursue development of the EIM with the CAISO, the  
4 anticipated quantitative and qualitative benefits of the EIM, and the actions  
5 PacifiCorp has taken to maintain reliability and protect customers through the  
6 development and implementation of the EIM.

7 **PRUDENCE OF THE COMPANY'S DECISION**  
8 **TO PARTICIPATE IN THE EIM**

9 **Q. Please describe the prudence determination the Company is seeking.**

10 A. The Company requests that the Commission find that the Company's decision to  
11 participate in the EIM is prudent. The Company seeks a prudence determination  
12 now because of the unique circumstances associated with the EIM. The EIM has  
13 the potential to transform western power markets and provide significant benefits  
14 to customers. Given the importance of the EIM undertaking, PacifiCorp seeks a  
15 prudence review now, closer in time to when the Company is making key EIM  
16 decisions than the Company's next general rate case. This is especially true  
17 because, under the terms of the stipulation in docket UE 263, PacifiCorp will not  
18 file another general rate case in Oregon until 2015 at the earliest. A separate  
19 prudence review process will allow parties to review the EIM in a timely, focused,  
20 and in-depth manner.

21 **Q. How did the Company assess the potential benefits of participating in the**  
22 **EIM?**

23 A. The potential benefits of the EIM were analyzed by Energy and Environmental  
24 Economics, Inc. (E3 Report) in a report dated March 13, 2013. A copy of this

1 report is attached as Exhibit PAC/104. The E3 Report concluded that the creation  
2 of a PacifiCorp-ISO EIM would yield the following four principal benefits:

- 3 • *Interregional dispatch savings* by realizing the efficiency of combined  
4 five-minute dispatch, which would reduce “transactional friction”  
5 (e.g., transmission charges) and alleviate structural impediments  
6 currently preventing trade between the two systems;
- 7 • *Intraregional dispatch savings* by enabling PacifiCorp generators to be  
8 dispatched more efficiently through the CAISO’s automated system  
9 (nodal dispatch software), including benefits from more efficient  
10 transmission utilization;
- 11 • *Reduced flexibility reserves* by aggregating the two systems’ load,  
12 wind, and solar variability and forecast errors; and
- 13 • *Reduced renewable energy curtailment* by allowing BAs to export or  
14 reduce imports of renewable generation when it would otherwise need  
15 to be curtailed.

16 Additionally, the E3 Report identified joint customer benefits for CAISO  
17 and PacifiCorp, based on model year 2017, totaling between \$21 million and \$129  
18 million annually, and identified a range of customer benefits for PacifiCorp of  
19 between \$10.5 million and \$54.4 million annually.

20 These benefits are indicative but not exhaustive. A February 26, 2013  
21 FERC staff paper outlines other reliability benefits, including enhanced situational  
22 awareness, security constrained dispatch, faster delivery of replacement  
23 generation after the end of contingency reserve sharing assistance, and enhanced  
24 integration of renewable resources.<sup>5</sup>

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<sup>5</sup> A copy of the FERC staff paper is available at  
<http://www.westgov.org/PUCeim/meetings/2013sprg/briefing/03-08-13FERC-EIMrbqa.pdf>

1 **Q. Did the Company rely upon the E3 Report in deciding to execute the**  
2 **Implementation Agreement in April 2013?**

3 A. Yes. Given the low preliminary estimated start-up costs and permissive  
4 termination provisions, the risk of executing the Implementation Agreement was  
5 low compared to the potential benefits forecast by the E3 Report. The Company  
6 continued to review and refine its estimates of the costs of EIM participation,  
7 however, for purposes of conducting its own, more granular cost-benefit analysis.

8 **Q. How did the Company incorporate the E3 Report into its cost-benefit**  
9 **evaluations in May and July 2013?**

10 A. The Company used the E3 high-level cost estimates as the starting place for  
11 analyzing EIM costs and benefits. Preparing this analysis was challenging  
12 because the EIM was being created and designed concurrently with the  
13 Company's efforts to quantify the EIM's costs and benefits. In the Company's  
14 confidential May 2013 business case, the range of estimates included different  
15 market structure assumptions. The Company's May 2013 analysis is attached as  
16 Confidential Exhibit PAC/105. Once the EIM was structured using a scheduling-  
17 coordinator-metered-entity option, this streamlined the Company's cost estimates  
18 for its July 2013 analysis.

19 The July 2013 analysis calculated a range of present value revenue  
20 requirement (PVRR) savings for projected EIM operation from October 1, 2014,  
21 through 2023. The PVRR savings in 2013 dollars ranged from [REDACTED] million,  
22 based on the assumption of low transfer capability and low benefits, to  
23 [REDACTED] million, based on the assumption of high transfer capability and high

1 benefits. The analysis assumes that benefits will begin October 1, 2014, but for  
2 the first quarter of operations, benefits are reflected at half of the full level to  
3 allow an adequate ramp-in period. The full level of benefits was assumed to  
4 begin in January 2015. The Company's July 2013 cost-benefit analysis  
5 supporting its decision to pursue the EIM is attached as Confidential Exhibit  
6 PAC/106.

7 **Q. Why is the range of projected customer savings so wide?**

8 A. The projected PVRR savings vary primarily because of the wide range of  
9 potential benefits, which is largely driven by the extent to which PacifiCorp will  
10 be able to use its existing transmission rights between PacifiCorp and the CAISO  
11 for the EIM. This transfer capability will capture the benefit of load and resource  
12 diversity across the wide EIM footprint and co-optimize dispatch across that wide  
13 area. The potential transfer range was unknown at the time the Company made  
14 the decision to pursue the EIM and remains uncertain as of this stage in the  
15 development process. The outcome will be influenced, in part, by the ongoing  
16 efforts among PacifiCorp, BPA, and the CAISO to clarify operational procedures  
17 associated with PacifiCorp's use of its existing transmission rights across the  
18 California-Oregon Intertie. The Company currently has long-term contract  
19 wheeling rights of 331 MW northbound and 432 MW southbound with PacifiCorp  
20 Transmission and 71 MW northbound and 93 MW southbound with BPA. On  
21 February 14, 2014, PacifiCorp, the CAISO, and BPA entered into a memorandum  
22 of understanding to achieve operating procedures by key milestone dates. A copy  
23 is attached as Exhibit PAC/107.

1 **Q. Do the projected benefits outweigh the estimated costs even at the low end of**  
2 **projected annual benefits?**

3 A. Yes.

4 **Q. Do the projected benefits grow if more BAs participate in the EIM?**

5 A. Yes. The E3 Report and numerous energy imbalance market studies that have  
6 been produced over the past several years all demonstrate that the larger the  
7 energy imbalance footprint and transfer capability within the energy imbalance  
8 market footprint, the greater the diversity and therefore the greater customer  
9 savings that may be realized from an energy imbalance market.

10 **Q. Have other entities expressed interest in participating in the EIM?**

11 A. Yes. The CAISO and PacifiCorp EIM stakeholder processes both realized robust  
12 participation from a variety of entities across the West. Nevada Power Company  
13 d/b/a NV Energy and Sierra Pacific Power Company d/b/a NV Energy  
14 (collectively referred to as NV Energy) entered into an EIM implementation  
15 agreement with the CAISO, which CAISO filed with the FERC on April 16, 2014.  
16 Also on April 16, NV Energy filed an application for approval to participate in the  
17 EIM with the Public Utilities Commission of Nevada. With approval from the  
18 FERC and the Nevada commission, NV Energy will target beginning its  
19 participation in October 2015. No other entities have made similar commitments  
20 at this time.

21 **Q. Please describe the cost assumptions in the Company's evaluations.**

22 A. In general, there are two categories of costs: start-up costs and ongoing costs  
23 (annual O&M costs and variable O&M costs). Start-up costs include both capital

1 and operation and maintenance (“O&M”) expense. Start-up costs include:  
2 (1) upgrading real-time and settlement metering and telecommunication  
3 equipment; (2) upgrading systems that are necessary to support efficient market  
4 operations; (3) support of EIM development and implementation; and (4)  
5 implementation costs paid to the CAISO to participate in EIM.<sup>6</sup>

6 **Q. Please describe the Company’s estimated Start-Up Costs.**

7 A. The Company’s July 2013 analysis estimated that it will spend approximately  
8 \$20 million on a total-company basis (approximately \$5 million on an Oregon-  
9 allocated basis) to develop and implement the EIM by October 1, 2014. Start-up  
10 costs include approximately \$16 million in capital costs on a total-company basis  
11 (approximately \$4 million Oregon-allocated) for upgrading the settlement  
12 metering and telecommunication equipment, upgrading systems for efficient  
13 market operations and processing EIM settlements, as well as approximately  
14 \$4 million in O&M on a total-company basis (approximately \$1 million Oregon-  
15 allocated) for support of EIM development and implementation.

16 The Amendment to the Implementation Agreement adds \$462,800 to the  
17 start-up cost estimate prepared in July 2013, associated with a base schedule  
18 aggregation fee. The July 2013 analysis included a contingency, which absorbed  
19 this cost, so there was no change to the overall project cost estimate. The CAISO  
20 provided the following description of this service in its FERC filing letter seeking  
21 approval of the Amendment:

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<sup>6</sup> The cost components associated with the one-time implementation fee are described in further detail in the declarations of Mr. Michael K. Epstein that were provided with the CAISO filings with FERC for approval of the Implementation Agreement and the Amendment in Docket No. ER13-1372 and Docket No. ER14-1350, respectively.



1 The additional functionality was included in the design at the  
2 request of stakeholders as an option for a participating  
3 balancing authority to submit base schedules to the [CA]ISO.  
4 PacifiCorp desires to take advantage of this design feature with  
5 respect to its incorporation into the EIM and has requested the  
6 [CA]ISO configure its systems accordingly. This functionality  
7 will provide an overall benefit to PacifiCorp and its customers  
8 by leveraging the [CA]ISO's existing technologies and  
9 expertise and reducing costs for PacifiCorp if it were required  
10 to design, configure and implement this functionality on its  
11 own. The [CA]ISO and PacifiCorp have mutually agreed to  
12 this rate increase, and the [CA]ISO requests that the  
13 Commission accept the Amendment as filed.<sup>7</sup>

14 **Q. What are the Company's annual O&M costs and variable O&M costs?**

15 A. Starting in 2015, the annual O&M costs are expected to be approximately  
16 \$1.7 million on a total-company basis (approximately \$425,000 on an Oregon-  
17 allocated basis), related to additional staff and IT systems and support. The  
18 variable O&M costs are expected to be approximately \$1.3 million on a total-  
19 company basis (approximately \$325,000 Oregon-allocated) and include the EIM  
20 Administrative Charge and other variable fees paid to the CAISO to participate in  
21 EIM. As discussed above, the Company proposes to include only the annual  
22 O&M costs in the deferred account.

23 **Q. How did the Company use the results of its May and July 2013 cost-benefit  
24 analyses?**

25 A. The Company used the analyses to confirm its decision to participate in the EIM.  
26 While the E3 Report lacked the benefit of a final EIM market design and actual  
27 operating history, it did provide indicative results that show customer benefits will  
28 exceed costs, potentially by a significant amount.

---

<sup>7</sup> CAISO Application for Approval of the Amendment at 4, FERC Docket No. ER14-1350 (Feb. 21, 2014).

1 **Q. In addition to the projected quantitative benefits, are there any other**  
2 **qualitative benefits resulting from the EIM?**

3 A. Yes. In addition to the quantitative benefits presented in the E3 Report, the EIM  
4 is also expected to provide qualitative benefits on a region-wide basis, particularly  
5 related to reliability. Under the EIM, the CAISO can manage the combined  
6 system using economic five-minute dispatch, and the pool of resources available  
7 to respond to events is expanded, thereby increasing the diversity of resources  
8 available to provide imbalance energy. The EIM will improve situational  
9 awareness across the EIM footprint by giving PacifiCorp and the CAISO access  
10 to a wider view of system operations in real-time and forward-looking operational  
11 intervals. Transmission operators will have an enhanced system representation  
12 and monitoring capability through the EIM. By automating and coordinating  
13 five-minute dispatch across the footprint, the EIM generates a single security-  
14 constrained economic dispatch solution. Currently, BAAs each create individual  
15 solutions that typically are coordinated only within the BAA or with minimal  
16 external counterparties. This can lead to inefficient results and potentially  
17 contradictory adjustments to the interconnected system. In addition, the EIM  
18 manages flows within transmission limits during dispatch, which will lead to  
19 improved congestion management in advance of the operating intervals. All  
20 customers benefit from this increased reliability in both the adequacy and  
21 diversity of supply.

22 The EIM also reduces the cost to integrate renewable resources by  
23 capturing diversity benefits through the wider geographic footprint. For example,

1 there is potential for significant weather differences throughout the expansive  
2 EIM geographic area. This geographic diversity mitigates the intermittency  
3 inherent in many renewable resources.

4 In addition, the EIM provides the potential for renewable resources to be  
5 used more efficiently. Wind may be blowing in an area far from load, but with a  
6 wider EIM footprint that expands beyond the individual BAA, that wind  
7 generation can be used to serve energy imbalances instead of having to be  
8 curtailed as oversupply. Finally, different peak periods within the EIM footprint  
9 will allow better utilization of renewable resources to meet peak loads.

#### 10 **RECOMMENDATION**

11 **Q. What is your recommendation for this Commission?**

12 A. The Company's decision to participate in the EIM was prudent based on the  
13 evidence available at the time it made this decision. This conclusion is based on  
14 the E3 Report and the Company's own cost-benefit analysis. As previously noted,  
15 the Company has the ability to exit the EIM with no exit fee if participation in the  
16 EIM is no longer in the best interest of PacifiCorp's customers. I recommend the  
17 Commission find that the Company acted prudently in deciding to participate in  
18 the EIM.

19 **Q. Does this conclude your direct testimony?**

20 A. Yes.

Docket No. UM-\_\_\_\_  
Exhibit PAC/101  
Witness: Stefan A. Bird

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF THE STATE OF OREGON**

**PACIFICORP**

---

**Exhibit Accompanying Direct Testimony of Stefan A. Bird  
PacifiCorp/CAISO Memorandum of Understanding**

**April 2014**

## ENERGY IMBALANCE MARKET MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into as of February 12, 2013 ("Effective Date"), by and between PacifiCorp, an Oregon corporation ("PacifiCorp"), and the California Independent System Operator Corporation, a California nonprofit public benefit corporation ("ISO"). PacifiCorp and the ISO are sometimes referred to in this MOU individually as a "Party" and, collectively, as the "Parties".

### RECITALS

- A. WHEREAS, PacifiCorp owns and operates facilities for the generation transmission, and distribution of electric power and energy in interstate commerce;
- B. WHEREAS, the ISO operates transmission facilities under its operational control and wholesale electricity markets, including an energy imbalance market, pursuant to its tariff on file with the Federal Energy Regulatory Commission ("FERC");
- C. WHEREAS, both Parties are committed to the development of relationships and opportunities focused on improving reliability and the efficiency of existing energy systems for the benefit of customers and stakeholders;
- D. WHEREAS, PacifiCorp desires to explore the feasibility, costs and benefits of participation in an energy imbalance market that can efficiently meet the needs of customers that rely on its transmission facilities and that could potentially be expanded to meet the needs of other customers ("EIM" or the "Project");
- E. WHEREAS, the ISO desires to explore the feasibility, costs and benefits of developing and operating the EIM in a manner that employs the systems and processes of the ISO's existing energy imbalance market to implement the Project;
- F. WHEREAS, the Parties acknowledge that the rules and procedures governing the Project's operation must be set forth in the provisions of a tariff filed with the FERC by the ISO, including corresponding revisions to PacifiCorp's tariff and that, prior to submission of the ISO tariff provisions, the ISO will consult with and obtain the views of stakeholders, including but not limited to, PacifiCorp;
- G. WHEREAS, the ISO will incur start-up costs associated with the Project, and PacifiCorp is willing to fund its share of such costs as separately agreed to pursuant to a definitive agreement mutually satisfactory to the Parties ("Implementation Agreement"); and

H. WHEREAS, the Parties are entering into this MOU to memorialize this understanding and set forth a process by which the Parties will negotiate terms and conditions of an Implementation Agreement, as more fully described in Exhibit A ("Principles") and Exhibit B ("Schedule"), and initiate an ISO stakeholder review and board approval process directed toward development of market rules for the Project consistent with the principles outlined in this MOU ("Stakeholder Process");

NOW THEREFORE, in consideration of the mutual covenants contained herein, and of other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Effective Date; Term.

(a) This MOU shall become effective on the Effective Date.

(b) The term of this MOU shall commence on the Effective Date and shall terminate upon the earliest date to occur of the following ("Termination Date"):

(i) The date that each of the Parties executes and delivers the Implementation Agreement, and such agreement is accepted by FERC without conditions or modifications unsatisfactory to either Party;

(ii) The date that either Party provides notice to the other Party that it has decided, in its sole and absolute discretion, not to proceed with the Project; or

(iii) The Parties fail to execute and deliver the Implementation Agreement on or before April 30, 2013, as such date may be extended by mutual written agreement of the Parties ("Target Date").

(c) This MOU shall automatically terminate on the Termination Date and shall have no further force or effect, provided that the rights and obligations set forth in (i) Sections 5, 6(g), 7 and 9 shall survive the termination of this MOU and remain in full force and effect; provided further, that Section 4 shall survive the termination of this MOU and remain in full force and effect for two (2) years following the termination of this MOU.

2. Implementation Agreement and Stakeholder Process.

(a) During the term of this MOU, both Parties shall proceed diligently and in good faith to attempt to negotiate mutually satisfactory terms of the Implementation Agreement and all such other definitive agreements, documents and approvals necessary to fully document the transactions

contemplated by the Project and the Implementation Agreement by no later than the Target Date.

(b) The ISO will commence the Stakeholder Process no later than the Target Date, consistent with its current governance structure and approval processes.

(c) Each Party shall select a senior-level representative ("Representative") to be responsible for coordinating such Party's activities under this MOU. Each Party commits to provide its Representative with the support and resources necessary to further the purposes of this MOU. In no event shall the Representatives be permitted to amend the terms of this MOU, other than in accordance with Section 6(b).

(d) Based on the information currently known to the Parties, the Parties propose that the Implementation Agreement would consider the principles attached hereto as Exhibit A ("Principles") and outline a scope of work with a target EIM implementation date of October 2014. The Principles set forth the Parties' current general understanding with respect to certain provisions of the Implementation Agreement, but do not represent a binding agreement or final contractual language or address every provision which the Parties may wish to incorporate into the Implementation Agreement. In addition and notwithstanding the foregoing, the Parties may choose to jointly develop and implement the Project through different structures pursuant to alternative agreements as may be agreed to by the Parties.

(e) The Principles also set forth the Parties' current general understanding with respect to many aspects of the Stakeholder Process, but are not intended to represent final tariff language or to address every provision which the ISO or PacifiCorp may wish to incorporate into its tariff provisions relating to EIM.

3. Nature of MOU. Neither this MOU nor the Principles is intended to include all of the essential terms of the transactions contemplated by this MOU (which will only be contained in the Implementation Agreement) and, accordingly, neither this MOU nor the Principles is intended to be a complete and binding agreement. No binding agreement will exist between the Parties with respect to the transactions to be included in the Implementation Agreement unless and until the Parties execute and deliver the Implementation Agreement, and such agreement is accepted by FERC without conditions or modifications unsatisfactory to either Party. Notwithstanding the foregoing, the Parties intend for Sections 4, 5, 6, 7, 8, and 9 of this MOU to be binding on the Parties as of the Effective Date.

4. Confidentiality.

(a) All written or oral information received from another Party in connection with this MOU (but not this MOU after the Effective Date) necessary to negotiate the Implementation Agreement shall constitute "Confidential Information" subject to the terms and conditions herein. Confidential Information does not include information that (i) becomes generally available to the public other than as a result of disclosure by such Party, its officers, directors, employees, agents, or representatives; (ii) is or becomes available to such Party on a non-confidential basis from other sources or their agents or representatives when such sources are not known by such Party to be prohibited from making the disclosure; (iii) is already known to such Party or has been independently acquired or developed by such Party without violating any of such Party's obligations under this Section 4 ; or (iv) is the subject of a mutual written agreement by the Parties to allow for such disclosure and designation as non-confidential or public information on a case-by-case basis in accordance with Section 8 of this MOU.

(b) The Confidential Information will be kept confidential by each Party and each Party agrees to protect the Confidential Information using the same degree of care, but no less than a reasonable degree of care, as a Party uses to protect its own confidential information of a like nature. Notwithstanding the preceding sentence, a Party may disclose the Confidential Information or portions thereof to those of such Party's officers, employees, partners, representatives, advisors, or agents who need to know such information for the purpose of analyzing or performing an obligation related to the Project. Notwithstanding the foregoing, a Party is not authorized to disclose such Confidential Information to any officers, employees, partners, representatives, advisors, or agents without (i) informing such officer, employee, partner, representative, advisor, or agent of the confidential nature of the Confidential Information and (ii) receiving the agreement of such officer, employee, partner, representative, advisor, or agent as to the confidentiality obligation herein. Each Party agrees to be responsible for any breach of this Section 4 by such Party or a Party's officers, employees, partners, representatives, advisors or agents.

(c) In the event that a Party becomes legally compelled (by law, rule, regulation, order, deposition, interrogatory, request for documents, subpoena, civil investigative demand or similar process) to disclose any of the Confidential Information, such Party shall provide the other Party with prompt prior written notice of such requirement so that the other Party may seek a protective order or other appropriate remedy and/or waive compliance with the terms of this Section 4. In the event that such protective order or other remedy is not obtained, or that such Party waives compliance with the provisions hereof, the Party compelled to disclose



shall (i) furnish only that portion of the Confidential Information which, in accordance with the advice of its own counsel (which may include internal counsel), is legally required to be furnished, and (ii) exercise reasonable efforts to obtain assurances that confidential treatment will be accorded the Confidential Information so furnished.

(d) Each Party is entitled to equitable relief, by injunction or otherwise, to enforce its rights under this provision to prevent the release of Confidential Information without bond or proof of damages, and may seek other remedies available at law or in equity for breach of this provision.

(e) Upon written request by a Party, the other Party shall promptly return to the requesting Party or destroy all Confidential Information it received, including all copies of its analyses, compilations, studies or other documents prepared by or for it, that contain the Confidential Information in a manner that would allow its extraction or that would allow the identification of the requesting Party as the source of the Confidential Information or inputs to the analysis. Notwithstanding the foregoing, neither Party shall be required to destroy or alter any computer archival and backup tapes or archival and backup files (collectively, "Computer Tapes"), provided that such Computer Tapes shall be kept confidential in accordance with the terms of this MOU.

5. Limitation of Liability; Indemnity.

(a) Each Party acknowledges and agrees that (i) the other Party's decision to proceed with the Implementation Agreement, and the decision to proceed with the Project, and any other decision with respect to the Implementation Agreement or the Project, is within the other Party's sole and absolute discretion and that the other Party may terminate this MOU at any time for any reason whatsoever or for no reason; and (ii) the other Party shall not be liable to it for any claim, loss, cost, liability, damage or expense, including any direct damage or any special, indirect, exemplary, punitive, incidental or consequential loss or damage (including any loss of revenue, income, profits or investment opportunities or claims of third party customers), arising out of or directly or indirectly related to the other Party's decision to terminate this MOU, the other Party's performance under this MOU, or any other decision with respect to proceeding or not proceeding with the Implementation Agreement or the Project.

(b) The rights and obligations under this Section 5 shall survive the expiration and termination of this MOU (but shall be superseded by, and of no further force and effect upon the execution of, the Implementation Agreement).

6. General Provisions.

(a) This MOU represents the entire agreement between the Parties and supersedes any prior written or oral agreements or understandings between the Parties relating to the subject matter of this MOU, provided that nothing in this MOU shall limit, repeal, or in any manner modify the existing legal rights, privileges, and duties of each of the Parties as provided by agreement, statute or any other law or applicable court or regulatory decision.

(b) This MOU may not be amended except in writing signed by both of the Parties; provided, however, the Parties may mutually agree to changes in the Exhibits without such changes constituting an amendment to this MOU.

(c) Any waiver on the part of a Party to this MOU of any provision or condition of this MOU must be in writing signed by each Party to be bound by such waiver, shall be effective only to the extent specifically set forth in such writing and shall not limit or affect any rights with respect to any other or future circumstance.

(d) This MOU is for the sole and exclusive benefit of the Parties and shall not create a contractual relationship with, or cause of action in favor of, any third party.

(e) Neither Party shall have the right to assign its interest in this MOU, including its rights, duties, and obligations hereunder, without the prior written consent of the other Party, which consent may be withheld by the other Party in its sole and absolute discretion. Any assignment made in violation of the terms of this Section 6(e) shall be null and void and shall have no force and effect.

(f) In the event that any provision of this MOU is determined to be invalid or unenforceable for any reason, in whole or part, the remaining provisions of this MOU shall be unaffected thereby and shall remain in full force and effect to the fullest extent permitted by law, and such invalid or unenforceable provision shall be replaced by the Parties with a provision that is valid and enforceable and that comes closest to expressing the Parties' intention with respect to such invalid or unenforceable provision.

(g) Whenever this MOU requires or provides that (i) a notice be given by a Party to the other Party or (ii) a Party's action requires the approval or consent of the other Party, such notice, consent or approval shall be given in writing and shall be given by personal delivery, by recognized overnight courier service, email or by certified mail (return receipt requested), postage prepaid, to the recipient thereof at the address given for such Party as set forth below, or to such other address as may be designated

by notice given by any Party to the other Party in accordance with the provisions of this Section 6(g):

If to PacifiCorp:

PacifiCorp  
825 NE Multnomah Street, Suite 2000  
Portland, OR 97232  
Attention: Senior Vice President, Strategic Business Performance  
E-mail: Andrea.Kelly@PacifiCorp.com

If to the ISO:

California Independent System Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Attention: Director, Strategic Alliances  
E-mail: DFuller@caiso.com

Each notice, consent or approval shall be conclusively deemed to have been given (i) on the day of the actual delivery thereof, if given by personal delivery, email or overnight delivery, or (ii) date of delivery shown on the receipt, if given by certified mail (return receipt requested).

(h) This MOU may be executed in one or more counterparts (including by facsimile or a scanned image), each of which when so executed shall be deemed to be an original, and all of which shall together constitute one and the same instrument.

(i) Nothing contained in this MOU shall be construed as creating a corporation, company, partnership, association, joint venture or other entity, nor shall anything contained in this MOU be construed as creating or requiring any fiduciary relationship between the Parties. No Party shall be responsible hereunder for the acts or omissions of the other Party. Nothing herein shall preclude a Party from taking any action (or having its affiliates take any action) with respect to any other project, including any such project that may compete with or be similar in kind to the Project.

(j) Unless otherwise expressly provided, for purposes of this MOU, the following rules of interpretation shall apply: (i) any reference in this MOU to gender includes all genders, and the meaning of defined terms applies to both the singular and the plural of those terms; (ii) the insertion of headings are for convenience of reference only and do not affect, and will not be utilized in construing or interpreting, this MOU; (iii) all references in this MOU to any "Section" are to the corresponding Section of this MOU unless otherwise specified; (iv) words such as "herein," "hereinafter," "hereof," and "hereunder" refer to this MOU (including the Exhibits to this

MOU) as a whole and not merely to a subdivision in which such words appear, unless the context otherwise requires; (v) the word "including" or any variation thereof means "including, without limitation" and does not limit any general statement that it follows to the specific or similar items or matters immediately following it; and (vi) the Parties have participated jointly in the negotiation and drafting of this MOU and, in the event an ambiguity or question of intent or interpretation arises, this MOU shall be construed as jointly drafted by the Parties and no presumption or burden of proof favoring or disfavoring any Party will exist or arise by virtue of the authorship of any provision of this MOU.

7. Governing Law; Venue. This MOU shall be governed by, and construed and interpreted in accordance with, the laws of the State of California without regard to its principles of conflicts of laws. Venue for any action hereunder shall be proper in any state or federal court located within the State of California or, where subject to its jurisdiction, FERC. Each Party waives to the fullest extent permitted by law, any right it may have to contest venue and a right to trial by jury in respect of any suit, action, claim or proceeding relating to this MOU.

8. Communication. The Parties shall mutually agree to the timing and content of any planned press release, public statement or meeting with the public or governmental authorities regarding the Project, subject to the terms and conditions of Section 4 herein. It is also understood the EIM will be implemented through the Stakeholder Process and that process will be open to the public.

9. Dispute Resolution. Unless otherwise provided herein, each of the provisions of this MOU shall be enforceable independently of any other provision of this MOU and independent of any other claim or cause of action. In the event of any dispute arising under this MOU, the Parties shall first attempt to resolve the matter through direct negotiation between the Representatives of the Parties. If the Representatives are unable to resolve the issue within ten (10) days after presentation of the dispute, then:

(a) To the fullest extent permitted by law, each of the Parties hereto waives any right it may have to a trial by jury in respect of litigation directly or indirectly arising out of, under or in connection with this MOU. Each Party further waives any right to consolidate, or to request the consolidation of, any action in which a jury trial has been waived with any other action in which a jury trial cannot be or has not been waived.

(b) If a waiver of jury trial is deemed by any court of competent jurisdiction to not be enforceable for any reason, then to the fullest extent permitted by law, each of the Parties hereto agrees to binding arbitration. Such arbitration shall be in accordance with the rules and procedures of the American Arbitration Association (AAA). Notwithstanding any AAA rules and procedures or any other provisions or any state or federal laws, the Parties agree that the arbitrators shall not consider or award punitive

damages as a remedy. Upon request by either Party, AAA shall provide the Parties a list of arbitrators each of whom have experience and expertise with respect to construction. Upon each of the Parties receipt of such list, each Party shall have ten (10) days to select an arbitrator. The two selected arbitrators shall then select a third arbitrator within thirty (30) days from the date the initial two arbitrators were selected and the matter subject to arbitration shall be arbitrated within sixty (60) days after the selection of the third arbitrator.

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IN WITNESS WHEREOF, each of the Parties has caused its duly authorized officer to execute this Memorandum of Understanding as of the date first above written.

PACIFICORP

By: 

Name: Gregory E. Abel

Title: Chairman and Chief Executive Officer

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

By: 

Name: Stephen Berberich

Title: President and Chief Executive Officer

## EXHIBIT A

### PRINCIPLES

The Parties' present understanding with respect to the Project is reflected in the following Principles. The Parties shall endeavor in good faith to address the Principles in the Implementation Agreement, as applicable, and the ISO shall endeavor in good faith to reflect the Principles in the market rules governing the Project, subject to input provided during the Stakeholder Process and regulatory review. The Parties understand that development of the Project, input provided during the Stakeholder Process, conditions imposed in connection with regulatory review of the Project and other circumstances may require changes in the Principles. Accordingly, the Principles are non-binding and subject to the outcome of the Parties' negotiations of the Implementation Agreement and of the Stakeholder Process, as more fully explained in Sections 2 and 3 of the MOU.

- (a) PacifiCorp has determined there is an opportunity to secure economic benefits for PacifiCorp's customers in the near-term through improved dispatch and operation of PacifiCorp's generation fleet and through the efficient use and continued reliable operation of existing and future transmission facilities.
- (b) The ISO has determined there are benefits to ISO market participants in the near term through greater access to energy imbalance resources in real-time and through the efficient use and reliable operation of the transmission facilities and markets operated by the ISO.
- (c) EIM implementation shall be compatible with existing and emerging market initiatives, such as the Northwest Power Pool reserve sharing program and FERC Order No. 764 (and its progeny), among others.
- (d) The EIM shall be informed by the proposal the ISO submitted to the Public Utility Commissions' Energy Imbalance Market group on March 29, 2012, adapted as appropriate to the circumstances of the Project.
- (e) The ISO shall develop the market rules applicable to the Project through the Stakeholder Process; PacifiCorp shall be a stakeholder in that process with rights and responsibilities with respect to the EIM implementation as provided for in the Implementation Agreement.
- (f) The ISO's up front implementation costs associated with PacifiCorp shall be accounted for based on cost causation and paid for by PacifiCorp pursuant to the Implementation Agreement; the ISO shall recover ongoing EIM administrative costs and any implementation costs of the Project not accounted for in the Implementation Agreement or through other implementation agreements through a rate filed with FERC.

- (g) Other entities may participate in the EIM within a timeframe to be determined by the ISO if they agree to fund their share of implementation costs pursuant to an implementation agreement in a manner similar to PacifiCorp.
- (h) Ongoing EIM business relationships between the ISO and participants, including PacifiCorp, shall be developed through the Stakeholder Process and established by the EIM tariff rules and associated EIM service agreements.
- (i) The Implementation Agreement shall terminate concurrently with the effective date of the EIM service agreement(s) between the ISO and PacifiCorp, as well as any similar implementation agreement between the ISO and other EIM participants, except for any provisions thereof that the Parties agree should survive such termination.
- (j) The initial EIM governance framework shall be consistent with the existing ISO governance, allow for voluntary participation and expansion of participants and market activities, and may evolve based on stakeholder feedback.
- (k) There shall be no modification of the Parties' respective functional responsibilities associated with reliability standards compliance; however, an agreement to clarify respective roles and responsibilities under certain circumstances may be appropriate.
- (l) EIM participants shall determine in the Stakeholder Process whether and how to account for transmission service, and the ISO ongoing administrative charge for settlement of such rates shall be determined based on cost causation.



## EXHIBIT B

### Stakeholder Process Draft Milestone Schedule

Milestone	Activity	Date
Execute MOU	Public release of the executed MOU	Feb 12, 2013
Stakeholder Feedback on MOU	The ISO and PacifiCorp present and receive stakeholder feedback on MOU	Feb 12 - Mar 8, 2013
ISO Board Authorization	The ISO presents the MOU to its governing board and requests authorization to enter into the Implementation Agreement and initiate an EIM stakeholder process, consistent with the Principles	Mar 20 - 21, 2013
EIM Stakeholder Process	Initiation of EIM stakeholder process for all participants	Apr 2013
Implementation Agreement Execution and Filing with FERC	The Parties will negotiate and execute the Implementation Agreement consistent with the MOU, and file with FERC	Apr 30, 2013
Implementation Agreement Effective	Implementation Agreement effective based on FERC acceptance, including first payment to the ISO for start-up costs	Jun 30, 2013
ISO Board Approval	Stakeholder process for EIM is concluded, final EIM proposal is presented to the ISO governing board for approval	Sept - Dec 2013
EIM Tariffs Filed with FERC	The ISO and PacifiCorp file respective tariff changes with FERC at least 120 days before go-live	Jan - Apr 2014
Go-Live	EIM market opens to initial participation	Oct 2014

### Project Draft Milestone Schedule

Milestone	Activity	Date
Initial Resource and Contract Analysis—Phase 1	Joint analysis of existing resources, transmission assets, and existing contracts with particular focus on contracts that interconnect PacifiCorp and the ISO	Feb - Apr 2013
Initial Technical Requirements and Market Design Review	Joint analysis of technical requirements, market design, and resources	Feb - Apr 2013
Initial Participation Requirements for Third-Party Generator Owners	Assessment/determination of participation requirements for PacifiCorp-system third-party generator owners and load serving entities, informed by outreach and engagement	Feb - Apr 2013
Resource/Contract Analysis	Joint analysis of existing resources, transmission	Jul - Oct 2013

Phase 2	assets, and existing contracts	
Modeling Work	Modeling work performed by the ISO for full network model expansion, EMS model update, state estimator work, and market model update	Feb 2013 - Mar 2014
Final EIM Tariff Development	The ISO prepares tariff based on board approval; PacifiCorp prepares and internally approves corresponding tariff changes	Jan – Apr 2014
Settlement Development (includes requirements, design, software development and testing)	Development of settlement system modifications to accommodate EIM	Jul 2013 - Jul 2014
User Interface Development (includes requirements, design, software development and testing)	Development of user interfaces for ISO operators and EIM participants	Jul - Jul 2014
Finalize Contracts	Execute all enabling contracts to support EIM participation	May - Jun 2014
Market Simulation	Conduct market simulation using models updated for PacifiCorp	Aug - Sep 2014

Docket No. UM-\_\_\_\_  
Exhibit PAC/102  
Witness: Stefan A. Bird

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF THE STATE OF OREGON**

**PACIFICORP**

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**Exhibit Accompanying Direct Testimony of Stefan A. Bird  
Implementation Agreement**

**April 2014**



California Independent  
System Operator Corporation

April 30, 2013

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

**Re: California Independent System Operator Corporation  
Filing of ISO Rate Schedule No. 73  
Docket No. ER13-\_\_\_\_-000**

Dear Secretary Bose:

The California Independent System Operator Corporation (“ISO”)<sup>1</sup> submits for filing and acceptance an agreement dated April 30, 2013, between the ISO and PacifiCorp (“Implementation Agreement”).<sup>2</sup> The Implementation Agreement sets forth the terms under which the ISO will modify and extend its existing real-time energy market systems to provide energy imbalance market service to PacifiCorp, including transmission customers taking transmission service under PacifiCorp’s open access transmission tariff (“OATT”). Under the Implementation Agreement, PacifiCorp will compensate the ISO for its share of the costs of these system changes, software licenses, and other configuration activities. The ISO has also initiated a concurrent stakeholder process to design the energy imbalance market and establish its governing market rules.

The ISO requests that the Commission accept the Implementation Agreement effective July 1, 2013, so the extension of the real-time energy market to include PacifiCorp’s participation in the energy imbalance market may proceed without delay. The ISO notes, as discussed further below, that additional filings will be submitted for the Commission’s review of the rules of the expanded energy imbalance market and the

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<sup>1</sup> Capitalized terms not otherwise defined herein have the meanings set forth in Appendix A to the ISO tariff and in the Implementation Agreement.

<sup>2</sup> The ISO submits the Implementation Agreement pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d, and Part 35 of the Commission’s regulations, 18 C.F.R. Part 35, and in compliance with Order No. 714, *Electronic Tariff Filings*, FERC Stats. & Regs. ¶ 31,276 (2009).

terms of participation in the market before the market commences operation, which is targeted for October 1, 2014.

## I. Background

### A. Discussions Concerning an Energy Imbalance Market Serving Multiple Balancing Authority Areas and Advantages of the Expanded Energy Imbalance Market

Industry leaders in the West have explored and promoted the energy imbalance market concept for the last several years. The Western Electricity Coordinating Council (“WECC”) launched a major initiative and study effort in 2010. Late in 2011, the Western Governors Association appointed a group of western public utilities commissioners to advance the concept and understanding of an energy imbalance market. Such an energy imbalance market has the potential to produce significant economic and reliability benefits for customers throughout the region.<sup>3</sup> In addition, an energy imbalance market would provide the energy imbalance services that utilities in the region currently offer under schedules 4 and 9 of their respective OATT, as Order Nos. 888 and 890 require, to address real-time variations in load and generation.<sup>4</sup>

Replacing the utilities’ separate provision of energy imbalance service with an automated market operating in multiple balancing authority areas would allow participants to obtain imbalance energy from a far greater pool of resources than would otherwise be available. The expansion of the resources able to provide imbalance energy would benefit customers of all participating balancing authority areas.

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<sup>3</sup> See *PacifiCorp – ISO Energy Imbalance Market Benefits Report* (March 13, 2013), by Energy and Environmental Economics, Inc., <http://www.caiso.com/Documents/PacifiCorp-ISOEnergyImbalanceMarketBenefits.pdf> (“PacifiCorp-ISO Benefits Report”); and *Examination of Potential Benefits of an Energy Imbalance Market in the Western Interconnection* (March 2013), by the National Renewable Energy Laboratory, <http://www.nrel.gov/docs/fy13osti/57115.pdf>; see also *Qualitative Assessment of Potential Reliability Benefits from a Western Energy Imbalance Market* (February 26, 2013), FERC Staff, <http://www.westgov.org/PUceim/meetings/2013/briefing/03-08-13FERC-EIMrbqa.pdf>. In addition, the Northwest Power Pool has conducted an energy imbalance market benefit study with respect to its region, which was presented on April 8, 2013 at the western public utilities commissioners’ group meeting in Boise, Idaho.

<sup>4</sup> See *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities and Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Order No. 888, FERC Stats. & Regs. ¶ 31,036, at 31,705 (1996), *order on reh’g*, Order No. 888-A, FERC Stats. & Regs. ¶ 31,048 (1997), *order on reh’g*, Order No. 888-B, 81 FERC ¶ 61,248 (1997), *order on reh’g*, Order No. 888-C, 82 FERC ¶ 61,046 (1998), *aff’d in part and rev’d in part sub nom. Transmission Access Policy Study Group v. FERC*, 225 F.3d 667 (D.C. Cir. 2000), *aff’d sub nom. New York v. FERC*, 535 U.S. 1 (2002). *Preventing Undue Discrimination and Preference in Transmission Service*, Order No. 890, FERC Stats. & Regs. ¶ 31,241, *order on reh’g*, Order No. 890-A, FERC Stats. & Regs. ¶ 31,261 (2007), *order on reh’g*, Order No. 890-B, 123 FERC ¶ 61,299 (2008), *order on reh’g*, Order No. 890-C, 126 FERC ¶ 61,228 (2009), *order on clarification*, Order No. 890-D, 129 FERC ¶ 61,126 (2009).

The ISO already conducts a real-time energy imbalance market in connection with its provision of transmission service under the ISO tariff. The ISO's real-time energy market creates locational marginal prices and automatically dispatches the least cost resources every 5 minutes to economically serve load, while avoiding transmission congestion through the use of a detailed network model. Resources with the ability to respond to 5-minute dispatch instructions may bid available energy into this market. The ISO has examined how its experience could facilitate the development of an energy imbalance market that would operate in multiple balancing authority areas and benefit existing customers of the ISO and other interested participants.

As a result of its review, the ISO determined that the real-time portion of the existing ISO market, including 5-minute dispatch, could be expanded to function as an energy imbalance market operating in multiple balancing authority areas and that doing so would benefit both existing ISO customers and customers of other interested participants.<sup>5</sup> The ISO determined that basing an energy imbalance market on the real-time portion of the existing ISO market offers several advantages, including:

- The benefit of building on an existing, stable platform that balancing authority areas could incrementally avail themselves of;
- The economies of scale that result from balancing resources and loads of other balancing authority areas together with the resources and loads participating in the ISO, benefitting all participants through improved reliability, better forecasting and integration of renewables, and improved scheduling practices;
- The ability to use “security-constrained economic dispatch” to manage congestion more efficiently and ensure that the energy imbalance market's dispatch would not cause constraints to be violated; and
- Improved management of intermittent resources through automatic adjustments made by the ISO's market system.<sup>6</sup>

As discussed further below, expansion of the ISO's existing real-time energy market presents a low risk and low cost market platform.

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<sup>5</sup> See ISO Conceptual EIM Proposal (March 29, 2012), [http://www.caiso.com/Documents/ISOConceptualProposal\\_PUC-EIM\\_20120405.pdf](http://www.caiso.com/Documents/ISOConceptualProposal_PUC-EIM_20120405.pdf); ISO Clarification of Conceptual EIM Proposal (January 19, 2013), [http://www.caiso.com/Documents/ISOConceptualProposalClarification\\_PUC-EIM\\_20130129.pdf](http://www.caiso.com/Documents/ISOConceptualProposalClarification_PUC-EIM_20130129.pdf); see also *PacifiCorp – ISO Benefits Report* (estimating annual economic PacifiCorp-ISO benefits from the EIM to be in the range of \$21.4 million to \$128.7 million, depending upon the transfer capacity actually available between the two systems in real time).

<sup>6</sup> *Id.*

## **B. ISO-PacifiCorp Memorandum of Understanding**

On February 12, 2013, PacifiCorp and the ISO executed a memorandum of understanding (“MOU”).<sup>7</sup> The MOU established a basis for the ISO and PacifiCorp to move forward with two activities. The first activity was the negotiation and filing for Commission approval of the Implementation Agreement. The second activity contemplated by the MOU is the ISO’s development of the expanded energy imbalance market design and applicable market rules for submission to the Commission at a later date, after taking into account input from stakeholders.<sup>8</sup>

The MOU itself contains twelve principles and a high-level project milestone schedule, including milestones associated with a stakeholder process. The ISO and PacifiCorp developed the principles to meet the parties’ needs and the anticipated needs of customers and other stakeholders with respect to the energy imbalance market.

The Implementation Agreement incorporates the specific principles in the MOU and also establishes a more detailed project scope and schedule than was provided in the MOU. The current stakeholder process timeline anticipates presentation of the final energy imbalance market design proposal to the ISO governing board in November 2013 and, with board authorization, development of the necessary tariff changes for submission to the Commission for acceptance in early 2014.<sup>9</sup>

## **II. The Implementation Agreement**

The Implementation Agreement details the contractual terms, including the scope of work and the agreed to fee, under which the ISO will take the steps necessary to adapt the ISO’s energy imbalance market for use by PacifiCorp and its transmission customers, including key milestones and associated milestone payment provisions. The six fundamental purposes served by the Implementation Agreement are described below.

### **A. The Implementation Agreement Establishes Project Scope and Schedule**

The Implementation Agreement establishes the project scope and schedule, which is set forth in Exhibit A. The Implementation Agreement requires both the ISO

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<sup>7</sup> See PacifiCorp-ISO Memorandum of Understanding (February 12, 2013), [http://www.caiso.com/Documents/ISO-PacifiCorpMOU\\_Effective20130212.pdf](http://www.caiso.com/Documents/ISO-PacifiCorpMOU_Effective20130212.pdf).

<sup>8</sup> See ISO Energy Imbalance Market Design Straw Proposal and Issue Paper (April 4, 2013), [http://www.caiso.com/Documents/DesignStrawProposal-IssuePaper-EnergyImbalanceMarket\\_040413.pdf](http://www.caiso.com/Documents/DesignStrawProposal-IssuePaper-EnergyImbalanceMarket_040413.pdf).

<sup>9</sup> PacifiCorp – ISO Implementation Agreement, Recital C, Section 14, and Exhibit A

and PacifiCorp to complete a variety of project tasks necessary for the development and implementation by October 1, 2014, of an energy imbalance market in which PacifiCorp and its OATT customers can participate. The parties chose this date to allow for completion of all necessary activities because it is outside of the summer peak operational period. These tasks may be modified by mutual agreement of the parties.<sup>10</sup>

The milestones included in the Implementation Agreement are intended to align the project timeline and the stakeholder process. These activities must be aligned so that the imbalance energy market can both be implemented in a timely manner and take into account stakeholder input in developing the market design and rules.<sup>11</sup>

### **B. PacifiCorp's Share of the ISO's Development Costs Will Be Recovered Through a Fixed Implementation Fee**

The Implementation Agreement specifies that PacifiCorp will pay a fixed implementation fee of \$2.1 million, subject to completion of milestones specified in the Implementation Agreement.<sup>12</sup> This is the fee that the ISO will charge PacifiCorp through five (5) specific milestone payments for recovery of the portion of the costs attributable to the ISO's configuration of its real-time energy market to function as an energy imbalance market available to PacifiCorp and its transmission customers. On March 20, 2013, the ISO Board authorized the ISO management to enter into the Implementation Agreement and increase its 2013 capital budget by \$2.1 million to account for the anticipated associated revenues.<sup>13</sup>

The implementation fee is based on the ISO's estimate of the costs it will incur to configure its real-time energy market to function as an energy imbalance market available to all balancing authority areas in the WECC. The components of that estimate are described in the Declaration of Michael K. Epstein, the ISO's Director of Financial Planning, which is included with this filing as Attachment B, and are summarized below.

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<sup>10</sup> Implementation Agreement, Section 3.

<sup>11</sup> Activities more broadly considered as being necessary to implement the energy imbalance market, including the necessary tariff revisions and service agreements, will be the subject of the stakeholder process regarding the energy imbalance market design and rules, as discussed further below in Section II.E of this transmittal letter.

<sup>12</sup> Implementation Agreement, Section 4 and Exhibit A.

<sup>13</sup> ISO Board Resolution, March 20-21, 2013, [http://www.caiso.com/Documents/DecisionPacifiCorpEIM\\_ImplementationAgreement-Motion-Mar2013.pdf](http://www.caiso.com/Documents/DecisionPacifiCorpEIM_ImplementationAgreement-Motion-Mar2013.pdf).



Implementation Costs (in thousands of dollars)	
Licenses	10,800
EMS system improvements	1,000
Data storage	2,000
Necessary hardware upgrades	500
Production software modifications	1,000
Network configuration and mapping	500
Integration	500
Testing	1,500
System performance tuning	250
Training and operations readiness	150
Project management	100
<b>Total</b>	<b>\$18,300</b>

Using this estimate, the ISO derived a rate that allocates the \$18.3 million to potential entrants into the energy imbalance market according to their proportionate share of the total WECC load (excluding the ISO's load), using data reported to WECC. The ISO then applied this fee to PacifiCorp's share of the WECC load (exclusive of the ISO).

The \$2.1 million implementation fee is just and reasonable because it allocates a portion of the overall cost to PacifiCorp in an amount proportionate to PacifiCorp's share of the benefits that will ensue from the energy imbalance market, as measured by usage. In addition, as explained in Mr. Epstein's declaration, the ISO confirmed the reasonableness of the resulting allocation by comparing it to an estimate of the costs the ISO projects it will incur to configure its real-time energy market to function as an energy imbalance market that serves both the ISO and PacifiCorp, prior to expansion to include other entities and determining that the fee accurately represents those costs.

The Implementation Agreement also provides for adjustment of the fixed implementation fee by mutual agreement of the parties in the event the ISO's actual or expected costs exceed the estimate that forms the basis of the implementation fee. This provision allows for appropriate consideration of the allocation of costs associated with incorporation of PacifiCorp into the energy imbalance market. At the same time, the requirement for PacifiCorp to agree to any increase in the implementation fee due to increased development costs ensures that PacifiCorp's share of those costs remains reasonable. The Implementation Agreement therefore represents a reasonable balance of the parties' interest in preserving a level of cost certainty for their customers while appropriately allocating the costs of developing the energy imbalance market.

### **C. The Implementation Agreement Affirms Key Principles**

In addition to other provisions of the Implementation Agreement, Section 14 incorporates several of the principles identified in the MOU. These principles are

necessarily dependent on the outcome of the market design and development process, including input from stakeholders, but are reiterated in the Implementation Agreement to guide the parties' efforts as the stakeholder process unfolds. Each of these principles is set forth below.

1. *Structure of the market rules.* The EIM market rules shall be contained in a discrete part of the ISO tariff to the extent this structure provides additional clarity to all EIM participants; provided, however, provisions generally applicable to the relationship between the ISO and market participants may be provided for by reference and applicable to EIM participants. This format and structure will enable a better understanding of the EIM market rules and ensure that oversight of these market rules can evolve. Having the EIM market rules discretely organized facilitates portability and opportunity for a different oversight structure, as appropriate. In the meantime, this format and structure provides clarity for all interested participants.
2. *Market rule oversight.* Initial EIM governance and market rule oversight shall be consistent with existing ISO governance, allow for voluntary participation and expansion of participants and market activities, and evolve based on stakeholder feedback. Consideration of EIM governance and market rule oversight will be considered during the stakeholder process. However, it is important to move forward in a timely manner to capture the benefits of the EIM and gain experience as these important issues continue to be considered.
3. *Transmission services.* The Parties shall consider whether and how to account for transmission service in the EIM stakeholder process. Each transmission owner participating in the EIM will retain its rights to establish imbalance energy service rates under its OATT. In addition, it will be important to consider whether a transmission service rate for transfers between balancing authority areas participating in the EIM is appropriate.
4. *Compliance with greenhouse gas emission standards.* The EIM shall include an appropriate means to identify transactions that do not involve California resources or loads, or that otherwise occur outside the State of California, such that only the imbalance energy portion that is imported into California would be subject to any laws, regulations or costs associated with a California specific greenhouse gas compliance obligation. In doing so, it will be important to work with California regulators and all EIM participants to ensure greenhouse gas costs are accounted for properly.
5. *Compatibility with existing and emerging market features.* The EIM shall be implemented in a manner that is compatible with the Northwest Power Pool reserve sharing program and other existing and emerging market initiatives, including FERC Order No. 764 (and its progeny). The EIM design is founded upon a 15 minute real time market being implemented prior to the EIM, and it

remains essential the EIM not erode existing reserve sharing benefits.

6. *Opportunity for Others to Participate.* Other entities may participate in the EIM within a timeframe to be determined by the ISO if they agree to fund their share of implementation costs pursuant to a FERC-accepted implementation agreement in a manner similar to PacifiCorp. It is expected that a regular commitment cycle would be established in the EIM market rules, providing an opportunity to take EIM service after the commitment is made.

In addition to the principles outlined above, Section 12 provides the opportunity for the ISO and PacifiCorp to work with customers in the PacifiCorp balancing authority area, or other third parties, to ensure accommodation of their interests when the energy imbalance market is implemented. Lastly, Section 13 provides that both parties will comply with their respective compliance obligations, including WECC and NERC Reliability Standards. The Implementation Agreement is not intended to modify the parties' current functional responsibilities associated with such compliance.

#### **D. The Implementation Agreement Provides a Framework to Resolve Differences**

The Implementation Agreement represents a binding commitment of the parties. As such, it must provide a workable framework for the parties to resolve any differences and correct course along the way. On the other hand, the Implementation Agreement recognizes that proceeding with development of the energy imbalance market is a voluntary act on the part of the ISO and choosing to participate in the energy imbalance market is a voluntary act on the part of PacifiCorp.

Accordingly, the Implementation Agreement allows either party to terminate the agreement for any reason, provided it has first entered into good faith discussions for thirty (30) days in an effort to resolve any differences.<sup>14</sup> This and other related provisions mean that the parties must work closely together to achieve the goal of implementing an energy imbalance market in a form approved by the Commission.

#### **E. The Implementation Agreement Sets Forth the Agreed Development Process, Including the Process for Obtaining Stakeholder Input**

Success of the energy imbalance market is dependent on parallel completion of both (1) the tasks and milestones identified in the Implementation Agreement *and* (2) the development of proposed market rules, the receipt and consideration of stakeholder input, and the acceptance of the market rules and associated tariff amendments and agreements by the Commission. Upon Commission acceptance of the energy imbalance market rules and the associated service agreements, the Implementation Agreement will terminate.

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<sup>14</sup> Implementation Agreement, Section 2.

## **F. Other Provisions**

The Implementation Agreement includes a variety of standard provisions that round out the parties' commitment. These are confidentiality (Section 5), limitations of liability (Section 6), representations and warranties (Section 7), general provisions such as notices, amendments, etc. (Section 8), governing law and venue (Section 9), communication (Section 10), and dispute resolution (Section 11).

## **III. Next Steps**

Following Commission acceptance of this filing, the ISO will continue its stakeholder process and initiate activities necessary to implement PacifiCorp into the energy imbalance market. In parallel with the ISO's process, implementation of the energy imbalance market may require modifications to PacifiCorp's OATT. The ISO recognizes that PacifiCorp will be working with its transmission customers and other interested parties to facilitate implementation of the energy imbalance market.

## **IV. Effective Date**

The ISO requests that the Implementation Agreement be made effective on July 1, 2013.

## **V. Request for Waivers**

The ISO believes this filing constitutes a new service (development of an expanded energy imbalance market) to a new customer (PacifiCorp), and is thus an initial rate schedule, subject to section 35.12 of the Commission's rules, 18 C.F.R. § 35.12 (2012). This filing substantially complies with the requirements of section 35.12 of the Commission's rules, 18 C.F.R. § 35.12 (2013), applicable to filings of this type. The ISO respectfully requests waiver of any such requirement to the extent this filing does not satisfy that requirement.

In the event the Commission concludes that this filing is a change in a rate tariff or service agreement, the ISO submits that the filing also substantially complies with the requirements of section 35.13 of the Commission's rules, 18 C.F.R. § 35.13 (2013), applicable to filings of this type. The ISO respectfully requests waiver of any such requirement to the extent this filing does not satisfy that requirement. In particular, the ISO requests waiver of the requirement to submit Period 1 and Period 2 schedules, because the implementation fee is a one-time fee that is not based on historical data in Period 1 schedules or on the projections in Period 2 schedules.

In either event, there is good cause to waive filing requirements that are not material to the Commission's consideration of the Implementation Agreement.

## **VI. Service**

The ISO has served copies of this filing upon all scheduling coordinators, the California Public Utilities Commission, and the California Energy Commission. In addition, the ISO has posted the filing on the ISO website.

Enclosed for filing is each of the following:

- (1) This letter of transmittal; and
- (2) Implementation Agreement (Attachment A); and
- (3) Declaration of Michael K. Epstein, Director of Financial Planning (Attachment B).

## **VII. Correspondence**

The ISO requests that all correspondence, pleadings, and other communications concerning this filing be served upon the following:

John C. Anders\*  
Senior Counsel  
California Independent System  
Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Tel: (916) 608-7287  
E-mail: janders@caiso.com

\* Individual designated for service pursuant to Rule 203(b)(3),  
18 C.F.R. § 203(b)(3).

### **VIII. Conclusion**

The ISO respectfully requests that the Commission accept this filing and permit the Implementation Agreement, ISO Rate Schedule No. 73, to be effective July 1, 2013. If there are any questions concerning this filing, please contact the undersigned.

Respectfully submitted,

**By: /s/ John C. Anders**

Nancy Saracino

General Counsel

Roger E. Collanton

Deputy General Counsel

Beth Ann Burns

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Attorneys for the California Independent  
System Operator Corporation

**Attachment A**

**Rate Schedule 73**

**Energy Imbalance Market Implementation Agreement**

**between the ISO and PacifiCorp**

**California Independent System Operator**

**April 30, 2013**

## **ENERGY IMBALANCE MARKET IMPLEMENTATION AGREEMENT**

This Implementation Agreement (“Agreement”) is entered into as of April 30, 2013, by and between PacifiCorp, an Oregon corporation (“PacifiCorp”), and the California Independent System Operator Corporation, a California nonprofit public benefit corporation (“ISO”). PacifiCorp and the ISO are sometimes referred to in this Agreement individually as a “Party” and, collectively, as the “Parties”.

### **RECITALS**

A. WHEREAS, PacifiCorp has determined there is an opportunity to secure benefits for PacifiCorp’s customers through improved dispatch and operation of PacifiCorp’s generation fleet and through the efficient use and continued reliable operation of existing and future transmission facilities and desires to participate in an energy imbalance market (“EIM”) that benefits its customers and could potentially be expanded to benefit other customers in the region;

B. WHEREAS, the ISO has determined there are benefits to ISO market participants through greater access to energy imbalance resources in real-time and through the efficient use and reliable operation of the transmission facilities and markets operated by the ISO, and desires to develop and operate the EIM by employing the systems and processes of the ISO’s existing imbalance energy market;

C. WHEREAS, the ISO will develop EIM market rules through a stakeholder process in which PacifiCorp will be a stakeholder with rights and responsibilities with respect to the EIM implementation as provided for in this Agreement.

D. WHEREAS, the Parties acknowledge that the rules and procedures governing the EIM must be set forth in the provisions of an ISO tariff filed with the Federal Energy Regulatory Commission (“FERC”), as well as corresponding revisions to PacifiCorp’s Open Access Transmission Tariff and the execution of associated service agreements, to implement the EIM;

E. WHEREAS, the Parties are entering into this Agreement to set forth the terms upon which the ISO will timely configure its systems to incorporate PacifiCorp into the EIM and develop the market rules for the EIM (“Project”) as contemplated by the Memorandum of Understanding dated February 12, 2013 (“MOU”), such that PacifiCorp and the ISO are prepared for an October 1, 2014 implementation of the Project (“Implementation Date”);

NOW THEREFORE, in consideration of the mutual covenants contained herein, and of other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:



## AGREEMENT

### 1. Effective Date and Term.

(a) This Agreement shall become effective upon the date the Agreement is accepted, approved or otherwise permitted to take effect by FERC, without condition or modification unsatisfactory to either Party ("Effective Date").

(b) In the event FERC requires any modification to the Agreement or imposes any other condition upon its acceptance or approval of the Agreement, each Party shall have ten (10) days to notify the other Party that any such modification or condition is unacceptable to that Party. If no Party provides such notice, then the Agreement, as modified or conditioned by FERC, shall take effect as of the date determined under section 1(a). If either Party provides such notice to the other Party, the Parties shall take any one or more of the following actions: (i) meet and confer and agree to accept any modifications or conditions imposed by such FERC order; (ii) jointly seek further administrative or legal remedies with respect to such FERC order, including a request for rehearing or clarification; or (iii) enter into negotiations with respect to accommodation of such FERC order, provided however, if the Parties have not agreed to such an accommodation within thirty (30) days after the date on which such FERC order becomes a final and non-appealable order, such order shall be deemed an adverse order and the Parties shall have no further rights and obligations under this Agreement.

(c) The term of this Agreement ("Term") shall commence on the Effective Date and shall terminate upon the earliest to occur of (1) the date FERC permits all necessary revisions to the ISO and PacifiCorp tariffs to take effect and the service agreements under such tariffs necessary for the commencement of the EIM have taken effect; (2) termination in accordance with Section 2 of this Agreement; or (3) such other date as mutually agreed to by the Parties ("Termination Date").

(d) This Agreement shall automatically terminate on the Termination Date and shall have no further force or effect, provided that the rights and obligations set forth in Sections 5 and 6 shall survive the termination of this Agreement and remain in full force and effect.

### 2. Termination.

(a) The Parties may mutually agree to terminate this Agreement in writing at any time. In addition, either Party may terminate this Agreement in its sole discretion after conclusion of the negotiation period in Section 2(b), as provided in Section 2(d) or 2(e) as applicable.

(b) If either the ISO or PacifiCorp seeks to terminate this agreement, it must first notify the other Party in writing of its intent to do so ("Notice of Intent to Terminate") and engage in thirty (30) days of good faith negotiations in an effort to resolve its concerns. If the Parties successfully resolve the concerns of the Party

issuing the Notice of Intent to Terminate, the Party that issued such notice shall notify the other Party in writing of the withdrawal of such Notice ("Notice of Resolution").

(c) At the time the Notice of Intent to Terminate is provided, or any time thereafter unless a Notice of Resolution is issued, PacifiCorp may provide written notice directing the ISO to suspend performance on any or all work on the Project for a specified period of time ("Notice to Suspend Work"). Upon receipt of a Notice to Suspend Work, the ISO shall: (1) discontinue work on the Project; (2) place no further orders with subcontractors related to the Project; (3) take commercially reasonable actions to suspend all orders and subcontracts; (4) protect and maintain the work on the Project; and (5) otherwise mitigate PacifiCorp's costs and liabilities for the areas of work suspended. The ISO will not invoice PacifiCorp pursuant to Section 4(c) of this Agreement for any milestone payment following the issuance of a Notice to Suspend Work. To the extent a Notice of Resolution is issued pursuant to Section 2(b), the Notice to Suspend Work in effect at the time shall be deemed withdrawn and the ISO shall be entitled to invoice PacifiCorp for any milestone completed as specified in Section 4(c) of this Agreement and PacifiCorp shall pay such invoice pursuant to Section 4.

(d) Any time after 30 days from the date of the Notice of Intent to Terminate under Section 2(b), issued by either Party, and prior to the date of a Notice of Resolution, the ISO may terminate this Agreement by providing written notice to PacifiCorp that it is terminating this Agreement ("Termination Notice") effective immediately. The ISO may terminate this Agreement at its sole discretion for any reason, including but not limited to: (i) a lack of reasonable progress in the development of the Project in accordance with Exhibit A to this Agreement, subject to modification only as described in Section 3(c); (ii) a disagreement between the Parties regarding Project design, scope, or implementation, which disagreement the Parties are unable to resolve to their mutual satisfaction; or (iii) if the ISO determines in its sole discretion that the Project is not likely to provide the benefits the ISO is seeking to obtain.

(e) Any time after 30 days from the date of the Notice of Intent to Terminate under Section 2(b), issued by either Party, and prior to the date of a Notice of Resolution, PacifiCorp may terminate this Agreement by providing written notice to the ISO that it is terminating this Agreement ("Termination Notice") effective immediately. PacifiCorp may terminate this Agreement at its sole discretion for any reason, including but not limited to: (i) a lack of reasonable progress in the development of the Project in accordance with Exhibit A to this Agreement, subject only to modification only as described in Section 3(c); (iii) a disagreement between the Parties regarding Project design, scope, or implementation, which disagreement the Parties are unable to resolve to their mutual satisfaction; or (iii) if PacifiCorp determines in its sole discretion that the Project is not likely to provide the benefits PacifiCorp is seeking to obtain.

(f) In the event this Agreement is terminated by either or both of the Parties, this Agreement will become wholly void and of no further force and effect, without further action by either Party, and the liabilities and obligations of the Parties hereunder will terminate, and each Party shall be fully released and discharged from any liability or obligation under or resulting from this Agreement as of the date of the Termination Notice provided in Section 2(d) or 2(e), as applicable, notwithstanding the requirement for the ISO to submit the filing specified in Section 2(g). Notwithstanding the foregoing, the rights and obligations set forth in Sections 5 and 6 shall survive the termination of this Agreement and remain in full force and effect as specified in Sections 5 and 6, and any milestone payment obligation pursuant to Section 4(c) that arose prior to the Termination Notice in accordance with Section 2(d) or 2(e) shall survive until satisfied or resolved in accordance with Section 11.

(g) The Parties acknowledge that the ISO is required to file a timely notice of termination with FERC. The Parties acknowledge and agree that the filing of the notice of termination by the ISO with FERC will be considered timely if the filing of the notice of termination is made after the preconditions for termination have been met, and the ISO files the notice of termination within ten (10) days after the Termination Notice has been provided by either the ISO in accordance with Section 2(d) or PacifiCorp in accordance with Section 2(e). This Agreement shall terminate upon acceptance by FERC of such a notice of termination.

### 3. Implementation Scope and Schedule.

(a) The Parties shall complete the Project as described in Exhibit A , subject to modification only as described in Section 3(c) below.

(b) The Parties shall undertake the activities described in Exhibit A with the objective of completing the Project and implementing the EIM no later than the Implementation Date, subject to modification only as described in section 3(c) below.

(c) Either Party may propose a change in Exhibit A or the Implementation Date to the other Party to pursue the Project objectives in accordance with Section 14. If a Party proposes a change in Exhibit A or the Implementation Date, the Parties shall negotiate in good faith to attempt to reach agreement on the proposal and any necessary changes in Exhibit A and any other affected provision of this Agreement, provided that any change in Exhibit A or the Implementation Date must be mutually agreed to by the Parties. The agreement of the Parties to a change in Exhibit A or the Implementation Date shall be memorialized in a revision to Exhibit A, which will be binding on the Parties and shall be posted on the internet web sites of the ISO and PacifiCorp, without the need for execution of an amendment to this Agreement. Changes that require revision of any provision of this Agreement other than Exhibit A shall be reflected in an executed amendment to this Agreement and filed with FERC for acceptance.

(d) At least once per calendar month during the Term, the Parties' Designated Executives, or their designees, will meet telephonically or in person (at a mutually agreed to location) to discuss the continued appropriateness of Exhibit A to ensure that the Project can meet the Implementation Date. For purposes of this section, "Designated Executive" shall mean the individual identified in Section 8(g), or their designee or successor.

4. Implementation Charges, Invoicing and Milestone Payments.

(a) PacifiCorp shall pay the ISO a fixed fee of \$2.1 million for costs incurred by the ISO to implement the Project ("Implementation Fee"), subject to completion of the milestones specified in Section 4(c) and subject to adjustment only as described in Section 4(b).

(b) The Implementation Fee shall be subject to adjustment only by mutual agreement of the Parties in either of the following circumstances: (1) if the Parties agree to a change in Exhibit A or the Implementation Date in accordance with Section 3(c) and the Parties agree that an adjustment to the Implementation Fee is warranted in light of such change; or (2) the ISO provides notice to PacifiCorp that the sum of its actual costs through the date of such notice and its projected costs to accomplish the balance of the Project exceed the Implementation Fee.

(c) Upon completion of the milestones identified in Exhibit A, the ISO shall invoice PacifiCorp for the Implementation Fee as follows:

- i. \$500,000 twenty (20) days after the Effective Date as further described in Section 1 of this Agreement and Exhibit A as Milestone 1;
- ii. \$400,000 upon deployment into the ISO test environment of the full network model database that includes the topology of the PacifiCorp system as further described in Exhibit A as Milestone 2;
- iii. \$400,000 upon delivery to PacifiCorp of the EIM technical specifications and configuration guides as further described in Exhibit A as Milestone 3;
- iv. \$400,000 upon commencement of EIM market simulation as further described in Exhibit A as Milestone 4; and
- v. \$400,000 ten (10) days after the Implementation Date as further described in Exhibit A as Milestone 5.

(d) Following the completion of each milestone identified in Section 4(c)(i) through (v), the ISO will deliver to PacifiCorp an invoice which will show the amount due, together with reasonable documentation supporting the completion of the milestone being invoiced. PacifiCorp shall pay the invoice no later than

forty-five (45) days after the date of receipt. Any milestone payment past due will accrue interest, per annum, calculated in accordance with the methodology specified for interest in the FERC regulations at 18 C.F.R. § 35.19a(a)(2)(iii) (the "FERC Methodology").

(e) If a milestone has not been completed as described in 4(c)(i), (ii), (iii), (iv), or (v) and Exhibit A, as Exhibit A may have been modified in accordance with Section 3(c), the Parties shall negotiate in good faith an agreed upon change to Exhibit A consistent with Section 3(c) such that the timing of milestone payments in Section 4(c) can be adjusted to correspond to the updated Exhibit A.

(f) If PacifiCorp disputes any portion of any amount specified in an invoice delivered by the ISO, PacifiCorp shall pay its total amount of the invoice when due, and identify the disputed amount and state that the disputed amount is being paid under protest. Any disputed amount shall be resolved pursuant to the provisions of Section 11. If it is determined pursuant to Section 11 that an overpayment or underpayment has been made by PacifiCorp or any amount on an invoice is incorrect, then (i) in the case of any overpayment, the ISO shall promptly return the amount of the overpayment (or credit the amount of the overpayment on the next invoice) to PacifiCorp; and (ii) in the case of an underpayment, PacifiCorp shall promptly pay the amount of the underpayment to the ISO. Any overpayment or underpayment shall include interest for the period from the date of overpayment, underpayment, or incorrect allocation, until such amount has been paid or credited against a future invoice calculated in the manner prescribed for calculating interest in Section 4(d).

(g) All costs necessary to implement the Project not provided for in this Agreement shall be borne separately by each Party and recovered through rates as may be authorized by their respective regulatory authorities.

(h) All milestone payments required to be made under the terms of this Agreement shall be made to the account or accounts designated by the Party which the milestone payment is owed, by wire transfer (in immediately available funds in the lawful currency of the United States).

## 5. Confidentiality.

(a) All written or oral information received from another Party in connection with this Agreement (but not this Agreement after it is filed with FERC) necessary to complete the Project and marked or otherwise identified at the time of communication by such Party as containing information that Party considers commercially sensitive or confidential shall constitute "Confidential Information" subject to the terms and conditions herein.

(b) If PacifiCorp releases PacifiCorp's Confidential Information in connection with the public EIM stakeholder process or a regulatory filing, or if the ISO releases the ISO's Confidential Information in connection with the public EIM

stakeholder process or a regulatory filing, then the information released shall no longer constitute Confidential Information. In addition, Confidential Information does not include information that (i) is or becomes generally available to the public other than as a result of disclosure by either Party, its officers, directors, employees, agents, or representatives; (ii) is or becomes available to such Party on a non-confidential basis from other sources or their agents or representatives when such sources are not known by such Party to be prohibited from making the disclosure; (iii) is already known to such Party or has been independently acquired or developed by such Party without violating any of such Party's obligations under this Section 5; (iv) is the subject of a mutual written agreement between the Parties, including an agreement evidenced through an exchange of electronic or other communications, for discussion at any stakeholder meetings or during the stakeholder process or with any regulatory authority; or (v) is the subject of a mutual written agreement between the Parties, including an agreement evidenced through an exchange of electronic or other communications, to allow for such disclosure and designation as non-confidential or public information on a case-by-case basis in accordance with Section 10 of this Agreement.

(c) The Confidential Information will be kept confidential by each Party and each Party agrees to protect the Confidential Information using the same degree of care, but no less than a reasonable degree of care, as a Party uses to protect its own confidential information of a like nature. Notwithstanding the preceding sentence, a Party may disclose the Confidential Information or portions thereof to those of such Party's officers, employees, partners, representatives, advisors, or agents who need to know such information for the purpose of analyzing or performing an obligation related to the Project. Notwithstanding the foregoing, a Party is not authorized to disclose such Confidential Information to any officers, employees, partners, representatives, advisors, or agents without (i) informing such officer, employee, partner, representative, advisor, or agent of the confidential nature of the Confidential Information and (ii) receiving the agreement of such officer, employee, partner, representative, advisor, or agent as to the confidentiality obligation herein. Each Party agrees to be responsible for any breach of this Section 5 by such Party or a Party's officers, employees, partners, representatives, advisors or agents.

(d) In the event that a Party becomes compelled by a court of competent jurisdiction or regulatory authority (by law, rule, regulation, order, deposition, interrogatory, request for documents, data request issued by a regulatory authority, subpoena, civil investigative demand or similar request or process) to disclose any of the Confidential Information, such Party shall provide the other Party with prompt prior written notice of such requirement so that the other Party may seek a protective order or other appropriate remedy and/or waive compliance with the terms of this Section 5. In the event that such protective order or other remedy is not obtained, or that such Party waives compliance with the provisions hereof, the Party compelled to disclose shall (i) furnish only that portion of the Confidential Information which, in accordance with the advice of its own counsel (which may include internal counsel), is legally required to be furnished, and (ii)

exercise reasonable efforts to obtain assurances that confidential treatment will be accorded the Confidential Information so furnished.

(e) Notwithstanding the foregoing, the Parties acknowledge that they are required by law or regulation to report certain information that could embody Confidential Information from time to time, and may do so from time to time without providing prior notice to the other Party. Such reports may include models, filings, and reports of costs, general rate case filings, cost adjustment mechanisms, FERC-required reporting, investigations, annual state reports that include resources and loads, integrated resource planning reports, reports to entities such as FERC, the North American Electric Reliability Council ("NERC"), Western Electricity Coordinating Council ("WECC"), or similar or successor organizations, or similar or successor forms, filings, or reports, the specific names of which may vary by jurisdiction, along with supporting documentation. Additionally, in regulatory proceedings or investigations in all state and federal jurisdictions in which they may do business, the Parties will from time to time be required to produce Confidential Information, and may do so without prior notice using its business judgment in compliance with all of the foregoing and including the appropriate level of confidentiality for such disclosures in the normal course of business.

(f) Each Party is entitled to equitable relief, by injunction or otherwise, to enforce its rights under this provision to prevent the release of Confidential Information without bond or proof of damages, and may seek other remedies available at law or in equity for breach of this provision.

(g) Upon written request by a Party, the other Party shall promptly return to the requesting Party or destroy all Confidential Information it received, including all copies of its analyses, compilations, studies or other documents prepared by or for it, that contain the Confidential Information in a manner that would allow its extraction or that would allow the identification of the requesting Party as the source of the Confidential Information or inputs to the analysis. Notwithstanding the foregoing, neither Party shall be required to destroy or alter any computer archival and backup tapes or archival and backup files (collectively, "Computer Tapes"), provided that such Computer Tapes shall be kept confidential in accordance with the terms of this Agreement.

(h) Nothing in this Agreement shall be deemed to restrict either Party from engaging with third parties with respect to any matter and for any reason, specifically including the EIM, provided Confidential Information is treated in accordance with this Section 5.

(i) This Section 5, Confidentiality, applies for two years (24 months) after the Termination Date.

6. Limitation of Liability; Indemnity.

(a) Each Party acknowledges and agrees that the other Party shall not be liable to it for any claim, loss, cost, liability, damage or expense, including any direct damage or any special, indirect, exemplary, punitive, incidental or consequential loss or damage (including any loss of revenue, income, profits or investment opportunities or claims of third party customers), arising out of or directly or indirectly related to the other Party's decision to enter into this Agreement, the other Party's performance under this Agreement, or any other decision with respect to the Project or the EIM.

(b) Each Party shall indemnify, defend and hold harmless the other Party and its officers, directors, employees, agents, contractors and sub-contractors, from and against all third party claims, judgments, losses, liabilities, costs, expenses (including reasonable attorneys' fees) and damages for personal injury, death or property damage, caused by the negligence or willful misconduct related to this Agreement or breach of this Agreement of the indemnifying Party, its officers, directors, agents, employees, contractors or sub-contractors, provided that this indemnification shall be only to the extent such personal injury, death or property damage is not attributable to the negligence or willful misconduct related to this Agreement or breach of this Agreement of the Party seeking indemnification, its officers, directors, agents, employees, contractors or sub-contractors. The indemnified Party shall give the other Party prompt notice of any such claim. The indemnifying Party, in consultation with the indemnified Party, shall have the right to choose competent counsel, control the conduct of any litigation or other proceeding, and settle any claim. The indemnified Party shall provide all documents and assistance reasonably requested by the indemnifying Party.

(c) The rights and obligations under this Section 6 shall survive the expiration and termination of this Agreement.

7. Representation and Warranties

(a) Representations and Warranties of PacifiCorp. PacifiCorp represents and warrants to the ISO as of the Effective Date as follows:

(1) It is duly formed, validly existing and in good standing under the laws of the jurisdiction of its formation.

(2) It has all requisite corporate power necessary to own its assets and carry on its business as now being conducted or as proposed to be conducted under this Agreement.

(3) It has all necessary corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement, and the execution and delivery of this Agreement and the performance by it of this



Agreement have been duly authorized by all necessary corporate action on its part.

(4) The execution and delivery of this Agreement and the performance by it of this Agreement do not: (i) violate its organizational documents; (ii) violate any governmental requirements applicable to it; or (iii) result in a breach of or constitute a default of any material agreement to which it is a party.

(5) This Agreement has been duly and validly executed and delivered by it and constitutes its legal, valid and binding obligation enforceable against it in accordance with its terms, except as the same may be limited by bankruptcy, insolvency or other similar laws affecting creditors' rights generally and by principles of equity regardless of whether such principles are considered in a proceeding at law or in equity.

(6) All material governmental authorizations have been obtained by it prior to the date hereof in connection with the due execution and delivery of, and performance by it of its obligations under, this Agreement, have been duly obtained or made and are in full force and effect.

(b) Representations and Warranties of the ISO. ISO represents and warrants to PacifiCorp as of the Effective Date as follows:

(1) It is duly formed, validly existing and in good standing under the laws of the jurisdiction of its formation.

(2) It has all requisite corporate power necessary to own its assets and carry on its business as now being conducted or as proposed to be conducted under this Agreement.

(3) It has all necessary corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement, and the execution and delivery of this Agreement and the performance by it of this Agreement have been duly authorized by all necessary corporate action on its part.

(4) The execution and delivery of this Agreement and the performance by it of this Agreement do not: (i) violate its organizational documents; (ii) violate any governmental requirements applicable to it; or (iii) result in a breach of or constitute a default of any material agreement to which it is a party.

(5) This Agreement has been duly and validly executed and delivered by it and constitutes its legal, valid and binding obligation enforceable against it in accordance with its terms, except as the same may be limited by bankruptcy, insolvency, regulatory authority, or other similar laws affecting

creditors' rights generally and by principles of equity regardless of whether such principles are considered in a proceeding at law or in equity.

(6) All material governmental authorizations have been obtained by it prior to the date hereof in connection with the due execution and delivery of, and performance by it of its obligations under, this Agreement, have been duly obtained or made and are in full force and effect.

8. General Provisions.

(a) This Agreement, including Exhibit A to this Agreement, represents the entire agreement between the Parties and supersedes any prior written or oral agreements or understandings between the Parties relating to the subject matter of this Agreement, including specifically the MOU, provided that nothing in this Agreement shall limit, repeal, or in any manner modify the existing legal rights, privileges, and duties of each of the Parties as provided by any other agreement, statute or any other law or applicable court or regulatory decision.

(b) This Agreement may not be amended except in writing signed by both of the Parties; provided, however, the Parties may mutually agree to changes in Exhibit A in accordance with Section 3(c). This Agreement may be modified to include one or more additional parties upon mutual agreement, not to be unreasonably withheld or delayed, of the then-current Parties, if the new party agrees to fund their share of implementation costs in a manner similar to PacifiCorp.

(c) Any waiver by a Party to this Agreement of any provision or condition of this Agreement must be in writing signed by each Party to be bound by such waiver, shall be effective only to the extent specifically set forth in such writing and shall not limit or affect any rights with respect to any other or future circumstance.

(d) This Agreement is for the sole and exclusive benefit of the Parties and shall not create a contractual relationship with, or cause of action in favor of, any third party.

(e) Neither Party shall have the right to assign its interest in this Agreement, including its rights, duties, and obligations hereunder, without the prior written consent of the other Party, which consent may be withheld by the other Party in its sole and absolute discretion. Any assignment made in violation of the terms of this Section 8(e) shall be null and void and shall have no force and effect.

(f) In the event that any provision of this Agreement is determined to be invalid or unenforceable for any reason, in whole or part, the remaining provisions of this Agreement shall be unaffected thereby and shall remain in full force and effect to the fullest extent permitted by law, and such invalid or unenforceable provision shall be replaced by the Parties with a provision that is valid and

enforceable and that comes closest to expressing the Parties' intention with respect to such invalid or unenforceable provision.

(g) Whenever this Agreement requires or provides that (i) a notice be given by a Party to the other Party or (ii) a Party's action requires the approval or consent of the other Party, such notice, consent or approval shall be given in writing and shall be given by personal delivery, by recognized overnight courier service, email or by certified mail (return receipt requested), postage prepaid, to the recipient thereof at the address given for such Party as set forth below, or to such other address as may be designated by notice given by any Party to the other Party in accordance with the provisions of this Section 8(g):

If to PacifiCorp:

PacifiCorp  
825 NE Multnomah Street, Suite 2000  
Portland, OR 97232  
Attention: Senior Vice President, Strategic Business Performance  
E-mail: Andrea.Kelly@PacifiCorp.com

If to the ISO:

California Independent System Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Attention: Vice President, Technology  
E-mail: PRistanovic@caiso.com

Each notice, consent or approval shall be conclusively deemed to have been given (i) on the day of the actual delivery thereof, if given by personal delivery, email or overnight delivery, or (ii) date of delivery shown on the receipt, if given by certified mail (return receipt requested).

(h) This Agreement may be executed in one or more counterparts (including by facsimile or a scanned image), each of which when so executed shall be deemed to be an original, and all of which shall together constitute one and the same instrument.

(i) Nothing contained in this Agreement shall be construed as creating a corporation, company, partnership, association, joint venture or other entity, nor shall anything contained in this Agreement be construed as creating or requiring any fiduciary relationship between the Parties. No Party shall be responsible hereunder for the acts or omissions of the other Party.

(j) The decision to execute an EIM service agreement and participate in the EIM remains within the sole discretion of PacifiCorp and the decision whether

to proceed with development of the EIM remains within the sole discretion of the ISO.

(k) Nothing in this Agreement shall preclude a Party from exercising any rights or taking any action (or having its affiliates take any action) with respect to any other project, including an energy imbalance market or similar project that may compete with the Project or the EIM.

(l) Unless otherwise expressly provided, for purposes of this Agreement, the following rules of interpretation shall apply: (i) any reference in this Agreement to gender includes all genders, and the meaning of defined terms applies to both the singular and the plural of those terms; (ii) the insertion of headings are for convenience of reference only and do not affect, and will not be utilized in construing or interpreting, this Agreement; (iii) all references in this Agreement to any "Section" are to the corresponding Section of this Agreement unless otherwise specified; (iv) words such as "herein," "hereinafter," "hereof," and "hereunder" refer to this Agreement (including Exhibit A to this Agreement) as a whole and not merely to a subdivision in which such words appear, unless the context otherwise requires; (v) the word "including" or any variation thereof means "including, without limitation" and does not limit any general statement that it follows to the specific or similar items or matters immediately following it; and (vi) the Parties have participated jointly in the negotiation and drafting of this Agreement and, in the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as jointly drafted by the Parties and no presumption or burden of proof favoring or disfavoring any Party will exist or arise by virtue of the authorship of any provision of this Agreement.

9. Governing Law; Venue. This Agreement shall be governed by, and construed and interpreted in accordance with, the laws of the State of California without regard to its principles of conflicts of laws. Venue for any action hereunder shall be FERC, where subject to its jurisdiction, or in any Sacramento County state or Eastern District federal court located within the State of California. Each Party waives to the fullest extent permitted by law, any right it may have to contest venue and a right to trial by jury in respect of any suit, action, claim or proceeding relating to this Agreement.

10. Communication. The Parties shall develop a communication protocol for the dissemination of material information associated with the Project, which shall be approved by PacifiCorp and the ISO. Pursuant to the communication protocol, the individual identified in Section 8(g), or their designee or successor, shall provide reasonable advance notice to the other Party of planned press releases, public statements, and meetings with the public or governmental authorities in which material information concerning the Project will be shared. The Parties shall mutually consult with each other as provided in the communication protocol prior to making such public statements or disclosures; provided that nothing herein shall prevent, limit, or delay either Party from making any disclosure required by applicable law or regulation. In the event either Party engages in material

unplanned communications about the Project that otherwise should have been subject to this Section and the communication protocol, such Party shall provide notice to the other Party as promptly as possible of the nature and content of such communication.

11. Dispute Resolution. Unless otherwise provided herein, each of the provisions of this Agreement shall be enforceable independently of any other provision of this Agreement and independent of any other claim or cause of action. In the event of any dispute arising under this Agreement, the Parties shall first attempt to resolve the matter through direct good faith negotiation between the Parties, including a full opportunity for escalation within the Parties' respective organizations. If the Parties are unable to resolve the issue within thirty (30) days after presentation of the dispute, then for matters subject to FERC jurisdiction either Party shall have the right to file a complaint under Section 206 of the Federal Power Act. For all other matters, then:

(a) To the fullest extent permitted by law, each of the Parties hereto waives any right it may have to a trial by jury in respect of litigation directly or indirectly arising out of, under or in connection with this Agreement. Each Party further waives any right to consolidate, or to request the consolidation of, any action in which a jury trial has been waived with any other action in which a jury trial cannot be or has not been waived.

(b) If a waiver of jury trial is deemed by any court of competent jurisdiction to not be enforceable for any reason, then to the fullest extent permitted by law, each of the Parties hereto agrees to binding arbitration. Such arbitration shall be in accordance with the rules and procedures of the American Arbitration Association (AAA). Notwithstanding any AAA rules and procedures or any other provisions or any state or federal laws, the Parties agree that the arbitrators shall not consider or award punitive damages as a remedy. Upon request by either Party, AAA shall provide the Parties a list of arbitrators each of who have experience and expertise with respect to construction. Upon each of the Parties receipt of such list, each Party shall have ten (10) days to select an arbitrator. The two selected arbitrators shall then select a third arbitrator within thirty (30) days from the date the initial two arbitrators were selected and the matter subject to arbitration shall be arbitrated within sixty (60) days after the selection of the third arbitrator.

12. Third Party Agreements. The Parties may engage in discussions with third parties, either jointly or unilaterally, to facilitate the Project or EIM implementation process. Each Party may enter into binding agreements or tariffs or modify existing agreements or tariffs with these third parties to implement the approved terms and conditions of the Project or EIM as necessary and appropriate.

13. Compliance. Each Party shall comply with all federal, state, local or municipal governmental authority; any governmental, quasi-governmental, regulatory or administrative agency, commission, body or other authority

exercising or entitled to exercise any administrative, executive, judicial, legislative, policy, regulatory or taxing authority or power, including FERC, NERC, WECC; or any court or governmental tribunal, in each case, having jurisdiction over either Party in connection with the execution, delivery and performance of its obligations under this Agreement. This Agreement is not intended to modify, change or otherwise amend the Parties' current functional responsibilities associated with compliance with WECC and NERC Reliability Standards; provided however, the Parties may enter into separate mutually agreed to arrangements to clarify roles and responsibilities associated with compliance with WECC and NERC Reliability Standards.

14. EIM Principles. The Parties recognize and acknowledge that input received from stakeholders during the course of implementing the Project, conditions imposed or questions raised in the EIM regulatory approval process, and analyses the Parties may perform or information the Parties receive or develop in the course of implementing the Project through the EIM stakeholder process or otherwise may require adjustments in the Project. Consistent with the foregoing, the Project shall nevertheless be implemented consistent with the following principles:

(a) The EIM market rules shall be contained in a discrete part of the ISO tariff to the extent this structure provides additional clarity to all EIM participants; provided, however, provisions generally applicable to the relationship between the ISO and market participants may be provided for by reference and applicable to EIM participants.

(b) Initial EIM governance and market rule oversight shall be consistent with existing ISO governance, allow for voluntary participation and expansion of participants and market activities, and evolve based on stakeholder feedback.

(c) The Parties shall consider whether and how to account for transmission service in the EIM stakeholder process.

(d) The EIM shall include an appropriate means to identify transactions that do not involve California resources or loads, or that otherwise occur outside the State of California, such that only the imbalance energy portion that is imported into California would be subject to any laws, regulations or costs associated with a California specific greenhouse gas compliance obligation.

(f) The EIM shall be implemented in a manner that is compatible with the Northwest Power Pool reserve sharing program and other existing and emerging market initiatives, including FERC Order No. 764 (and its progeny).

(g) Other entities may participate in the EIM within a timeframe to be determined by the ISO if they agree to fund their share of implementation costs pursuant to a FERC-accepted implementation agreement in a manner similar to PacifiCorp.

IN WITNESS WHEREOF, each of the Parties has caused its duly authorized officer to execute this Implementation Agreement as of the date first above written.

PACIFICORP

By: Andrea Kelly  
Name: Andrea L. Kelly  
Title: Senior Vice President, Strategic Business Performance

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

By: Karen Edson  
Name: Karen Edson  
Title: Vice President, Policy and Client Services

## EXHIBIT A: PROJECT SCOPE AND SCHEDULE

The Project consists of the activities and delivery dates identified in this Exhibit A, implemented in accordance with the Agreement, including specifically the principles set forth in Section 14.

The Parties understand that input received from stakeholders during the course of implementing the Project, conditions imposed or questions raised in the regulatory approval process, and the activities of the Parties in implementing the Project may cause the Parties to determine that changes in the Project are necessary or desirable. Accordingly, this Exhibit A may be modified in accordance with Section 3(c) of the Agreement.

Each Party is responsible for performing a variety of tasks necessary to achieve the milestones on schedule and shall plan accordingly. The Parties shall communicate and coordinate as provided in the Agreement to support the planning and execution to complete the Project.

Project Scope and Milestones	Project Delivery Dates
<p><b>Detailed Project Management Plan</b> – The Parties will develop and initiate a final project management plan that describes specific project tasks each Party must perform, delivery dates, project team members, meeting requirements, and a process for approving changes to support completion of the Project.</p>	<p>May 31, 2013</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 1</b> – The Agreement must be made effective in accordance with Section 1 of the Agreement to complete this milestone.</li> </ul>	<p>July 1, 2013</p>
<p><b>Full Network Model Expansion</b> – Full Network Model expansion for PacifiCorp and EMS/SCADA, including, proof of concept of export/import of EMS data; complete PACE and PACW model into the ISO test model; complete validation for all SCADA points from PacifiCorp; complete testing of the new market model; and validation of the Outage, State Estimator, Real Time Contingency Analysis, and Automatic Generation Control applications.</p>	<p>November 22, 2013</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 2</b> - This milestone is completed upon the modeling PacifiCorp into the ISO Full Network Model through the EMS which will be deployed using the ISO's network and resource modeling process.</li> </ul>	<p>December 6, 2013</p>
<p><b>System Implementation Program Improvements</b> – System requirements and software design, the execution of necessary software vendor contracts, technical interface specifications and configuration guides, and other related activities.</p>	<p>April 1, 2014</p>



<ul style="list-style-type: none"> <li>• <b>Milestone 3</b> - For PacifiCorp and the ISO to exchange production data (market inputs and outputs) and complete this milestone, the ISO will provide to PacifiCorp all final technical specifications for application program interface (API) specifications, metering specifications and settlement specifications. Final technical specifications related to some systems may be required earlier as provided in the project management plan.</li> </ul>	<p>April 8, 2014</p>
<p><b>Construction, Testing and Training in Preparation for Market Simulation</b> - This task includes IT infrastructure upgrades, security testing, training simulators, and functional testing.</p>	<p>July 1, 2014</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 4</b> - The EIM market simulation will allow PacifiCorp and the ISO to conduct specific market scenarios in a test environment prior to the production deployment to ensure that all system interfaces are functioning as expected and to produce simulated market results. To complete this milestone, the commencement of EIM simulation will signal that the PacifiCorp and the ISO have independently completed EIM system design, development and testing to participate in joint testing.</li> </ul>	<p>July 8, 2014</p>
<p><b>System Deployment and Go Live</b> – Implementing the Project and going live will include resource registration, operating procedures and updates, execution of service agreements, completion of the policy and tariff stakeholder processes, applicable board approvals, the filing and acceptance of tariff changes with FERC, and the development of new and updated Business Practice Manuals.</p>	<p>September 30, 2014</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 5</b> – This milestone is complete upon the first production energy imbalance market trade date.</li> </ul>	<p>October 1, 2014</p>

**Attachment B**

**Declaration of Michael K. Epstein**

**Energy Imbalance Market Implementation Agreement**

**between the ISO and PacifiCorp**

**California Independent System Operator**

**April 30, 2013**

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

**California Independent System     )  
Operator Corporation                 )**     **Docket No. ER13 \_\_\_\_-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 "ISO"). My business address is 250 Outcropping Way, Folsom, California 95630. I am responsible for the ISO's budget preparation and management; long term planning; accounting for the FERC refund case; market cash settlements; and audit coordination for all the ISO's settlement and operations activities. As part of my duties at the ISO, I oversee the development of the ISO'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 ISO 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 ISO proposes to charge PacifiCorp for the development and implementation of the energy imbalance market under the Implementation Agreement that the ISO is filing today.

***The Implementation Fee***

4. The implementation fee is based on the ISO'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 ISO estimates that the total start-up cost for the energy imbalance market would be \$18.3 million. (Throughout this declaration, I am rounding millions to a single decimal point.) The ISO would not incur this entire cost up front, however. Rather, the ISO 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, \$10.8 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 ISO 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 is \$4.5 million. The fees in certain cases include a provision for a fee increase for each specified increment of additional ISO peak demand. The detail 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 ISO 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 ISO used the 2009 load, which was included in the 2010

- billing, for this allocation. The 2009 annual load for the ISO was 231.9 million MWh. Using this data, the ISO estimated that what increment in ISO load would occasion a specific amount of additional license costs.
9. The WECC load, exclusive of the ISO, is 616.0 million MWh. The ISO calculated that this is a particular multiple of the load increments used in the license contracts. The ISO calculated the product of this multiple and the increased costs associated with the contractual increment. Using this methodology, the ISO estimates the license costs for implementing a WECC-wide energy imbalance market would be 24 times \$450,000, or \$10.8 million.

#### ***Data Storage***

10. The ISO will need to procure additional data storage to account for the expanded data requirements associated with integrating all WECC balancing authority areas into ISO systems. The storage will provide the required highly available and redundant storage as well as cover long term archiving.
11. The storage for current ISO production requires 200 terabytes at a cost of approximately \$7.5 million. The ISO 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 ISO currently uses about 100 servers. The ISO 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 ISO 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 ISO will need to include the other energy imbalance market balancing authority areas into the ISO'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 ISO 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 ISO 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 ISO will need to improve the existing energy management system, which currently supports the ISO control area with a peak demand of 50,000 MW. These system improvements would enable the ISO to integrate the imbalance energy for the additional balancing authority areas within the four second data resource time.
17. The ISO 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 ISO will need to conduct testing to ensure that it meets all energy imbalance market business and system requirements.
19. The ISO 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 ISO 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, ISO 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 \$18.3 million, the ISO proceeded to develop a rate that could be used for individual participants. To do so, the ISO divided the \$18.3 million total cost by the 616.0 million MWh of non-ISO net energy for load in the WECC, for a rate of \$0.03/MWh.
22. Finally, to determine the PacifiCorp fee as established in the Implementation Agreement, the ISO applied the rate to PacifiCorp's most recently reported net energy for load for 2011 of 68.7 million MWh, for a rounded total of \$2.1 million.

***Comparison of PacifiCorp Fee to Generic Rate***

23. Although the ISO 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 ISO thought it

worthwhile to compare PacifiCorp's fee based on the \$.03/MWh rate with an estimate of the specific costs of expansion of the existing energy imbalance market to include PacifiCorp. Using the same process described above, the ISO estimated the costs that appear in the following table:

Software license costs	\$900
Production software modifications	600
Network configuration and mapping	75
Integration	75
Testing	300
Training and operations readiness	100
Project Management	50
<b>Total</b>	<b>\$2,100</b>

24. As is readily apparent, although the total costs are the same, the proportion of the total PacifiCorp-specific costs that each component represents differs from proportion of the WECC-wide costs that the component represents. For example, the ISO will incur no additional storage costs or EMS upgrade, but to integrate PacifiCorp, the ISO will need to incur the majority of total production software costs up front. Although the PacifiCorp-specific costs are the same as the PacifiCorp fee based on the generic rate, the ISO cannot determine at this time if this will be the case with regard to all future participants. Nonetheless, the ISO 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: April 30, 2013

/s/ Michael K. Epstein  
Michael K. Epstein

Docket No. UM-\_\_\_\_  
Exhibit PAC/103  
Witness: Stefan A. Bird

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF THE STATE OF OREGON**

**PACIFICORP**

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**Exhibit Accompanying Direct Testimony of Stefan A. Bird  
Amendment to the Implementation Agreement**

**April 2014**



February 21, 2014

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

**Re: California Independent System Operator Corporation  
Amendment to ISO Rate Schedule No. 73  
Docket No. ER14-\_\_\_\_-000**

Dear Secretary Bose:

The California Independent System Operator Corporation (“ISO”) submits for filing and acceptance an amendment to the Implementation Agreement dated April 30, 2013, between the ISO and PacifiCorp (“Amendment”).<sup>1</sup> The Implementation Agreement sets forth the terms under which the ISO will timely configure its systems to incorporate PacifiCorp into the Energy Imbalance Market (“EIM”) and develop the market rules for the EIM, such that PacifiCorp and the ISO are prepared for an October 1, 2014 implementation date. Under the Implementation Agreement, PacifiCorp will compensate the ISO for its share of EIM implementation costs, including, system requirements, software design, and other technical interface specifications and configuration activities to provide energy imbalance service to PacifiCorp.<sup>2</sup> The mutually agreed to Amendment accounts for additional costs expected to be incurred by the ISO on behalf of PacifiCorp to include enhanced functionality associated with base schedule aggregation in the EIM design. The ISO requests that the Commission accept the Amendment effective April 23, 2014, so that the incorporation of PacifiCorp into the EIM on October 1, 2014 may include this additional functionality.

## **I. Background**

The Implementation Agreement describes the terms and conditions under which the ISO will incorporate PacifiCorp into the EIM, including the mutually agreed to scope of work, fee, key milestones and associated milestone payment provisions. The Implementation Agreement requires both the ISO and PacifiCorp to complete a variety of project tasks necessary for the associated EIM

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<sup>1</sup> The ISO submits the Amendment pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d (2012).

<sup>2</sup> *Cal. Indep. Sys. Operator Corp.*, 143 FERC ¶ 61,298 (2013).

The Honorable Kimberly D. Bose  
February 21, 2014  
Page 2

development and implementation by October 1, 2014. These tasks may be modified by mutual agreement of the parties.<sup>3</sup>

The Implementation Agreement specifies that PacifiCorp will pay a fixed implementation fee of \$2.1 million for the portion of the costs attributable to the ISO's incorporation of PacifiCorp into the EIM. The ISO will invoice PacifiCorp upon the completion of each of five (5) specific milestones, as specified in the Implementation Agreement.<sup>4</sup> The Implementation Agreement also provides for adjustment of the fixed implementation fee by mutual agreement of the parties in the event the ISO's actual and projected costs exceed the implementation fee.

## **II. Base Schedule Aggregation Process**

The EIM design requires participating balancing authorities to submit balanced hourly base schedules. These base schedules must account for all loads and resources within the balancing authority area, as well as interchange transactions, and are financially binding. During the ISO's stakeholder process to develop the EIM design, interested parties expressed concern about the collection of base schedule information from non-participating and participating resources, the analysis necessary to evaluate those schedules for potential congestion, the timely submission of the information to the ISO, and the associated costs to be incurred by participating balancing authorities to develop the necessary interfaces. More specifically, the requirement to submit a balanced base schedule would require a balancing authority to invest in new interfaces for non-participating and participating resources within its area and new applications to evaluate balance and feasibility of the base schedules prior to their submission to the ISO. In response, the ISO proposed to provide a more cost effective and efficient service to facilitate the submission of base schedules, compile the hourly resources plan, and achieve final approval of the resource plan by the participating balancing authority.

The ISO intends to add functionality to receive hourly resource base schedule information directly from participating and non-participating resources and perform the balancing and feasibility check. The ISO will then provide results back to the participating balancing authority that is responsible to make appropriate adjustments to the base schedule. This will allow a balancing authority participating in the EIM to identify and resolve unbalanced supply and demand or transmission flow overloads before the base schedule in the resource plan becomes financially binding. The scheduling coordinator for the balancing authority will remain responsible for communicating with resources in the balancing authority area it represents and for making changes to the base schedules as needed. The scheduling coordinator also remains responsible for

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<sup>3</sup> Implementation Agreement, Section 3.

<sup>4</sup> Implementation Agreement, Section 4 and Exhibit A.

approving and communicating to the ISO the final hourly resource plan, including any required changes to base schedules necessary to resolve issues identified in the resource sufficiency evaluation.

Implementation of this additional functionality requires that the ISO develop a participating balancing authority branded user interface. The ISO will also store results of the pre-market base schedule balancing and feasibility evaluation power flow run results, and create web service payloads and reports for the relevant pre-market results. This functionality is referred to as base schedule aggregation.<sup>5</sup>

### III. Implementation Fee Increase

Implementation of the base schedule aggregation functionality will require the ISO to incur \$462,800 in additional software development and configuration costs.<sup>6</sup> Cost data supporting this rate increase is included in the table below, and further described in the declaration of Michael K. Epstein attached to this transmittal letter. The categories of costs below correspond to the category of costs that were identified in the underlying rate established by the Implementation Agreement.

<b>Implementation Costs (in total dollars)</b>	
Licenses	na
EMS system improvements	na
Data storage	na
Necessary hardware upgrades	na
Production software modifications	\$72,000
Network configuration and mapping	\$21,600
Integration	\$17,300
Testing	\$115,000
System performance tuning	\$71,100
Training and operations readiness	\$28,000
Project management and support	\$136,800
<b>Total</b>	<b>\$462,800</b>

<sup>5</sup> The tariff changes to support the EIM, including the base schedule aggregation functionality, will be separately filed by the ISO on or about February 28, 2014. See [Draft Final Proposal for the Energy Imbalance Market](#) at pp. 32-33 (describing the base schedule aggregation functionality and process).

<sup>6</sup> These costs represent a one-time cost incurred by the ISO and will not impact the implementation costs paid by other balancing authorities that may later join the EIM. Nonetheless, other balancing authorities that join the EIM will be required to pay their costs associated with the submission of base schedules to the ISO, regardless of whether they utilize the base schedule aggregation functionality. Interface requirements are inherent in the EIM design and each balancing authority will be responsible for its associated costs.

The Honorable Kimberly D. Bose  
February 21, 2014  
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The additional functionality was included in the design at the request of stakeholders as an option for a participating balancing authority to submit base schedules to the ISO. PacifiCorp desires to take advantage of this design feature with respect to its incorporation into the EIM and has requested the ISO configure its systems accordingly. This functionality will provide an overall benefit to PacifiCorp and its customers by leveraging the ISO's existing technologies and expertise and reducing costs for PacifiCorp if it were required to design, configure and implement this functionality on its own. The ISO and PacifiCorp have mutually agreed to this rate increase, and the ISO requests that the Commission accept the Amendment as filed.

#### **IV. Effective Date**

The ISO requests that the Amendment be made effective on April 23, 2014, sixty-one days after the date of this filing.

#### **V. Request for Waivers**

The ISO submits that the filing also substantially complies with the requirements of section 35.13 of the Commission's rules, 18 C.F.R. § 35.13 (2013), applicable to filings of this type. The ISO respectfully requests waiver of any such requirement to the extent this filing does not satisfy that requirement. In particular, the ISO requests waiver of the requirement to submit Period 1 and Period 2 schedules, because the implementation fee is a one-time fee that is not based on historical data in Period 1 schedules or on the projections in Period 2 schedules. In either event, there is good cause to waive filing requirements that are not material to the Commission's consideration of the Amendment and the underlying rate in the Implementation Agreement has been accepted.

#### **VI. Service**

The ISO has served copies of this filing upon all parties in ER13-1372-000, the California Public Utilities Commission, and the California Energy Commission. In addition, the ISO has posted the filing on the ISO website.

Enclosed for filing is each of the following:

- (1) This letter of transmittal;
- (2) Amendment (Attachment A);
- (3) Amended Implementation Agreement, redline (Attachment B);
- (4) Amended Implementation Agreement, clean (Attachment C); and
- (5) Declaration of Michael K. Epstein, Director of Financial Planning (Attachment D).



The Honorable Kimberly D. Bose  
February 21, 2014  
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## VII. Correspondence

The ISO requests that all correspondence, pleadings, and other communications concerning this filing be served upon the following:

John C. Anders\*  
Senior Counsel  
California Independent System  
Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Tel: (916) 608-7287  
E-mail: [janders@caiso.com](mailto:janders@caiso.com)

\* Individual designated for service pursuant to Rule 203(b)(3),  
18 C.F.R. § 203(b)(3).

## VIII. Conclusion

The ISO respectfully requests that the Commission accept this filing and permit the Amendment of ISO Rate Schedule No. 73, to be effective April 23, 2014. If there are any questions concerning this filing, please contact the undersigned.

Respectfully submitted,

**By: /s/ John C. Anders**

Roger E. Collanton  
General Counsel  
Sidney M. Davies  
Assistant General Counsel  
John C. Anders  
Senior Counsel  
California Independent System  
Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Tel: (916) 608-7287  
Fax: (916) 608-7222  
[janders@caiso.com](mailto:janders@caiso.com)

Attorneys for the California Independent  
System Operator Corporation

**Attachment A – Amendment**

**Rate Schedule No. 73**

**First Amendment to Energy Imbalance Market Implementation Agreement**

**California Independent System Operator Corporation**

**February 21, 2014**

## **ENERGY IMBALANCE MARKET IMPLEMENTATION AGREEMENT FIRST AMENDMENT**

This first amendment to the Implementation Agreement (“First Amendment”) is entered into by PacifiCorp, an Oregon corporation (“PacifiCorp”), and the California Independent System Operator Corporation, a California nonprofit public benefit corporation (“ISO”). PacifiCorp and the ISO are sometimes referred to in this First Amendment individually as a “Party” and, collectively, as the “Parties”.

### **RECITALS**

A. WHEREAS, the Implementation Agreement sets forth the terms upon which the ISO and PacifiCorp agreed to develop the Energy Imbalance Market (“EIM”);

B. WHEREAS, the Implementation Agreement recognizes and acknowledges that adjustments in the Project may be necessary, and that a mutually agreed to amendment between the Parties would be required to account for any associated increase in the ISO’s development costs to incorporate PacifiCorp into the EIM;

C. WHEREAS, the final EIM rules are expected to include additional functionality to facilitate the base schedule submission process, and is more fully described in the final EIM proposal as approved by the ISO governing board on November 7, 2013 (“Base Schedule Aggregation Functionality”);

D. WHEREAS, the Parties are entering into this First Amendment to set forth the terms upon which the ISO will configure its systems to incorporate the Base Schedule Aggregation Functionality;

NOW THEREFORE, in consideration of the mutual covenants contained herein, and of other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree to amend the Implementation Agreement as follows:

### **AMENDMENT**

1. Effective Date.

a. This First Amendment shall become effective upon the date the First Amendment is accepted, approved or otherwise permitted to take effect by FERC, without condition or modification unsatisfactory to either Party (“First Amendment Effective Date”).

b. In the event FERC requires any modification to the First Amendment or imposes any other condition upon its acceptance or approval of the First Amendment, each Party shall have ten (10) days to notify the other Party that any such modification or condition is unacceptable to that Party. If no Party provides such notice, then the First Amendment, as modified or conditioned by FERC, shall

take effect as of the date determined under section 1(a). If either Party provides such notice to the other Party, the Parties shall take any one or more of the following actions: (i) meet and confer and agree to accept any modifications or conditions imposed by such FERC order; (ii) jointly seek further administrative or legal remedies with respect to such FERC order, including a request for rehearing or clarification; or (iii) enter into negotiations with respect to accommodation of such FERC order, provided however, if the Parties have not agreed to such an accommodation within thirty (30) days after the date on which such FERC order becomes a final and non-appealable order, such order shall be deemed an adverse order and the Parties shall have no further rights and obligations under this First Amendment.

2. Amendment.

a. Section 3 of the Implementation Agreement, Implementation Scope and Schedule, shall include a new subsection as follows:

(e) The Parties shall update Exhibit A and the project management plan described therein with activities to the extent necessary to implement the Base Schedule Aggregation Functionality.

b. Section 4 of the Implementation Agreement, Implementation Charges, Invoicing, and Milestone Payments, shall include a new subsection as follows:

(i) The Implementation Fee shall be increased by \$462,800 to account for costs incurred by the ISO to implement the Base Schedule Aggregation Functionality. The ISO shall invoice the costs to implement the Base Schedule Aggregation Functionality to PacifiCorp equally among any milestone payments that have not been invoiced as of the First Amendment Effective Date. If all milestones have been invoiced prior to the First Amendment Effective Date, the ISO shall separately invoice PacifiCorp for this amount.

3. Entire Agreement.

This First Amendment constitutes the complete and final agreement of the Parties with respect to the purpose of this First Amendment as described in the Recitals hereto and supersedes all prior understandings, whether written or oral, with respect to such subject matter. Except as expressly modified in this First Amendment, the Implementation Agreement shall remain in full force and effect in accordance with its terms, and the unmodified provisions of the Implementation Agreement shall apply to any new rights and/or obligations established by this First Amendment.

4. Counterparts.

This First Amendment may be executed in one or more counterparts at different times, each of which shall be regarded as an original and all of which, taken together, shall constitute one and the same agreement.

IN WITNESS WHEREOF, each of the Parties has caused its duly authorized officer to execute this First Amendment.

PACIFICORP

By: Andrea Kelly

Name: Andrea L. Kelly  
Title: Senior Vice President, Strategic Business Performance  
Date: \_\_\_\_\_

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

By: \_\_\_\_\_

Name: Petar Ristanovic  
Title: Vice President, Technology  
Date: \_\_\_\_\_

4. Counterparts.

This First Amendment may be executed in one or more counterparts at different times, each of which shall be regarded as an original and all of which, taken together, shall constitute one and the same agreement.

IN WITNESS WHEREOF, each of the Parties has caused its duly authorized officer to execute this First Amendment.

PACIFICORP

By: \_\_\_\_\_

Name: Andrea L. Kelly  
Title: Senior Vice President, Strategic Business Performance  
Date: \_\_\_\_\_

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

By: *Petar Ristanovic*

Name: Petar Ristanovic  
Title: Vice President, Technology  
Date: 2/19/2014

**Attachment B – Marked Tariff**

**Rate Schedule No. 73**

**First Amendment to Energy Imbalance Market Implementation Agreement**

**California Independent System Operator Corporation**

**February 21, 2014**

**FIRST AMENDED ENERGY IMBALANCE MARKET  
IMPLEMENTATION AGREEMENT**

This Implementation Agreement (“Agreement”) is entered into as of April 30, 2013, by and between PacifiCorp, an Oregon corporation (“PacifiCorp”), and the California Independent System Operator Corporation, a California nonprofit public benefit corporation (“ISO”). PacifiCorp and the ISO are sometimes referred to in this Agreement individually as a “Party” and, collectively, as the “Parties”.

**RECITALS**

A. WHEREAS, PacifiCorp has determined there is an opportunity to secure benefits for PacifiCorp’s customers through improved dispatch and operation of PacifiCorp’s generation fleet and through the efficient use and continued reliable operation of existing and future transmission facilities and desires to participate in an energy imbalance market (“EIM”) that benefits its customers and could potentially be expanded to benefit other customers in the region;

B. WHEREAS, the ISO has determined there are benefits to ISO market participants through greater access to energy imbalance resources in real-time and through the efficient use and reliable operation of the transmission facilities and markets operated by the ISO, and desires to develop and operate the EIM by employing the systems and processes of the ISO’s existing imbalance energy market;

C. WHEREAS, the ISO will develop EIM market rules through a stakeholder process in which PacifiCorp will be a stakeholder with rights and responsibilities with respect to the EIM implementation as provided for in this Agreement.

D. WHEREAS, the Parties acknowledge that the rules and procedures governing the EIM must be set forth in the provisions of an ISO tariff filed with the Federal Energy Regulatory Commission (“FERC”), as well as corresponding revisions to PacifiCorp’s Open Access Transmission Tariff and the execution of associated service agreements, to implement the EIM;

E. WHEREAS, the Parties are entering into this Agreement to set forth the terms upon which the ISO will timely configure its systems to incorporate PacifiCorp into the EIM and develop the market rules for the EIM (“Project”) as contemplated by the Memorandum of Understanding dated February 12, 2013 (“MOU”), such that PacifiCorp and the ISO are prepared for an October 1, 2014 implementation of the Project (“Implementation Date”);

NOW THEREFORE, in consideration of the mutual covenants contained herein, and of other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:



## AGREEMENT

### 1. Effective Date and Term.

(a) This Agreement shall become effective upon the date the Agreement is accepted, approved or otherwise permitted to take effect by FERC, without condition or modification unsatisfactory to either Party (“Effective Date”).

(b) In the event FERC requires any modification to the Agreement or imposes any other condition upon its acceptance or approval of the Agreement, each Party shall have ten (10) days to notify the other Party that any such modification or condition is unacceptable to that Party. If no Party provides such notice, then the Agreement, as modified or conditioned by FERC, shall take effect as of the date determined under section 1(a). If either Party provides such notice to the other Party, the Parties shall take any one or more of the following actions: (i) meet and confer and agree to accept any modifications or conditions imposed by such FERC order; (ii) jointly seek further administrative or legal remedies with respect to such FERC order, including a request for rehearing or clarification; or (iii) enter into negotiations with respect to accommodation of such FERC order, provided however, if the Parties have not agreed to such an accommodation within thirty (30) days after the date on which such FERC order becomes a final and non-appealable order, such order shall be deemed an adverse order and the Parties shall have no further rights and obligations under this Agreement.

(c) The term of this Agreement (“Term”) shall commence on the Effective Date and shall terminate upon the earliest to occur of (1) the date FERC permits all necessary revisions to the ISO and PacifiCorp tariffs to take effect and the service agreements under such tariffs necessary for the commencement of the EIM have taken effect; (2) termination in accordance with Section 2 of this Agreement; or (3) such other date as mutually agreed to by the Parties (“Termination Date”).

(d) This Agreement shall automatically terminate on the Termination Date and shall have no further force or effect, provided that the rights and obligations set forth in Sections 5 and 6 shall survive the termination of this Agreement and remain in full force and effect.

### 2. Termination.

(a) The Parties may mutually agree to terminate this Agreement in writing at any time. In addition, either Party may terminate this Agreement in its sole discretion after conclusion of the negotiation period in Section 2(b), as provided in Section 2(d) or 2(e) as applicable.

(b) If either the ISO or PacifiCorp seeks to terminate this agreement, it must first notify the other Party in writing of its intent to do so (“Notice of Intent to

Terminate”) and engage in thirty (30) days of good faith negotiations in an effort to resolve its concerns. If the Parties successfully resolve the concerns of the Party issuing the Notice of Intent to Terminate, the Party that issued such notice shall notify the other Party in writing of the withdrawal of such Notice (“Notice of Resolution”).

(c) At the time the Notice of Intent to Terminate is provided, or any time thereafter unless a Notice of Resolution is issued, PacifiCorp may provide written notice directing the ISO to suspend performance on any or all work on the Project for a specified period of time (“Notice to Suspend Work”). Upon receipt of a Notice to Suspend Work, the ISO shall: (1) discontinue work on the Project; (2) place no further orders with subcontractors related to the Project; (3) take commercially reasonable actions to suspend all orders and subcontracts; (4) protect and maintain the work on the Project; and (5) otherwise mitigate PacifiCorp’s costs and liabilities for the areas of work suspended. The ISO will not invoice PacifiCorp pursuant to Section 4(c) of this Agreement for any milestone payment following the issuance of a Notice to Suspend Work. To the extent a Notice of Resolution is issued pursuant to Section 2(b), the Notice to Suspend Work in effect at the time shall be deemed withdrawn and the ISO shall be entitled to invoice PacifiCorp for any milestone completed as specified in Section 4(c) of this Agreement and PacifiCorp shall pay such invoice pursuant to Section 4.

(d) Any time after 30 days from the date of the Notice of Intent to Terminate under Section 2(b), issued by either Party, and prior to the date of a Notice of Resolution, the ISO may terminate this Agreement by providing written notice to PacifiCorp that it is terminating this Agreement (“Termination Notice”) effective immediately. The ISO may terminate this Agreement at its sole discretion for any reason, including but not limited to: (i) a lack of reasonable progress in the development of the Project in accordance with Exhibit A to this Agreement, subject to modification only as described in Section 3(c); (ii) a disagreement between the Parties regarding Project design, scope, or implementation, which disagreement the Parties are unable to resolve to their mutual satisfaction; or (iii) if the ISO determines in its sole discretion that the Project is not likely to provide the benefits the ISO is seeking to obtain.

(e) Any time after 30 days from the date of the Notice of Intent to Terminate under Section 2(b), issued by either Party, and prior to the date of a Notice of Resolution, PacifiCorp may terminate this Agreement by providing written notice to the ISO that it is terminating this Agreement (“Termination Notice”) effective immediately. PacifiCorp may terminate this Agreement at its sole discretion for any reason, including but not limited to: (i) a lack of reasonable progress in the development of the Project in accordance with Exhibit A to this Agreement, subject only to modification only as described in Section 3(c); (ii) a disagreement between the Parties regarding Project design, scope, or implementation, which disagreement the Parties are unable to resolve to their mutual satisfaction; or (iii) if PacifiCorp determines in its sole discretion that the Project is not likely to provide the benefits PacifiCorp is seeking to obtain.

(f) In the event this Agreement is terminated by either or both of the Parties, this Agreement will become wholly void and of no further force and effect, without further action by either Party, and the liabilities and obligations of the Parties hereunder will terminate, and each Party shall be fully released and discharged from any liability or obligation under or resulting from this Agreement as of the date of the Termination Notice provided in Section 2(d) or 2(e), as applicable, notwithstanding the requirement for the ISO to submit the filing specified in Section 2(g). Notwithstanding the foregoing, the rights and obligations set forth in Sections 5 and 6 shall survive the termination of this Agreement and remain in full force and effect as specified in Sections 5 and 6, and any milestone payment obligation pursuant to Section 4(c) that arose prior to the Termination Notice in accordance with Section 2(d) or 2(e) shall survive until satisfied or resolved in accordance with Section 11.

(g) The Parties acknowledge that the ISO is required to file a timely notice of termination with FERC. The Parties acknowledge and agree that the filing of the notice of termination by the ISO with FERC will be considered timely if the filing of the notice of termination is made after the preconditions for termination have been met, and the ISO files the notice of termination within ten (10) days after the Termination Notice has been provided by either the ISO in accordance with Section 2(d) or PacifiCorp in accordance with Section 2(e). This Agreement shall terminate upon acceptance by FERC of such a notice of termination.

### 3. Implementation Scope and Schedule.

(a) The Parties shall complete the Project as described in Exhibit A , subject to modification only as described in Section 3(c) below.

(b) The Parties shall undertake the activities described in Exhibit A with the objective of completing the Project and implementing the EIM no later than the Implementation Date, subject to modification only as described in section 3(c) below.

(c) Either Party may propose a change in Exhibit A or the Implementation Date to the other Party to pursue the Project objectives in accordance with Section 14. If a Party proposes a change in Exhibit A or the Implementation Date, the Parties shall negotiate in good faith to attempt to reach agreement on the proposal and any necessary changes in Exhibit A and any other affected provision of this Agreement, provided that any change in Exhibit A or the Implementation Date must be mutually agreed to by the Parties. The agreement of the Parties to a change in Exhibit A or the Implementation Date shall be memorialized in a revision to Exhibit A, which will be binding on the Parties and shall be posted on the internet web sites of the ISO and PacifiCorp, without the need for execution of an amendment to this Agreement. Changes that require revision of any provision of this Agreement other than Exhibit A shall be reflected in an executed amendment to this Agreement and filed with FERC for acceptance.

(d) At least once per calendar month during the Term, the Parties' Designated Executives, or their designees, will meet telephonically or in person (at a mutually agreed to location) to discuss the continued appropriateness of Exhibit A to ensure that the Project can meet the Implementation Date. For purposes of this section, "Designated Executive" shall mean the individual identified in Section 8(g), or their designee or successor.

(e) The Parties shall update Exhibit A and the project management plan described therein with activities to the extent necessary to implement the Base Schedule Aggregation Functionality.

4. Implementation Charges, Invoicing and Milestone Payments.

(a) PacifiCorp shall pay the ISO a fixed fee of \$2.1 million for costs incurred by the ISO to implement the Project ("Implementation Fee"), subject to completion of the milestones specified in Section 4(c) and subject to adjustment only as described in Section 4(b).

(b) The Implementation Fee shall be subject to adjustment only by mutual agreement of the Parties in either of the following circumstances: (1) if the Parties agree to a change in Exhibit A or the Implementation Date in accordance with Section 3(c) and the Parties agree that an adjustment to the Implementation Fee is warranted in light of such change; or (2) the ISO provides notice to PacifiCorp that the sum of its actual costs through the date of such notice and its projected costs to accomplish the balance of the Project exceed the Implementation Fee.

(c) Upon completion of the milestones identified in Exhibit A, the ISO shall invoice PacifiCorp for the Implementation Fee as follows:

- i. \$500,000 twenty (20) days after the Effective Date as further described in Section 1 of this Agreement and Exhibit A as Milestone 1;
- ii. \$400,000 upon deployment into the ISO test environment of the full network model database that includes the topology of the PacifiCorp system as further described in Exhibit A as Milestone 2;
- iii. \$400,000 upon delivery to PacifiCorp of the EIM technical specifications and configuration guides as further described in Exhibit A as Milestone 3;
- iv. \$400,000 upon commencement of EIM market simulation as further described in Exhibit A as Milestone 4; and
- v. \$400,000 ten (10) days after the Implementation Date as further described in Exhibit A as Milestone 5.

(d) Following the completion of each milestone identified in Section 4(c)(i) through (v), the ISO will deliver to PacifiCorp an invoice which will show the amount due, together with reasonable documentation supporting the completion of the milestone being invoiced. PacifiCorp shall pay the invoice no later than forty-five (45) days after the date of receipt. Any milestone payment past due will accrue interest, per annum, calculated in accordance with the methodology specified for interest in the FERC regulations at 18 C.F.R. § 35.19a(a)(2)(iii) (the “FERC Methodology”).

(e) If a milestone has not been completed as described in 4(c)(i), (ii), (iii), (iv), or (v) and Exhibit A, as Exhibit A may have been modified in accordance with Section 3(c), the Parties shall negotiate in good faith an agreed upon change to Exhibit A consistent with Section 3(c) such that the timing of milestone payments in Section 4(c) can be adjusted to correspond to the updated Exhibit A.

(f) If PacifiCorp disputes any portion of any amount specified in an invoice delivered by the ISO, PacifiCorp shall pay its total amount of the invoice when due, and identify the disputed amount and state that the disputed amount is being paid under protest. Any disputed amount shall be resolved pursuant to the provisions of Section 11. If it is determined pursuant to Section 11 that an overpayment or underpayment has been made by PacifiCorp or any amount on an invoice is incorrect, then (i) in the case of any overpayment, the ISO shall promptly return the amount of the overpayment (or credit the amount of the overpayment on the next invoice) to PacifiCorp; and (ii) in the case of an underpayment, PacifiCorp shall promptly pay the amount of the underpayment to the ISO. Any overpayment or underpayment shall include interest for the period from the date of overpayment, underpayment, or incorrect allocation, until such amount has been paid or credited against a future invoice calculated in the manner prescribed for calculating interest in Section 4(d).

(g) All costs necessary to implement the Project not provided for in this Agreement shall be borne separately by each Party and recovered through rates as may be authorized by their respective regulatory authorities.

(h) All milestone payments required to be made under the terms of this Agreement shall be made to the account or accounts designated by the Party which the milestone payment is owed, by wire transfer (in immediately available funds in the lawful currency of the United States).

(i) The Implementation Fee shall be increased by \$462,800 to account for costs incurred by the ISO to implement the Base Schedule Aggregation Functionality. The ISO shall invoice the costs to implement the Base Schedule Aggregation Functionality to PacifiCorp equally among any milestone payments that have not been invoiced as of the First Amendment Effective Date. If all milestones have been invoiced prior to the First Amendment Effective Date, the ISO shall separately invoice PacifiCorp for this amount.

5. Confidentiality.

(a) All written or oral information received from another Party in connection with this Agreement (but not this Agreement after it is filed with FERC) necessary to complete the Project and marked or otherwise identified at the time of communication by such Party as containing information that Party considers commercially sensitive or confidential shall constitute “Confidential Information” subject to the terms and conditions herein.

(b) If PacifiCorp releases PacifiCorp’s Confidential Information in connection with the public EIM stakeholder process or a regulatory filing, or if the ISO releases the ISO’s Confidential Information in connection with the public EIM stakeholder process or a regulatory filing, then the information released shall no longer constitute Confidential Information. In addition, Confidential Information does not include information that (i) is or becomes generally available to the public other than as a result of disclosure by either Party, its officers, directors, employees, agents, or representatives; (ii) is or becomes available to such Party on a non-confidential basis from other sources or their agents or representatives when such sources are not known by such Party to be prohibited from making the disclosure; (iii) is already known to such Party or has been independently acquired or developed by such Party without violating any of such Party’s obligations under this Section 5; (iv) is the subject of a mutual written agreement between the Parties, including an agreement evidenced through an exchange of electronic or other communications, for discussion at any stakeholder meetings or during the stakeholder process or with any regulatory authority; or (v) is the subject of a mutual written agreement between the Parties, including an agreement evidenced through an exchange of electronic or other communications, to allow for such disclosure and designation as non-confidential or public information on a case-by-case basis in accordance with Section 10 of this Agreement.

(c) The Confidential Information will be kept confidential by each Party and each Party agrees to protect the Confidential Information using the same degree of care, but no less than a reasonable degree of care, as a Party uses to protect its own confidential information of a like nature. Notwithstanding the preceding sentence, a Party may disclose the Confidential Information or portions thereof to those of such Party’s officers, employees, partners, representatives, advisors, or agents who need to know such information for the purpose of analyzing or performing an obligation related to the Project. Notwithstanding the foregoing, a Party is not authorized to disclose such Confidential Information to any officers, employees, partners, representatives, advisors, or agents without (i) informing such officer, employee, partner, representative, advisor, or agent of the confidential nature of the Confidential Information and (ii) receiving the agreement of such officer, employee, partner, representative, advisor, or agent as to the confidentiality obligation herein. Each Party agrees to be responsible for any breach of this Section 5 by such Party or a Party’s officers, employees, partners, representatives, advisors or agents.

(d) In the event that a Party becomes compelled by a court of competent jurisdiction or regulatory authority (by law, rule, regulation, order, deposition, interrogatory, request for documents, data request issued by a regulatory authority, subpoena, civil investigative demand or similar request or process) to disclose any of the Confidential Information, such Party shall provide the other Party with prompt prior written notice of such requirement so that the other Party may seek a protective order or other appropriate remedy and/or waive compliance with the terms of this Section 5. In the event that such protective order or other remedy is not obtained, or that such Party waives compliance with the provisions hereof, the Party compelled to disclose shall (i) furnish only that portion of the Confidential Information which, in accordance with the advice of its own counsel (which may include internal counsel), is legally required to be furnished, and (ii) exercise reasonable efforts to obtain assurances that confidential treatment will be accorded the Confidential Information so furnished.

(e) Notwithstanding the foregoing, the Parties acknowledge that they are required by law or regulation to report certain information that could embody Confidential Information from time to time, and may do so from time to time without providing prior notice to the other Party. Such reports may include models, filings, and reports of costs, general rate case filings, cost adjustment mechanisms, FERC-required reporting, investigations, annual state reports that include resources and loads, integrated resource planning reports, reports to entities such as FERC, the North American Electric Reliability Council ("NERC"), Western Electricity Coordinating Council ("WECC"), or similar or successor organizations, or similar or successor forms, filings, or reports, the specific names of which may vary by jurisdiction, along with supporting documentation. Additionally, in regulatory proceedings or investigations in all state and federal jurisdictions in which they may do business, the Parties will from time to time be required to produce Confidential Information, and may do so without prior notice using its business judgment in compliance with all of the foregoing and including the appropriate level of confidentiality for such disclosures in the normal course of business.

(f) Each Party is entitled to equitable relief, by injunction or otherwise, to enforce its rights under this provision to prevent the release of Confidential Information without bond or proof of damages, and may seek other remedies available at law or in equity for breach of this provision.

(g) Upon written request by a Party, the other Party shall promptly return to the requesting Party or destroy all Confidential Information it received, including all copies of its analyses, compilations, studies or other documents prepared by or for it, that contain the Confidential Information in a manner that would allow its extraction or that would allow the identification of the requesting Party as the source of the Confidential Information or inputs to the analysis. Notwithstanding the foregoing, neither Party shall be required to destroy or alter any computer archival and backup tapes or archival and backup files (collectively, "Computer

Tapes”), provided that such Computer Tapes shall be kept confidential in accordance with the terms of this Agreement.

(h) Nothing in this Agreement shall be deemed to restrict either Party from engaging with third parties with respect to any matter and for any reason, specifically including the EIM, provided Confidential Information is treated in accordance with this Section 5.

(i) This Section 5, Confidentiality, applies for two years (24 months) after the Termination Date.

6. Limitation of Liability; Indemnity.

(a) Each Party acknowledges and agrees that the other Party shall not be liable to it for any claim, loss, cost, liability, damage or expense, including any direct damage or any special, indirect, exemplary, punitive, incidental or consequential loss or damage (including any loss of revenue, income, profits or investment opportunities or claims of third party customers), arising out of or directly or indirectly related to the other Party’s decision to enter into this Agreement, the other Party’s performance under this Agreement, or any other decision with respect to the Project or the EIM.

(b) Each Party shall indemnify, defend and hold harmless the other Party and its officers, directors, employees, agents, contractors and sub-contractors, from and against all third party claims, judgments, losses, liabilities, costs, expenses (including reasonable attorneys’ fees) and damages for personal injury, death or property damage, caused by the negligence or willful misconduct related to this Agreement or breach of this Agreement of the indemnifying Party, its officers, directors, agents, employees, contractors or sub-contractors, provided that this indemnification shall be only to the extent such personal injury, death or property damage is not attributable to the negligence or willful misconduct related to this Agreement or breach of this Agreement of the Party seeking indemnification, its officers, directors, agents, employees, contractors or sub-contractors. The indemnified Party shall give the other Party prompt notice of any such claim. The indemnifying Party, in consultation with the indemnified Party, shall have the right to choose competent counsel, control the conduct of any litigation or other proceeding, and settle any claim. The indemnified Party shall provide all documents and assistance reasonably requested by the indemnifying Party.

(c) The rights and obligations under this Section 6 shall survive the expiration and termination of this Agreement.

7. Representation and Warranties



(a) Representations and Warranties of PacifiCorp. PacifiCorp represents and warrants to the ISO as of the Effective Date as follows:

(1) It is duly formed, validly existing and in good standing under the laws of the jurisdiction of its formation.

(2) It has all requisite corporate power necessary to own its assets and carry on its business as now being conducted or as proposed to be conducted under this Agreement.

(3) It has all necessary corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement, and the execution and delivery of this Agreement and the performance by it of this Agreement have been duly authorized by all necessary corporate action on its part.

(4) The execution and delivery of this Agreement and the performance by it of this Agreement do not: (i) violate its organizational documents; (ii) violate any governmental requirements applicable to it; or (iii) result in a breach of or constitute a default of any material agreement to which it is a party.

(5) This Agreement has been duly and validly executed and delivered by it and constitutes its legal, valid and binding obligation enforceable against it in accordance with its terms, except as the same may be limited by bankruptcy, insolvency or other similar laws affecting creditors' rights generally and by principles of equity regardless of whether such principles are considered in a proceeding at law or in equity.

(6) All material governmental authorizations have been obtained by it prior to the date hereof in connection with the due execution and delivery of, and performance by it of its obligations under, this Agreement, have been duly obtained or made and are in full force and effect.

(b) Representations and Warranties of the ISO. ISO represents and warrants to PacifiCorp as of the Effective Date as follows:

(1) It is duly formed, validly existing and in good standing under the laws of the jurisdiction of its formation.

(2) It has all requisite corporate power necessary to own its assets and carry on its business as now being conducted or as proposed to be conducted under this Agreement.

(3) It has all necessary corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement, and the execution and delivery of this Agreement and the performance by it of this

Agreement have been duly authorized by all necessary corporate action on its part.

(4) The execution and delivery of this Agreement and the performance by it of this Agreement do not: (i) violate its organizational documents; (ii) violate any governmental requirements applicable to it; or (iii) result in a breach of or constitute a default of any material agreement to which it is a party.

(5) This Agreement has been duly and validly executed and delivered by it and constitutes its legal, valid and binding obligation enforceable against it in accordance with its terms, except as the same may be limited by bankruptcy, insolvency, regulatory authority, or other similar laws affecting creditors' rights generally and by principles of equity regardless of whether such principles are considered in a proceeding at law or in equity.

(6) All material governmental authorizations have been obtained by it prior to the date hereof in connection with the due execution and delivery of, and performance by it of its obligations under, this Agreement, have been duly obtained or made and are in full force and effect.

## 8. General Provisions.

(a) This Agreement, including Exhibit A to this Agreement, represents the entire agreement between the Parties and supersedes any prior written or oral agreements or understandings between the Parties relating to the subject matter of this Agreement, including specifically the MOU, provided that nothing in this Agreement shall limit, repeal, or in any manner modify the existing legal rights, privileges, and duties of each of the Parties as provided by any other agreement, statute or any other law or applicable court or regulatory decision.

(b) This Agreement may not be amended except in writing signed by both of the Parties; provided, however, the Parties may mutually agree to changes in Exhibit A in accordance with Section 3(c). This Agreement may be modified to include one or more additional parties upon mutual agreement, not to be unreasonably withheld or delayed, of the then-current Parties, if the new party agrees to fund their share of implementation costs in a manner similar to PacifiCorp.

(c) Any waiver by a Party to this Agreement of any provision or condition of this Agreement must be in writing signed by each Party to be bound by such waiver, shall be effective only to the extent specifically set forth in such writing and shall not limit or affect any rights with respect to any other or future circumstance.

(d) This Agreement is for the sole and exclusive benefit of the Parties and shall not create a contractual relationship with, or cause of action in favor of, any third party.

(e) Neither Party shall have the right to assign its interest in this Agreement, including its rights, duties, and obligations hereunder, without the prior written consent of the other Party, which consent may be withheld by the other Party in its sole and absolute discretion. Any assignment made in violation of the terms of this Section 8(e) shall be null and void and shall have no force and effect.

(f) In the event that any provision of this Agreement is determined to be invalid or unenforceable for any reason, in whole or part, the remaining provisions of this Agreement shall be unaffected thereby and shall remain in full force and effect to the fullest extent permitted by law, and such invalid or unenforceable provision shall be replaced by the Parties with a provision that is valid and enforceable and that comes closest to expressing the Parties' intention with respect to such invalid or unenforceable provision.

(g) Whenever this Agreement requires or provides that (i) a notice be given by a Party to the other Party or (ii) a Party's action requires the approval or consent of the other Party, such notice, consent or approval shall be given in writing and shall be given by personal delivery, by recognized overnight courier service, email or by certified mail (return receipt requested), postage prepaid, to the recipient thereof at the address given for such Party as set forth below, or to such other address as may be designated by notice given by any Party to the other Party in accordance with the provisions of this Section 8(g):

If to PacifiCorp:

PacifiCorp  
825 NE Multnomah Street, Suite 2000  
Portland, OR 97232  
Attention: Senior Vice President, Strategic Business Performance  
E-mail: Andrea.Kelly@PacifiCorp.com

If to the ISO:

California Independent System Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Attention: Vice President, Technology  
E-mail: PRistanovic@caiso.com

Each notice, consent or approval shall be conclusively deemed to have been given (i) on the day of the actual delivery thereof, if given by personal delivery, email or overnight delivery, or (ii) date of delivery shown on the receipt, if given by certified mail (return receipt requested).

(h) This Agreement may be executed in one or more counterparts (including by facsimile or a scanned image), each of which when so executed shall

be deemed to be an original, and all of which shall together constitute one and the same instrument.

(i) Nothing contained in this Agreement shall be construed as creating a corporation, company, partnership, association, joint venture or other entity, nor shall anything contained in this Agreement be construed as creating or requiring any fiduciary relationship between the Parties. No Party shall be responsible hereunder for the acts or omissions of the other Party.

(j) The decision to execute an EIM service agreement and participate in the EIM remains within the sole discretion of PacifiCorp and the decision whether to proceed with development of the EIM remains within the sole discretion of the ISO.

(k) Nothing in this Agreement shall preclude a Party from exercising any rights or taking any action (or having its affiliates take any action) with respect to any other project, including an energy imbalance market or similar project that may compete with the Project or the EIM.

(l) Unless otherwise expressly provided, for purposes of this Agreement, the following rules of interpretation shall apply: (i) any reference in this Agreement to gender includes all genders, and the meaning of defined terms applies to both the singular and the plural of those terms; (ii) the insertion of headings are for convenience of reference only and do not affect, and will not be utilized in construing or interpreting, this Agreement; (iii) all references in this Agreement to any "Section" are to the corresponding Section of this Agreement unless otherwise specified; (iv) words such as "herein," "hereinafter," "hereof," and "hereunder" refer to this Agreement (including Exhibit A to this Agreement) as a whole and not merely to a subdivision in which such words appear, unless the context otherwise requires; (v) the word "including" or any variation thereof means "including, without limitation" and does not limit any general statement that it follows to the specific or similar items or matters immediately following it; and (vi) the Parties have participated jointly in the negotiation and drafting of this Agreement and, in the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as jointly drafted by the Parties and no presumption or burden of proof favoring or disfavoring any Party will exist or arise by virtue of the authorship of any provision of this Agreement.

9. Governing Law; Venue. This Agreement shall be governed by, and construed and interpreted in accordance with, the laws of the State of California without regard to its principles of conflicts of laws. Venue for any action hereunder shall be FERC, where subject to its jurisdiction, or in any Sacramento County state or Eastern District federal court located within the State of California. Each Party waives to the fullest extent permitted by law, any right it may have to contest venue and a right to trial by jury in respect of any suit, action, claim or proceeding relating to this Agreement.

10. Communication. The Parties shall develop a communication protocol for the dissemination of material information associated with the Project, which shall be approved by PacifiCorp and the ISO. Pursuant to the communication protocol, the individual identified in Section 8(g), or their designee or successor, shall provide reasonable advance notice to the other Party of planned press releases, public statements, and meetings with the public or governmental authorities in which material information concerning the Project will be shared. The Parties shall mutually consult with each other as provided in the communication protocol prior to making such public statements or disclosures; provided that nothing herein shall prevent, limit, or delay either Party from making any disclosure required by applicable law or regulation. In the event either Party engages in material unplanned communications about the Project that otherwise should have been subject to this Section and the communication protocol, such Party shall provide notice to the other Party as promptly as possible of the nature and content of such communication.

11. Dispute Resolution. Unless otherwise provided herein, each of the provisions of this Agreement shall be enforceable independently of any other provision of this Agreement and independent of any other claim or cause of action. In the event of any dispute arising under this Agreement, the Parties shall first attempt to resolve the matter through direct good faith negotiation between the Parties, including a full opportunity for escalation within the Parties' respective organizations. If the Parties are unable to resolve the issue within thirty (30) days after presentation of the dispute, then for matters subject to FERC jurisdiction either Party shall have the right to file a complaint under Section 206 of the Federal Power Act. For all other matters, then:

(a) To the fullest extent permitted by law, each of the Parties hereto waives any right it may have to a trial by jury in respect of litigation directly or indirectly arising out of, under or in connection with this Agreement. Each Party further waives any right to consolidate, or to request the consolidation of, any action in which a jury trial has been waived with any other action in which a jury trial cannot be or has not been waived.

(b) If a waiver of jury trial is deemed by any court of competent jurisdiction to not be enforceable for any reason, then to the fullest extent permitted by law, each of the Parties hereto agrees to binding arbitration. Such arbitration shall be in accordance with the rules and procedures of the American Arbitration Association (AAA). Notwithstanding any AAA rules and procedures or any other provisions or any state or federal laws, the Parties agree that the arbitrators shall not consider or award punitive damages as a remedy. Upon request by either Party, AAA shall provide the Parties a list of arbitrators each of who have experience and expertise with respect to construction. Upon each of the Parties receipt of such list, each Party shall have ten (10) days to select an arbitrator. The two selected arbitrators shall then select a third arbitrator within thirty (30) days from the date the initial two arbitrators were selected and the matter subject to

arbitration shall be arbitrated within sixty (60) days after the selection of the third arbitrator.

12. Third Party Agreements. The Parties may engage in discussions with third parties, either jointly or unilaterally, to facilitate the Project or EIM implementation process. Each Party may enter into binding agreements or tariffs or modify existing agreements or tariffs with these third parties to implement the approved terms and conditions of the Project or EIM as necessary and appropriate.

13. Compliance. Each Party shall comply with all federal, state, local or municipal governmental authority; any governmental, quasi-governmental, regulatory or administrative agency, commission, body or other authority exercising or entitled to exercise any administrative, executive, judicial, legislative, policy, regulatory or taxing authority or power, including FERC, NERC, WECC; or any court or governmental tribunal, in each case, having jurisdiction over either Party in connection with the execution, delivery and performance of its obligations under this Agreement. This Agreement is not intended to modify, change or otherwise amend the Parties' current functional responsibilities associated with compliance with WECC and NERC Reliability Standards; provided however, the Parties may enter into separate mutually agreed to arrangements to clarify roles and responsibilities associated with compliance with WECC and NERC Reliability Standards.

14. EIM Principles. The Parties recognize and acknowledge that input received from stakeholders during the course of implementing the Project, conditions imposed or questions raised in the EIM regulatory approval process, and analyses the Parties may perform or information the Parties receive or develop in the course of implementing the Project through the EIM stakeholder process or otherwise may require adjustments in the Project. Consistent with the foregoing, the Project shall nevertheless be implemented consistent with the following principles:

(a) The EIM market rules shall be contained in a discrete part of the ISO tariff to the extent this structure provides additional clarity to all EIM participants; provided, however, provisions generally applicable to the relationship between the ISO and market participants may be provided for by reference and applicable to EIM participants.

(b) Initial EIM governance and market rule oversight shall be consistent with existing ISO governance, allow for voluntary participation and expansion of participants and market activities, and evolve based on stakeholder feedback.

(c) The Parties shall consider whether and how to account for transmission service in the EIM stakeholder process.

(d) The EIM shall include an appropriate means to identify transactions that do not involve California resources or loads, or that otherwise occur outside the State of California, such that only the imbalance energy portion that is imported

into California would be subject to any laws, regulations or costs associated with a California specific greenhouse gas compliance obligation.

(f) The EIM shall be implemented in a manner that is compatible with the Northwest Power Pool reserve sharing program and other existing and emerging market initiatives, including FERC Order No. 764 (and its progeny).

(g) Other entities may participate in the EIM within a timeframe to be determined by the ISO if they agree to fund their share of implementation costs pursuant to a FERC-accepted implementation agreement in a manner similar to PacifiCorp.

IN WITNESS WHEREOF, each of the Parties has caused its duly authorized officer to execute this Implementation Agreement as of the date first above written.

PACIFICORP

By: \_\_\_\_\_  
Name: Andrea L. Kelly  
Title: Senior Vice President, Strategic Business Performance

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

By: \_\_\_\_\_  
Name: Karen Edson  
Title: Vice President, Policy and Client Services

## EXHIBIT A: PROJECT SCOPE AND SCHEDULE

The Project consists of the activities and delivery dates identified in this Exhibit A, implemented in accordance with the Agreement, including specifically the principles set forth in Section 14.

The Parties understand that input received from stakeholders during the course of implementing the Project, conditions imposed or questions raised in the regulatory approval process, and the activities of the Parties in implementing the Project may cause the Parties to determine that changes in the Project are necessary or desirable. Accordingly, this Exhibit A may be modified in accordance with Section 3(c) of the Agreement.

Each Party is responsible for performing a variety of tasks necessary to achieve the milestones on schedule and shall plan accordingly. The Parties shall communicate and coordinate as provided in the Agreement to support the planning and execution to complete the Project.

<b>Project Scope and Milestones</b>	<b>Project Delivery Dates</b>
<b>Detailed Project Management Plan</b> – The Parties will develop and initiate a final project management plan that describes specific project tasks each Party must perform, delivery dates, project team members, meeting requirements, and a process for approving changes to support completion of the Project.	May 31, 2013
<ul style="list-style-type: none"> <li>• <b>Milestone 1</b> – The Agreement must be made effective in accordance with Section 1 of the Agreement to complete this milestone.</li> </ul>	July 1, 2013
<b>Full Network Model Expansion</b> – Full Network Model expansion for PacifiCorp and EMS/SCADA, including, proof of concept of export/import of EMS data; complete PACE and PACW model into the ISO test model; complete validation for all SCADA points from PacifiCorp; complete testing of the new market model; and validation of the Outage, State Estimator, Real Time Contingency Analysis, and Automatic Generation Control applications.	November 22, 2013
<ul style="list-style-type: none"> <li>• <b>Milestone 2</b> - This milestone is completed upon the modeling PacifiCorp into the ISO Full Network Model through the EMS which will be deployed using the ISO's network and resource modeling process.</li> </ul>	December 6, 2013
<b>System Implementation Program Improvements</b> – System requirements and software design, the execution of necessary software vendor contracts, technical interface specifications and configuration guides, and other related activities.	April 1, 2014



<ul style="list-style-type: none"> <li>• <b>Milestone 3</b> - For PacifiCorp and the ISO to exchange production data (market inputs and outputs) and complete this milestone, the ISO will provide to PacifiCorp all final technical specifications for application program interface (API) specifications, metering specifications and settlement specifications. Final technical specifications related to some systems may be required earlier as provided in the project management plan.</li> </ul>	<p>April 8, 2014</p>
<p><b>Construction, Testing and Training in Preparation for Market Simulation</b> - This task includes IT infrastructure upgrades, security testing, training simulators, and functional testing.</p>	<p>July 1, 2014</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 4</b> - The EIM market simulation will allow PacifiCorp and the ISO to conduct specific market scenarios in a test environment prior to the production deployment to ensure that all system interfaces are functioning as expected and to produce simulated market results. To complete this milestone, the commencement of EIM simulation will signal that the PacifiCorp and the ISO have independently completed EIM system design, development and testing to participate in joint testing.</li> </ul>	<p>July 8, 2014</p>
<p><b>System Deployment and Go Live</b> – Implementing the Project and going live will include resource registration, operating procedures and updates, execution of service agreements, completion of the policy and tariff stakeholder processes, applicable board approvals, the filing and acceptance of tariff changes with FERC, and the development of new and updated Business Practice Manuals.</p>	<p>September 30, 2014</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 5</b> – This milestone is complete upon the first production energy imbalance market trade date.</li> </ul>	<p>October 1, 2014</p>

**Attachment C – Clean Tariff**

**Rate Schedule No. 73**

**First Amendment to Energy Imbalance Market Implementation Agreement**

**California Independent System Operator Corporation**

**February 21, 2014**

## **FIRST AMENDED ENERGY IMBALANCE MARKET IMPLEMENTATION AGREEMENT**

This Implementation Agreement (“Agreement”) is entered into as of April 30, 2013, by and between PacifiCorp, an Oregon corporation (“PacifiCorp”), and the California Independent System Operator Corporation, a California nonprofit public benefit corporation (“ISO”). PacifiCorp and the ISO are sometimes referred to in this Agreement individually as a “Party” and, collectively, as the “Parties”.

### **RECITALS**

A. WHEREAS, PacifiCorp has determined there is an opportunity to secure benefits for PacifiCorp’s customers through improved dispatch and operation of PacifiCorp’s generation fleet and through the efficient use and continued reliable operation of existing and future transmission facilities and desires to participate in an energy imbalance market (“EIM”) that benefits its customers and could potentially be expanded to benefit other customers in the region;

B. WHEREAS, the ISO has determined there are benefits to ISO market participants through greater access to energy imbalance resources in real-time and through the efficient use and reliable operation of the transmission facilities and markets operated by the ISO, and desires to develop and operate the EIM by employing the systems and processes of the ISO’s existing imbalance energy market;

C. WHEREAS, the ISO will develop EIM market rules through a stakeholder process in which PacifiCorp will be a stakeholder with rights and responsibilities with respect to the EIM implementation as provided for in this Agreement.

D. WHEREAS, the Parties acknowledge that the rules and procedures governing the EIM must be set forth in the provisions of an ISO tariff filed with the Federal Energy Regulatory Commission (“FERC”), as well as corresponding revisions to PacifiCorp’s Open Access Transmission Tariff and the execution of associated service agreements, to implement the EIM;

E. WHEREAS, the Parties are entering into this Agreement to set forth the terms upon which the ISO will timely configure its systems to incorporate PacifiCorp into the EIM and develop the market rules for the EIM (“Project”) as contemplated by the Memorandum of Understanding dated February 12, 2013 (“MOU”), such that PacifiCorp and the ISO are prepared for an October 1, 2014 implementation of the Project (“Implementation Date”);

NOW THEREFORE, in consideration of the mutual covenants contained herein, and of other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

## AGREEMENT

### 1. Effective Date and Term.

(a) This Agreement shall become effective upon the date the Agreement is accepted, approved or otherwise permitted to take effect by FERC, without condition or modification unsatisfactory to either Party ("Effective Date").

(b) In the event FERC requires any modification to the Agreement or imposes any other condition upon its acceptance or approval of the Agreement, each Party shall have ten (10) days to notify the other Party that any such modification or condition is unacceptable to that Party. If no Party provides such notice, then the Agreement, as modified or conditioned by FERC, shall take effect as of the date determined under section 1(a). If either Party provides such notice to the other Party, the Parties shall take any one or more of the following actions: (i) meet and confer and agree to accept any modifications or conditions imposed by such FERC order; (ii) jointly seek further administrative or legal remedies with respect to such FERC order, including a request for rehearing or clarification; or (iii) enter into negotiations with respect to accommodation of such FERC order, provided however, if the Parties have not agreed to such an accommodation within thirty (30) days after the date on which such FERC order becomes a final and non-appealable order, such order shall be deemed an adverse order and the Parties shall have no further rights and obligations under this Agreement.

(c) The term of this Agreement ("Term") shall commence on the Effective Date and shall terminate upon the earliest to occur of (1) the date FERC permits all necessary revisions to the ISO and PacifiCorp tariffs to take effect and the service agreements under such tariffs necessary for the commencement of the EIM have taken effect; (2) termination in accordance with Section 2 of this Agreement; or (3) such other date as mutually agreed to by the Parties ("Termination Date").

(d) This Agreement shall automatically terminate on the Termination Date and shall have no further force or effect, provided that the rights and obligations set forth in Sections 5 and 6 shall survive the termination of this Agreement and remain in full force and effect.

### 2. Termination.

(a) The Parties may mutually agree to terminate this Agreement in writing at any time. In addition, either Party may terminate this Agreement in its sole discretion after conclusion of the negotiation period in Section 2(b), as provided in Section 2(d) or 2(e) as applicable.

(b) If either the ISO or PacifiCorp seeks to terminate this agreement, it must first notify the other Party in writing of its intent to do so ("Notice of Intent to

Terminate”) and engage in thirty (30) days of good faith negotiations in an effort to resolve its concerns. If the Parties successfully resolve the concerns of the Party issuing the Notice of Intent to Terminate, the Party that issued such notice shall notify the other Party in writing of the withdrawal of such Notice (“Notice of Resolution”).

(c) At the time the Notice of Intent to Terminate is provided, or any time thereafter unless a Notice of Resolution is issued, PacifiCorp may provide written notice directing the ISO to suspend performance on any or all work on the Project for a specified period of time (“Notice to Suspend Work”). Upon receipt of a Notice to Suspend Work, the ISO shall: (1) discontinue work on the Project; (2) place no further orders with subcontractors related to the Project; (3) take commercially reasonable actions to suspend all orders and subcontracts; (4) protect and maintain the work on the Project; and (5) otherwise mitigate PacifiCorp’s costs and liabilities for the areas of work suspended. The ISO will not invoice PacifiCorp pursuant to Section 4(c) of this Agreement for any milestone payment following the issuance of a Notice to Suspend Work. To the extent a Notice of Resolution is issued pursuant to Section 2(b), the Notice to Suspend Work in effect at the time shall be deemed withdrawn and the ISO shall be entitled to invoice PacifiCorp for any milestone completed as specified in Section 4(c) of this Agreement and PacifiCorp shall pay such invoice pursuant to Section 4.

(d) Any time after 30 days from the date of the Notice of Intent to Terminate under Section 2(b), issued by either Party, and prior to the date of a Notice of Resolution, the ISO may terminate this Agreement by providing written notice to PacifiCorp that it is terminating this Agreement (“Termination Notice”) effective immediately. The ISO may terminate this Agreement at its sole discretion for any reason, including but not limited to: (i) a lack of reasonable progress in the development of the Project in accordance with Exhibit A to this Agreement, subject to modification only as described in Section 3(c); (ii) a disagreement between the Parties regarding Project design, scope, or implementation, which disagreement the Parties are unable to resolve to their mutual satisfaction; or (iii) if the ISO determines in its sole discretion that the Project is not likely to provide the benefits the ISO is seeking to obtain.

(e) Any time after 30 days from the date of the Notice of Intent to Terminate under Section 2(b), issued by either Party, and prior to the date of a Notice of Resolution, PacifiCorp may terminate this Agreement by providing written notice to the ISO that it is terminating this Agreement (“Termination Notice”) effective immediately. PacifiCorp may terminate this Agreement at its sole discretion for any reason, including but not limited to: (i) a lack of reasonable progress in the development of the Project in accordance with Exhibit A to this Agreement, subject only to modification only as described in Section 3(c); (ii) a disagreement between the Parties regarding Project design, scope, or implementation, which disagreement the Parties are unable to resolve to their mutual satisfaction; or (iii) if PacifiCorp determines in its sole discretion that the Project is not likely to provide the benefits PacifiCorp is seeking to obtain.

(f) In the event this Agreement is terminated by either or both of the Parties, this Agreement will become wholly void and of no further force and effect, without further action by either Party, and the liabilities and obligations of the Parties hereunder will terminate, and each Party shall be fully released and discharged from any liability or obligation under or resulting from this Agreement as of the date of the Termination Notice provided in Section 2(d) or 2(e), as applicable, notwithstanding the requirement for the ISO to submit the filing specified in Section 2(g). Notwithstanding the foregoing, the rights and obligations set forth in Sections 5 and 6 shall survive the termination of this Agreement and remain in full force and effect as specified in Sections 5 and 6, and any milestone payment obligation pursuant to Section 4(c) that arose prior to the Termination Notice in accordance with Section 2(d) or 2(e) shall survive until satisfied or resolved in accordance with Section 11.

(g) The Parties acknowledge that the ISO is required to file a timely notice of termination with FERC. The Parties acknowledge and agree that the filing of the notice of termination by the ISO with FERC will be considered timely if the filing of the notice of termination is made after the preconditions for termination have been met, and the ISO files the notice of termination within ten (10) days after the Termination Notice has been provided by either the ISO in accordance with Section 2(d) or PacifiCorp in accordance with Section 2(e). This Agreement shall terminate upon acceptance by FERC of such a notice of termination.

### 3. Implementation Scope and Schedule.

(a) The Parties shall complete the Project as described in Exhibit A , subject to modification only as described in Section 3(c) below.

(b) The Parties shall undertake the activities described in Exhibit A with the objective of completing the Project and implementing the EIM no later than the Implementation Date, subject to modification only as described in section 3(c) below.

(c) Either Party may propose a change in Exhibit A or the Implementation Date to the other Party to pursue the Project objectives in accordance with Section 14. If a Party proposes a change in Exhibit A or the Implementation Date, the Parties shall negotiate in good faith to attempt to reach agreement on the proposal and any necessary changes in Exhibit A and any other affected provision of this Agreement, provided that any change in Exhibit A or the Implementation Date must be mutually agreed to by the Parties. The agreement of the Parties to a change in Exhibit A or the Implementation Date shall be memorialized in a revision to Exhibit A, which will be binding on the Parties and shall be posted on the internet web sites of the ISO and PacifiCorp, without the need for execution of an amendment to this Agreement. Changes that require revision of any provision of this Agreement other than Exhibit A shall be reflected in an executed amendment to this Agreement and filed with FERC for acceptance.

(d) At least once per calendar month during the Term, the Parties' Designated Executives, or their designees, will meet telephonically or in person (at a mutually agreed to location) to discuss the continued appropriateness of Exhibit A to ensure that the Project can meet the Implementation Date. For purposes of this section, "Designated Executive" shall mean the individual identified in Section 8(g), or their designee or successor.

(e) The Parties shall update Exhibit A and the project management plan described therein with activities to the extent necessary to implement the Base Schedule Aggregation Functionality.

#### 4. Implementation Charges, Invoicing and Milestone Payments.

(a) PacifiCorp shall pay the ISO a fixed fee of \$2.1 million for costs incurred by the ISO to implement the Project ("Implementation Fee"), subject to completion of the milestones specified in Section 4(c) and subject to adjustment only as described in Section 4(b).

(b) The Implementation Fee shall be subject to adjustment only by mutual agreement of the Parties in either of the following circumstances: (1) if the Parties agree to a change in Exhibit A or the Implementation Date in accordance with Section 3(c) and the Parties agree that an adjustment to the Implementation Fee is warranted in light of such change; or (2) the ISO provides notice to PacifiCorp that the sum of its actual costs through the date of such notice and its projected costs to accomplish the balance of the Project exceed the Implementation Fee.

(c) Upon completion of the milestones identified in Exhibit A, the ISO shall invoice PacifiCorp for the Implementation Fee as follows:

- i. \$500,000 twenty (20) days after the Effective Date as further described in Section 1 of this Agreement and Exhibit A as Milestone 1;
- ii. \$400,000 upon deployment into the ISO test environment of the full network model database that includes the topology of the PacifiCorp system as further described in Exhibit A as Milestone 2;
- iii. \$400,000 upon delivery to PacifiCorp of the EIM technical specifications and configuration guides as further described in Exhibit A as Milestone 3;
- iv. \$400,000 upon commencement of EIM market simulation as further described in Exhibit A as Milestone 4; and
- v. \$400,000 ten (10) days after the Implementation Date as further described in Exhibit A as Milestone 5.

(d) Following the completion of each milestone identified in Section 4(c)(i) through (v), the ISO will deliver to PacifiCorp an invoice which will show the amount due, together with reasonable documentation supporting the completion of the milestone being invoiced. PacifiCorp shall pay the invoice no later than forty-five (45) days after the date of receipt. Any milestone payment past due will accrue interest, per annum, calculated in accordance with the methodology specified for interest in the FERC regulations at 18 C.F.R. § 35.19a(a)(2)(iii) (the "FERC Methodology").

(e) If a milestone has not been completed as described in 4(c)(i), (ii), (iii), (iv), or (v) and Exhibit A, as Exhibit A may have been modified in accordance with Section 3(c), the Parties shall negotiate in good faith an agreed upon change to Exhibit A consistent with Section 3(c) such that the timing of milestone payments in Section 4(c) can be adjusted to correspond to the updated Exhibit A.

(f) If PacifiCorp disputes any portion of any amount specified in an invoice delivered by the ISO, PacifiCorp shall pay its total amount of the invoice when due, and identify the disputed amount and state that the disputed amount is being paid under protest. Any disputed amount shall be resolved pursuant to the provisions of Section 11. If it is determined pursuant to Section 11 that an overpayment or underpayment has been made by PacifiCorp or any amount on an invoice is incorrect, then (i) in the case of any overpayment, the ISO shall promptly return the amount of the overpayment (or credit the amount of the overpayment on the next invoice) to PacifiCorp; and (ii) in the case of an underpayment, PacifiCorp shall promptly pay the amount of the underpayment to the ISO. Any overpayment or underpayment shall include interest for the period from the date of overpayment, underpayment, or incorrect allocation, until such amount has been paid or credited against a future invoice calculated in the manner prescribed for calculating interest in Section 4(d).

(g) All costs necessary to implement the Project not provided for in this Agreement shall be borne separately by each Party and recovered through rates as may be authorized by their respective regulatory authorities.

(h) All milestone payments required to be made under the terms of this Agreement shall be made to the account or accounts designated by the Party which the milestone payment is owed, by wire transfer (in immediately available funds in the lawful currency of the United States).

(i) The Implementation Fee shall be increased by \$462,800 to account for costs incurred by the ISO to implement the Base Schedule Aggregation Functionality. The ISO shall invoice the costs to implement the Base Schedule Aggregation Functionality to PacifiCorp equally among any milestone payments that have not been invoiced as of the First Amendment Effective Date. If all milestones have been invoiced prior to the First Amendment Effective Date, the ISO shall separately invoice PacifiCorp for this amount.



5. Confidentiality.

(a) All written or oral information received from another Party in connection with this Agreement (but not this Agreement after it is filed with FERC) necessary to complete the Project and marked or otherwise identified at the time of communication by such Party as containing information that Party considers commercially sensitive or confidential shall constitute “Confidential Information” subject to the terms and conditions herein.

(b) If PacifiCorp releases PacifiCorp’s Confidential Information in connection with the public EIM stakeholder process or a regulatory filing, or if the ISO releases the ISO’s Confidential Information in connection with the public EIM stakeholder process or a regulatory filing, then the information released shall no longer constitute Confidential Information. In addition, Confidential Information does not include information that (i) is or becomes generally available to the public other than as a result of disclosure by either Party, its officers, directors, employees, agents, or representatives; (ii) is or becomes available to such Party on a non-confidential basis from other sources or their agents or representatives when such sources are not known by such Party to be prohibited from making the disclosure; (iii) is already known to such Party or has been independently acquired or developed by such Party without violating any of such Party’s obligations under this Section 5; (iv) is the subject of a mutual written agreement between the Parties, including an agreement evidenced through an exchange of electronic or other communications, for discussion at any stakeholder meetings or during the stakeholder process or with any regulatory authority; or (v) is the subject of a mutual written agreement between the Parties, including an agreement evidenced through an exchange of electronic or other communications, to allow for such disclosure and designation as non-confidential or public information on a case-by-case basis in accordance with Section 10 of this Agreement.

(c) The Confidential Information will be kept confidential by each Party and each Party agrees to protect the Confidential Information using the same degree of care, but no less than a reasonable degree of care, as a Party uses to protect its own confidential information of a like nature. Notwithstanding the preceding sentence, a Party may disclose the Confidential Information or portions thereof to those of such Party’s officers, employees, partners, representatives, advisors, or agents who need to know such information for the purpose of analyzing or performing an obligation related to the Project. Notwithstanding the foregoing, a Party is not authorized to disclose such Confidential Information to any officers, employees, partners, representatives, advisors, or agents without (i) informing such officer, employee, partner, representative, advisor, or agent of the confidential nature of the Confidential Information and (ii) receiving the agreement of such officer, employee, partner, representative, advisor, or agent as to the confidentiality obligation herein. Each Party agrees to be responsible for any breach of this Section 5 by such Party or a Party’s officers, employees, partners, representatives, advisors or agents.

(d) In the event that a Party becomes compelled by a court of competent jurisdiction or regulatory authority (by law, rule, regulation, order, deposition, interrogatory, request for documents, data request issued by a regulatory authority, subpoena, civil investigative demand or similar request or process) to disclose any of the Confidential Information, such Party shall provide the other Party with prompt prior written notice of such requirement so that the other Party may seek a protective order or other appropriate remedy and/or waive compliance with the terms of this Section 5. In the event that such protective order or other remedy is not obtained, or that such Party waives compliance with the provisions hereof, the Party compelled to disclose shall (i) furnish only that portion of the Confidential Information which, in accordance with the advice of its own counsel (which may include internal counsel), is legally required to be furnished, and (ii) exercise reasonable efforts to obtain assurances that confidential treatment will be accorded the Confidential Information so furnished.

(e) Notwithstanding the foregoing, the Parties acknowledge that they are required by law or regulation to report certain information that could embody Confidential Information from time to time, and may do so from time to time without providing prior notice to the other Party. Such reports may include models, filings, and reports of costs, general rate case filings, cost adjustment mechanisms, FERC-required reporting, investigations, annual state reports that include resources and loads, integrated resource planning reports, reports to entities such as FERC, the North American Electric Reliability Council ("NERC"), Western Electricity Coordinating Council ("WECC"), or similar or successor organizations, or similar or successor forms, filings, or reports, the specific names of which may vary by jurisdiction, along with supporting documentation. Additionally, in regulatory proceedings or investigations in all state and federal jurisdictions in which they may do business, the Parties will from time to time be required to produce Confidential Information, and may do so without prior notice using its business judgment in compliance with all of the foregoing and including the appropriate level of confidentiality for such disclosures in the normal course of business.

(f) Each Party is entitled to equitable relief, by injunction or otherwise, to enforce its rights under this provision to prevent the release of Confidential Information without bond or proof of damages, and may seek other remedies available at law or in equity for breach of this provision.

(g) Upon written request by a Party, the other Party shall promptly return to the requesting Party or destroy all Confidential Information it received, including all copies of its analyses, compilations, studies or other documents prepared by or for it, that contain the Confidential Information in a manner that would allow its extraction or that would allow the identification of the requesting Party as the source of the Confidential Information or inputs to the analysis. Notwithstanding the foregoing, neither Party shall be required to destroy or alter any computer archival and backup tapes or archival and backup files (collectively, "Computer

Tapes”), provided that such Computer Tapes shall be kept confidential in accordance with the terms of this Agreement.

(h) Nothing in this Agreement shall be deemed to restrict either Party from engaging with third parties with respect to any matter and for any reason, specifically including the EIM, provided Confidential Information is treated in accordance with this Section 5.

(i) This Section 5, Confidentiality, applies for two years (24 months) after the Termination Date.

6. Limitation of Liability; Indemnity.

(a) Each Party acknowledges and agrees that the other Party shall not be liable to it for any claim, loss, cost, liability, damage or expense, including any direct damage or any special, indirect, exemplary, punitive, incidental or consequential loss or damage (including any loss of revenue, income, profits or investment opportunities or claims of third party customers), arising out of or directly or indirectly related to the other Party’s decision to enter into this Agreement, the other Party’s performance under this Agreement, or any other decision with respect to the Project or the EIM.

(b) Each Party shall indemnify, defend and hold harmless the other Party and its officers, directors, employees, agents, contractors and sub-contractors, from and against all third party claims, judgments, losses, liabilities, costs, expenses (including reasonable attorneys’ fees) and damages for personal injury, death or property damage, caused by the negligence or willful misconduct related to this Agreement or breach of this Agreement of the indemnifying Party, its officers, directors, agents, employees, contractors or sub-contractors, provided that this indemnification shall be only to the extent such personal injury, death or property damage is not attributable to the negligence or willful misconduct related to this Agreement or breach of this Agreement of the Party seeking indemnification, its officers, directors, agents, employees, contractors or sub-contractors. The indemnified Party shall give the other Party prompt notice of any such claim. The indemnifying Party, in consultation with the indemnified Party, shall have the right to choose competent counsel, control the conduct of any litigation or other proceeding, and settle any claim. The indemnified Party shall provide all documents and assistance reasonably requested by the indemnifying Party.

(c) The rights and obligations under this Section 6 shall survive the expiration and termination of this Agreement.

7. Representation and Warranties

(a) Representations and Warranties of PacifiCorp. PacifiCorp represents and warrants to the ISO as of the Effective Date as follows:

(1) It is duly formed, validly existing and in good standing under the laws of the jurisdiction of its formation.

(2) It has all requisite corporate power necessary to own its assets and carry on its business as now being conducted or as proposed to be conducted under this Agreement.

(3) It has all necessary corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement, and the execution and delivery of this Agreement and the performance by it of this Agreement have been duly authorized by all necessary corporate action on its part.

(4) The execution and delivery of this Agreement and the performance by it of this Agreement do not: (i) violate its organizational documents; (ii) violate any governmental requirements applicable to it; or (iii) result in a breach of or constitute a default of any material agreement to which it is a party.

(5) This Agreement has been duly and validly executed and delivered by it and constitutes its legal, valid and binding obligation enforceable against it in accordance with its terms, except as the same may be limited by bankruptcy, insolvency or other similar laws affecting creditors' rights generally and by principles of equity regardless of whether such principles are considered in a proceeding at law or in equity.

(6) All material governmental authorizations have been obtained by it prior to the date hereof in connection with the due execution and delivery of, and performance by it of its obligations under, this Agreement, have been duly obtained or made and are in full force and effect.

(b) Representations and Warranties of the ISO. ISO represents and warrants to PacifiCorp as of the Effective Date as follows:

(1) It is duly formed, validly existing and in good standing under the laws of the jurisdiction of its formation.

(2) It has all requisite corporate power necessary to own its assets and carry on its business as now being conducted or as proposed to be conducted under this Agreement.

(3) It has all necessary corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement, and the execution and delivery of this Agreement and the performance by it of this

Agreement have been duly authorized by all necessary corporate action on its part.

(4) The execution and delivery of this Agreement and the performance by it of this Agreement do not: (i) violate its organizational documents; (ii) violate any governmental requirements applicable to it; or (iii) result in a breach of or constitute a default of any material agreement to which it is a party.

(5) This Agreement has been duly and validly executed and delivered by it and constitutes its legal, valid and binding obligation enforceable against it in accordance with its terms, except as the same may be limited by bankruptcy, insolvency, regulatory authority, or other similar laws affecting creditors' rights generally and by principles of equity regardless of whether such principles are considered in a proceeding at law or in equity.

(6) All material governmental authorizations have been obtained by it prior to the date hereof in connection with the due execution and delivery of, and performance by it of its obligations under, this Agreement, have been duly obtained or made and are in full force and effect.

## 8. General Provisions.

(a) This Agreement, including Exhibit A to this Agreement, represents the entire agreement between the Parties and supersedes any prior written or oral agreements or understandings between the Parties relating to the subject matter of this Agreement, including specifically the MOU, provided that nothing in this Agreement shall limit, repeal, or in any manner modify the existing legal rights, privileges, and duties of each of the Parties as provided by any other agreement, statute or any other law or applicable court or regulatory decision.

(b) This Agreement may not be amended except in writing signed by both of the Parties; provided, however, the Parties may mutually agree to changes in Exhibit A in accordance with Section 3(c). This Agreement may be modified to include one or more additional parties upon mutual agreement, not to be unreasonably withheld or delayed, of the then-current Parties, if the new party agrees to fund their share of implementation costs in a manner similar to PacifiCorp.

(c) Any waiver by a Party to this Agreement of any provision or condition of this Agreement must be in writing signed by each Party to be bound by such waiver, shall be effective only to the extent specifically set forth in such writing and shall not limit or affect any rights with respect to any other or future circumstance.

(d) This Agreement is for the sole and exclusive benefit of the Parties and shall not create a contractual relationship with, or cause of action in favor of, any third party.

(e) Neither Party shall have the right to assign its interest in this Agreement, including its rights, duties, and obligations hereunder, without the prior written consent of the other Party, which consent may be withheld by the other Party in its sole and absolute discretion. Any assignment made in violation of the terms of this Section 8(e) shall be null and void and shall have no force and effect.

(f) In the event that any provision of this Agreement is determined to be invalid or unenforceable for any reason, in whole or part, the remaining provisions of this Agreement shall be unaffected thereby and shall remain in full force and effect to the fullest extent permitted by law, and such invalid or unenforceable provision shall be replaced by the Parties with a provision that is valid and enforceable and that comes closest to expressing the Parties' intention with respect to such invalid or unenforceable provision.

(g) Whenever this Agreement requires or provides that (i) a notice be given by a Party to the other Party or (ii) a Party's action requires the approval or consent of the other Party, such notice, consent or approval shall be given in writing and shall be given by personal delivery, by recognized overnight courier service, email or by certified mail (return receipt requested), postage prepaid, to the recipient thereof at the address given for such Party as set forth below, or to such other address as may be designated by notice given by any Party to the other Party in accordance with the provisions of this Section 8(g):

If to PacifiCorp:

PacifiCorp  
825 NE Multnomah Street, Suite 2000  
Portland, OR 97232  
Attention: Senior Vice President, Strategic Business Performance  
E-mail: Andrea.Kelly@PacifiCorp.com

If to the ISO:

California Independent System Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Attention: Vice President, Technology  
E-mail: PRistanovic@caiso.com

Each notice, consent or approval shall be conclusively deemed to have been given (i) on the day of the actual delivery thereof, if given by personal delivery, email or overnight delivery, or (ii) date of delivery shown on the receipt, if given by certified mail (return receipt requested).

(h) This Agreement may be executed in one or more counterparts (including by facsimile or a scanned image), each of which when so executed shall

be deemed to be an original, and all of which shall together constitute one and the same instrument.

(i) Nothing contained in this Agreement shall be construed as creating a corporation, company, partnership, association, joint venture or other entity, nor shall anything contained in this Agreement be construed as creating or requiring any fiduciary relationship between the Parties. No Party shall be responsible hereunder for the acts or omissions of the other Party.

(j) The decision to execute an EIM service agreement and participate in the EIM remains within the sole discretion of PacifiCorp and the decision whether to proceed with development of the EIM remains within the sole discretion of the ISO.

(k) Nothing in this Agreement shall preclude a Party from exercising any rights or taking any action (or having its affiliates take any action) with respect to any other project, including an energy imbalance market or similar project that may compete with the Project or the EIM.

(l) Unless otherwise expressly provided, for purposes of this Agreement, the following rules of interpretation shall apply: (i) any reference in this Agreement to gender includes all genders, and the meaning of defined terms applies to both the singular and the plural of those terms; (ii) the insertion of headings are for convenience of reference only and do not affect, and will not be utilized in construing or interpreting, this Agreement; (iii) all references in this Agreement to any "Section" are to the corresponding Section of this Agreement unless otherwise specified; (iv) words such as "herein," "hereinafter," "hereof," and "hereunder" refer to this Agreement (including Exhibit A to this Agreement) as a whole and not merely to a subdivision in which such words appear, unless the context otherwise requires; (v) the word "including" or any variation thereof means "including, without limitation" and does not limit any general statement that it follows to the specific or similar items or matters immediately following it; and (vi) the Parties have participated jointly in the negotiation and drafting of this Agreement and, in the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as jointly drafted by the Parties and no presumption or burden of proof favoring or disfavoring any Party will exist or arise by virtue of the authorship of any provision of this Agreement.

9. Governing Law; Venue. This Agreement shall be governed by, and construed and interpreted in accordance with, the laws of the State of California without regard to its principles of conflicts of laws. Venue for any action hereunder shall be FERC, where subject to its jurisdiction, or in any Sacramento County state or Eastern District federal court located within the State of California. Each Party waives to the fullest extent permitted by law, any right it may have to contest venue and a right to trial by jury in respect of any suit, action, claim or proceeding relating to this Agreement.

10. Communication. The Parties shall develop a communication protocol for the dissemination of material information associated with the Project, which shall be approved by PacifiCorp and the ISO. Pursuant to the communication protocol, the individual identified in Section 8(g), or their designee or successor, shall provide reasonable advance notice to the other Party of planned press releases, public statements, and meetings with the public or governmental authorities in which material information concerning the Project will be shared. The Parties shall mutually consult with each other as provided in the communication protocol prior to making such public statements or disclosures; provided that nothing herein shall prevent, limit, or delay either Party from making any disclosure required by applicable law or regulation. In the event either Party engages in material unplanned communications about the Project that otherwise should have been subject to this Section and the communication protocol, such Party shall provide notice to the other Party as promptly as possible of the nature and content of such communication.

11. Dispute Resolution. Unless otherwise provided herein, each of the provisions of this Agreement shall be enforceable independently of any other provision of this Agreement and independent of any other claim or cause of action. In the event of any dispute arising under this Agreement, the Parties shall first attempt to resolve the matter through direct good faith negotiation between the Parties, including a full opportunity for escalation within the Parties' respective organizations. If the Parties are unable to resolve the issue within thirty (30) days after presentation of the dispute, then for matters subject to FERC jurisdiction either Party shall have the right to file a complaint under Section 206 of the Federal Power Act. For all other matters, then:

(a) To the fullest extent permitted by law, each of the Parties hereto waives any right it may have to a trial by jury in respect of litigation directly or indirectly arising out of, under or in connection with this Agreement. Each Party further waives any right to consolidate, or to request the consolidation of, any action in which a jury trial has been waived with any other action in which a jury trial cannot be or has not been waived.

(b) If a waiver of jury trial is deemed by any court of competent jurisdiction to not be enforceable for any reason, then to the fullest extent permitted by law, each of the Parties hereto agrees to binding arbitration. Such arbitration shall be in accordance with the rules and procedures of the American Arbitration Association (AAA). Notwithstanding any AAA rules and procedures or any other provisions or any state or federal laws, the Parties agree that the arbitrators shall not consider or award punitive damages as a remedy. Upon request by either Party, AAA shall provide the Parties a list of arbitrators each of who have experience and expertise with respect to construction. Upon each of the Parties receipt of such list, each Party shall have ten (10) days to select an arbitrator. The two selected arbitrators shall then select a third arbitrator within thirty (30) days from the date the initial two arbitrators were selected and the matter subject to



arbitration shall be arbitrated within sixty (60) days after the selection of the third arbitrator.

12. Third Party Agreements. The Parties may engage in discussions with third parties, either jointly or unilaterally, to facilitate the Project or EIM implementation process. Each Party may enter into binding agreements or tariffs or modify existing agreements or tariffs with these third parties to implement the approved terms and conditions of the Project or EIM as necessary and appropriate.

13. Compliance. Each Party shall comply with all federal, state, local or municipal governmental authority; any governmental, quasi-governmental, regulatory or administrative agency, commission, body or other authority exercising or entitled to exercise any administrative, executive, judicial, legislative, policy, regulatory or taxing authority or power, including FERC, NERC, WECC; or any court or governmental tribunal, in each case, having jurisdiction over either Party in connection with the execution, delivery and performance of its obligations under this Agreement. This Agreement is not intended to modify, change or otherwise amend the Parties' current functional responsibilities associated with compliance with WECC and NERC Reliability Standards; provided however, the Parties may enter into separate mutually agreed to arrangements to clarify roles and responsibilities associated with compliance with WECC and NERC Reliability Standards.

14. EIM Principles. The Parties recognize and acknowledge that input received from stakeholders during the course of implementing the Project, conditions imposed or questions raised in the EIM regulatory approval process, and analyses the Parties may perform or information the Parties receive or develop in the course of implementing the Project through the EIM stakeholder process or otherwise may require adjustments in the Project. Consistent with the foregoing, the Project shall nevertheless be implemented consistent with the following principles:

(a) The EIM market rules shall be contained in a discrete part of the ISO tariff to the extent this structure provides additional clarity to all EIM participants; provided, however, provisions generally applicable to the relationship between the ISO and market participants may be provided for by reference and applicable to EIM participants.

(b) Initial EIM governance and market rule oversight shall be consistent with existing ISO governance, allow for voluntary participation and expansion of participants and market activities, and evolve based on stakeholder feedback.

(c) The Parties shall consider whether and how to account for transmission service in the EIM stakeholder process.

(d) The EIM shall include an appropriate means to identify transactions that do not involve California resources or loads, or that otherwise occur outside the State of California, such that only the imbalance energy portion that is imported

into California would be subject to any laws, regulations or costs associated with a California specific greenhouse gas compliance obligation.

(f) The EIM shall be implemented in a manner that is compatible with the Northwest Power Pool reserve sharing program and other existing and emerging market initiatives, including FERC Order No. 764 (and its progeny).

(g) Other entities may participate in the EIM within a timeframe to be determined by the ISO if they agree to fund their share of implementation costs pursuant to a FERC-accepted implementation agreement in a manner similar to PacifiCorp.

IN WITNESS WHEREOF, each of the Parties has caused its duly authorized officer to execute this Implementation Agreement as of the date first above written.

PACIFICORP

By: \_\_\_\_\_

Name: Andrea L. Kelly

Title: Senior Vice President, Strategic Business Performance

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

By: \_\_\_\_\_

Name: Karen Edson

Title: Vice President, Policy and Client Services

## EXHIBIT A: PROJECT SCOPE AND SCHEDULE

The Project consists of the activities and delivery dates identified in this Exhibit A, implemented in accordance with the Agreement, including specifically the principles set forth in Section 14.

The Parties understand that input received from stakeholders during the course of implementing the Project, conditions imposed or questions raised in the regulatory approval process, and the activities of the Parties in implementing the Project may cause the Parties to determine that changes in the Project are necessary or desirable. Accordingly, this Exhibit A may be modified in accordance with Section 3(c) of the Agreement.

Each Party is responsible for performing a variety of tasks necessary to achieve the milestones on schedule and shall plan accordingly. The Parties shall communicate and coordinate as provided in the Agreement to support the planning and execution to complete the Project.

<b>Project Scope and Milestones</b>	<b>Project Delivery Dates</b>
<p><b>Detailed Project Management Plan</b> – The Parties will develop and initiate a final project management plan that describes specific project tasks each Party must perform, delivery dates, project team members, meeting requirements, and a process for approving changes to support completion of the Project.</p>	<p>May 31, 2013</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 1</b> – The Agreement must be made effective in accordance with Section 1 of the Agreement to complete this milestone.</li> </ul>	<p>July 1, 2013</p>
<p><b>Full Network Model Expansion</b> – Full Network Model expansion for PacifiCorp and EMS/SCADA, including, proof of concept of export/import of EMS data; complete PACE and PACW model into the ISO test model; complete validation for all SCADA points from PacifiCorp; complete testing of the new market model; and validation of the Outage, State Estimator, Real Time Contingency Analysis, and Automatic Generation Control applications.</p>	<p>November 22, 2013</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 2</b> - This milestone is completed upon the modeling PacifiCorp into the ISO Full Network Model through the EMS which will be deployed using the ISO's network and resource modeling process.</li> </ul>	<p>December 6, 2013</p>
<p><b>System Implementation Program Improvements</b> – System requirements and software design, the execution of necessary software vendor contracts, technical interface specifications and configuration guides, and other related activities.</p>	<p>April 1, 2014</p>

<ul style="list-style-type: none"> <li>• <b>Milestone 3</b> - For PacifiCorp and the ISO to exchange production data (market inputs and outputs) and complete this milestone, the ISO will provide to PacifiCorp all final technical specifications for application program interface (API) specifications, metering specifications and settlement specifications. Final technical specifications related to some systems may be required earlier as provided in the project management plan.</li> </ul>	<p>April 8, 2014</p>
<p><b>Construction, Testing and Training in Preparation for Market Simulation -</b> This task includes IT infrastructure upgrades, security testing, training simulators, and functional testing.</p>	<p>July 1, 2014</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 4</b> - The EIM market simulation will allow PacifiCorp and the ISO to conduct specific market scenarios in a test environment prior to the production deployment to ensure that all system interfaces are functioning as expected and to produce simulated market results. To complete this milestone, the commencement of EIM simulation will signal that the PacifiCorp and the ISO have independently completed EIM system design, development and testing to participate in joint testing.</li> </ul>	<p>July 8, 2014</p>
<p><b>System Deployment and Go Live</b> – Implementing the Project and going live will include resource registration, operating procedures and updates, execution of service agreements, completion of the policy and tariff stakeholder processes, applicable board approvals, the filing and acceptance of tariff changes with FERC, and the development of new and updated Business Practice Manuals.</p>	<p>September 30, 2014</p>
<ul style="list-style-type: none"> <li>• <b>Milestone 5</b> – This milestone is complete upon the first production energy imbalance market trade date.</li> </ul>	<p>October 1, 2014</p>

**Attachment D – Epstein Declaration**

**Rate Schedule No. 73**

**First Amendment to Energy Imbalance Market Implementation Agreement**

**California Independent System Operator Corporation**

**February 21, 2014**

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

**California Independent System     )  
Operator Corporation                 )**     **Docket No. ER14 \_\_\_\_-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 "ISO"). My business address is 250 Outcropping Way, Folsom, California 95630. I am responsible for the ISO's budget preparation and management; long term planning; accounting for the FERC refund case; market cash settlements; and audit coordination for all the ISO's settlement and operations activities. As part of my duties at the ISO, I oversee the development of the ISO'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 ISO 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 a proposed increase to the implementation fee that the ISO will invoice PacifiCorp pursuant to the proposed Implementation Agreement amendment that the ISO is filing today. The increase covers the addition of a base schedule aggregation functionality that is being added to the energy imbalance market design.

***The Implementation Fee***

4. The current implementation fee is based on the ISO's estimate of the costs specific to incorporating PacifiCorp into an energy imbalance market that could ultimately accommodate the entire Western Electricity Coordinating Council ("WECC"), should the WECC utilities all choose to participate, as more fully explained in my declaration filed in Docket No. ER13-1387-000. The total development costs for the energy imbalance market have been estimated to be \$18.3 million. PacifiCorp agreed to pay \$2.1 million, which reflects its share of the total costs for the energy imbalance market, but did not originally include the base schedule aggregation functionality. This functionality was approved as part of the final energy imbalance market design, and the parties have agreed to

include this additional functionality, after negotiation, filing and acceptance of the Implementation Agreement.

5. As explained below, the ISO estimates that the total cost for the base scheduled aggregation functionality would be \$462,800.
6. These costs correspond to seven of the eleven components identified as part of the total energy imbalance market development costs: licenses, \$0; energy management system upgrades, \$0; data storage, \$0; hardware upgrades, \$0; production software modification, \$72,000; network configuration and mapping, \$21,600; integration, \$17,300; testing, \$115,000; system performance tuning, \$71,100; training and operations readiness, \$28,000; and project management and support, \$136,800.

***Network Configuration and Mapping, Integration, System Performance Tuning.***

7. The ISO will need to (1) configure network models (\$21,600), (2) integrate system interfaces to enable data exchange between systems to meet business and system requirements (\$17,300), and (3) measure and analyze performance in a non-production environment and mitigate any identified performance issues to ensure that production performance is as expected (\$71,100).
8. The ISO 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 ISO 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.

***Production Software Modification and Testing***

9. The ISO will also require production software modifications to support new inputs and outputs associated with the base schedule aggregation functionality (\$72,000).
10. Following the system integration described above, the ISO will need to conduct testing to ensure that it meets all energy imbalance market business and system requirements (\$115,000).
11. The ISO 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 ISO 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 and Support***

12. Training and operations readiness is required to ensure effective operations after implementation (\$28,000).
13. Project management is required to complete and implement the modifications(\$136,800)

14. Similarly to the process for other cost categories, ISO 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 paragraphs 8 and 11 above, the staff consulted has extensive experience in estimating costs in this area.

***Derivation and Allocation***

15. Having determined that the total cost of implementing the base schedule aggregation functionality would be \$462,800, the ISO and PacifiCorp have agreed to include this cost pursuant to the Implementation Agreement so that the functionality will be available to PacifiCorp and its customers at the start of the energy imbalance market on October 1, 2014.

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: February 21, 2014



Michael K. Epstein

Docket No. UM-\_\_\_\_  
Exhibit PAC/104  
Witness: Stefan A. Bird

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF THE STATE OF OREGON**

**PACIFICORP**

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**Exhibit Accompanying Direct Testimony of Stefan A. Bird**

**E3 Report**

**April 2014**



# PacifiCorp-ISO Energy Imbalance Market Benefits

March 13, 2013



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## Attachment: Technical Appendix

## Executive Summary

This report examines the benefits of an energy imbalance market (EIM) between PacifiCorp and the California Independent System Operator (ISO). This report focuses on estimated potential EIM benefits with the low range reflecting a scenario in which assumptions were chosen to be conservative. The full range of estimated EIM benefits in this report for the year 2017 is \$21 million to \$129 million (2012\$). Preliminary cost estimates (based on previous studies) of setting up the EIM range from \$3 million to \$6 million, with an estimated annual cost of \$2 million to \$5 million.

The report supports the conclusion that the two-party EIM provides a low-cost, low-risk means of achieving operational savings for both PacifiCorp and ISO and enabling greater penetration of variable energy resources. The report further supports that the benefits of the EIM would increase to the extent that: (1) operational changes can be made to support the EIM, such as increased transmission transfer capabilities between PacifiCorp and ISO; and (2) additional entities join the EIM, thus bringing incremental load and resource diversity, transfer capability, and flexible generation resources that would further reduce costs for customers.

Changes in the electricity industry in the Western U.S. are making the need for greater coordination among balancing authorities (BAs),<sup>1</sup> such as through an EIM, increasingly apparent. Renewable portfolio standards already enacted in Western states are expected to result in some 60,000 MW of wind, solar, geothermal, and other renewable generation in the Western Interconnection by 2022, comprising approximately 15% of total electric energy.<sup>2</sup>

Recent studies have suggested that it will be possible to reliably operate the current western electric grid with high levels of variable generation, but doing so may require supplementing the hourly bilateral markets used in the West toward shorter scheduling timescales and greater coordination among western BAs. Greater coordination would allow BAs to pool load, wind, and solar variability and reduce flexibility reserve requirements, and would increase flexibility and reduce renewable curtailment.

In response, several regional initiatives, studies, and groups have emerged to explore innovations for scheduling and coordination. These include reforms being assessed as part of the Western Electric Coordinating Council's Efficient Dispatch Toolkit (EDT) initiative, an effort by a group of public utility commissions to explore an EIM for the West, and an ongoing Northwest Power Pool initiative to analyze the benefits of an EIM or other forms of regional coordination for the Pacific Northwest region.

As an extension of these efforts, in February 2013 PacifiCorp and ISO signed a memorandum of understanding to pursue an EIM. Energy and Environmental Economics,

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<sup>1</sup> A balancing authority (BA) is a responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a balancing authority area, and supports Interconnection frequency in real time. A balancing authority area (BAA) is the collection of generation, transmission, and loads within the metered boundaries of a balancing authority, which maintains load-resource balance within this area.

<sup>2</sup> These renewable capacity and energy projections are from the Western Electricity Coordinating Council's Transmission Expansion Planning Policy Committee (TEPPC) 2022 Common Case; see [http://www.wecc.biz/Lists/Calendar/Attachments/4057/2022\\_20Common%20Case%20-%20Webinar%205.pdf](http://www.wecc.biz/Lists/Calendar/Attachments/4057/2022_20Common%20Case%20-%20Webinar%205.pdf).



Inc. (E3), a consulting firm, was retained by ISO to assess the EIM's potential benefits. This report documents E3's findings.

The EIM under consideration is a balancing market that optimizes generator dispatch within and between balance authority areas (BAA)<sup>3</sup> every five minutes by leveraging the existing ISO real-time dispatch market functionality. It does not replace the day-ahead or hourly markets and scheduling procedures that exist today. The ISO outlined the structure of such an EIM in a recent proposal to the Western Governors Association and the Public Utilities Commissions Energy Imbalance Market (PUC-EIM) Task Force.<sup>4</sup>

An EIM covering PacifiCorp and ISO would allow both parties to improve dispatch efficiency and take advantage of the diversity in loads and generation resources between the two systems, reducing production costs, operating reserve requirements, and renewable generation curtailment. Specifically, the creation of a PacifiCorp-ISO EIM would yield the following four principal benefits:

- + *Interregional dispatch savings*, by realizing the efficiency of combined 5-minute dispatch, which would reduce "transactional friction" (e.g., transmission charges) and alleviate structural impediments currently preventing trade between the two systems;
- + *Intraregional dispatch savings*, by enabling PacifiCorp generators to be dispatched more efficiently through the ISO's automated system (nodal dispatch software), including benefits from more efficient transmission utilization;

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<sup>3</sup> See footnote #1

<sup>4</sup> See CAISO, "CAISO Response to Request from PUC-EIM Task Force," March 29, 2012, <http://www.westgov.org/PUCeim/documents/CAISOcewa.pdf>; CAISO, "Energy Imbalance Protocols (Revised to Support CAISO Cost Estimate for PUC-EIM)", January 24, 2013, <http://www.westgov.org/PUCeim/documents/CAISOrcp.pdf>.

- + *Reduced flexibility reserves*, by aggregating the two systems' load, wind, and solar variability and forecast errors; and
- + *Reduced renewable energy curtailment*, by allowing BAs to export or reduce imports of renewable generation when it would otherwise need to be curtailed.

These benefits are indicative but not exhaustive. A recent report by staff to the Federal Energy Regulatory Commission identifies non-quantified reliability benefits that will also arise. These include enhanced situational awareness, security constrained dispatch, faster delivery of replacement generation after the end of contingency reserve sharing assistance, and enhanced integration of renewable resources.<sup>5</sup>

E3 estimated benefits from a PacifiCorp-ISO EIM using the GridView<sup>6</sup> production simulation software to simulate operations of the Western Interconnection with and without the EIM in the year 2017. This year was selected to represent likely system conditions within the first several years after the EIM becomes operational. E3's analysis incorporated California's greenhouse gas regulations, and the associated dispatch costs.

The GridView results are sensitive to several key assumptions and modeling parameters. These include: limits on the transmission transfer capabilities between PacifiCorp and ISO, and the extent to which unloaded hydroelectric capacity is allowed to contribute toward contingency and flexibility reserve requirements. E3's analysis of EIM benefits is also sensitive to the assumed level of savings from moving to nodal dispatch in PacifiCorp and the amount of renewable energy curtailment that could be reduced through the EIM.

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<sup>5</sup> Staff of the Federal Energy Regulatory Commission, 2013, "Qualitative Assessment of Potential Reliability Benefits from a Western Energy Imbalance Market," February 26.

<sup>6</sup> GridView is ABB's production simulation software.

E3 developed several scenarios to address key uncertainties in the modeling of EIM benefits. These scenarios explore a wide range of potential benefit levels to reflect both the limitations of existing tools to characterize all of the changes to system operations that would occur under an EIM, particularly in the modeling of hydropower, reserves, and renewable curtailment, greenhouse gas regulation, and uncertainties about the extent to which future industry developments would allow cost savings to occur both with and without an EIM. The scenarios were developed around three assumptions of transfer capability between PacifiCorp and ISO: low (100 MW), medium (400 MW), and high (800 MW). Within each scenario, E3 modeled a low and high range of benefits. The assumptions for the low and high range estimates are shown in Table 1.

**Table 1. Low and high range assumptions under low (100 MW), medium (400 MW), and high (800 MW) PacifiCorp-ISO transfer capability scenarios**

Assumption	Low transfer capability		Medium transfer capability		High transfer capability	
	Low range	High range	Low range	High range	Low range	High range
Maximum hydropower contribution to contingency and flexibility reserves*	25%	12%	25%	12%	25%	12%
Share of intraregional dispatch savings achieved	10%	100%	10%	100%	10%	100%
Share of identified renewable energy curtailment avoided	10%	100%	10%	100%	10%	100%

\* Percent of nameplate capacity for each project

Across these scenarios, E3 estimated that a PacifiCorp-ISO EIM would generate total annual cost savings (in 2012 \$) of \$21-129 million in 2017, with PacifiCorp and ISO both benefitting. Table 2 shows the range of benefits by category for each scenario.

**Table 2. Low and high range annual benefits under low (100 MW), medium (400 MW), and high (800 MW) PacifiCorp-ISO transfer capability scenarios (million 2012\$)**

Benefit Category	Low		Medium		High	
	transfer capability		transfer capability		transfer capability	
	Low range	High range	Low range	High range	Low range	High range
Interregional dispatch	\$14.1	\$11.0	\$22.3	\$17.7	\$22.4	\$17.8
Intraregional dispatch	\$2.3	\$23.0	\$2.3	\$23.0	\$2.3	\$23.0
Flexibility reserves	\$4.0	\$20.8	\$11.0	\$51.3	\$13.4	\$77.1
Renewable curtailment	\$1.1	\$10.8	\$1.1	\$10.8	\$1.1	\$10.8
<b>Total benefits</b>	<b>\$21.4</b>	<b>\$65.6</b>	<b>\$36.7</b>	<b>\$102.8</b>	<b>\$39.2</b>	<b>\$128.7</b>

*Notes: Individual estimates may not sum to total benefits due to rounding. Section 2.4 describes why interregional dispatch savings are lower in the high range than the low range.*

The benefit estimates described in this report are gross benefits and are not net of estimated costs. Because the EIM would make use of ISO’s existing dispatch software, the initial cost is expected to be low when compared to these benefits. E3 did not conduct an independent analysis of the cost of establishing and operating an EIM. Based on ISO’s estimates of market operator costs, PacifiCorp would incur a one-time fixed charge of approximately \$2.1 million.<sup>7</sup> A separate study of a WECC-wide EIM estimated that each EIM market participant would also incur one-time capital costs of \$1-4 million for software, hardware, and other related investments.<sup>8</sup> Annual costs to operate the PacifiCorp-ISO EIM are estimated to be on the order of \$2-5 million.<sup>9</sup>

<sup>7</sup> Based on estimates from CAISO staff.

<sup>8</sup> WECC, 2011, “WECC Efficient Dispatch Toolkit Cost-Benefit Analysis (Revised),” WECC White Paper, p. 62, <http://www.wecc.biz/committees/EDT/EDT%20Results/EDT%20Cost%20Benefit%20Analysis%20Report%20-%20REVISED.pdf>.

<sup>9</sup> This estimate is comprised of CAISO estimate of \$1.35 million per year in administrative charges to PacifiCorp plus additional PacifiCorp costs of \$1-4 million per year in staffing and other operating costs for an EIM market participant.

# 1 Introduction

## 1.1 Background and Goals

PacifiCorp and ISO have been active participants in an ongoing regional effort to enhance bulk power operations to achieve cost savings for customers and facilitate the integration of higher levels of renewable generation. In response, PacifiCorp and ISO have been funding, participating in, and observing a number of regional and national initiatives, studies, and groups aimed at enhancing access to needed flexible resources, application of automated tools to manage resources and products that balance variable generation, and more effective utilization of existing and new transmission facilities. These efforts include:

- + The 2008 Western Executive Industry Leaders (WEIL) study, which identified economic opportunities to lower renewable procurement costs across the Western Interconnection;<sup>10</sup>
- + Two recent (2011 and 2012) studies of an EIM covering all of the Western Interconnection except for ISO and the Alberta Electric System Operator, one coordinated by WECC and another by the PUC-EIM Group (see Section 3.2);
- + Two studies examining intra-hour scheduling in the Western Interconnection, one for the WECC's Variable Generation Subcommittee and another for the Northwest Power Pool (see Section 3.2);

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<sup>10</sup> See [http://www.weilgroup.org/E3\\_WEIL\\_Complete\\_Study\\_2008\\_082508.pdf](http://www.weilgroup.org/E3_WEIL_Complete_Study_2008_082508.pdf) for the full report.

- + A Joint Initiative among Columbia Grid, Northern Tier Transmission Group, and WestConnect on a dynamic scheduling system, an intra-hour transaction accelerator platform, and intra-hour transmission scheduling;<sup>11</sup> and
- + The North American Electric Reliability Corporation's (NERC's) ongoing Integration of Variable Generation Task Force (IVGTF).<sup>12</sup>

Building on their involvement in these efforts, PacifiCorp and ISO undertook a joint study to evaluate the potential benefits of an EIM covering their service areas. E3 was retained to identify and quantify the benefits of this potential EIM, and to examine the allocation of benefits between PacifiCorp and ISO.

This report describes E3's methods and findings. Throughout the study process, E3 worked closely with both PacifiCorp and ISO to develop scenario assumptions, validate the approach, and estimate benefits consistent with how each party believes its system operates today and would operate in the future under each of the defined scenarios.

## 1.2 Structure of this Report

The remainder of the report is organized as follows. Section 2 identifies key assumptions (2.1), specifies methods (2.2) and scenarios (2.3), and presents benefits (2.4) and benefit attribution (2.5) for the analysis. Section 3 provides context for interpreting the results, describing where the assumptions lie along a conservative-moderate-aggressive spectrum (3.1) and how the results compare against other EIM studies (3.2). The report also contains a technical appendix that describes modeling assumptions and methods in more detail.

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<sup>11</sup> For documents related to this process, see <http://www.columbiagrid.org/ji-nttg-wc-documents.cfm>.

<sup>12</sup> For task force materials, see <http://www.nerc.com/filez/ivgtf.html>.

## 2 EIM Analysis

### 2.1 Key Assumptions

#### 2.1.1 WHAT IS AN EIM AND WHAT WOULD IT DO?

The EIM considered in this study would consist of a voluntary, sub-hourly market covering the PacifiCorp West, PacifiCorp East, and ISO BAAs. EIM software would automatically dispatch imbalance energy from generators voluntarily offering their resource for dispatch across these BAAs every five minutes using a security-constrained least-cost dispatch algorithm. By providing an interregional market for intra-hour imbalance energy, the EIM would complement PacifiCorp's existing procedures for transacting in the ISO's hour-ahead and day-ahead markets. This study assumes that the ISO hour-ahead and day-ahead markets will remain unchanged and that PacifiCorp will continue its existing operational plans to serve its load, arrangements for unit commitment, contingency reserves, regulation, regional reserve sharing agreements, and other BA responsibilities.

The EIM is expected to lead to four principal changes in system operations for PacifiCorp and ISO:

- + **More efficient interregional dispatch.** The EIM would allow more efficient use of generators and the transmission systems in PacifiCorp and ISO by removing transmission rate and structural impediments between BAAs, eliminating

within-hour limitations, and enabling more efficient dispatch between the two systems relative to hourly scheduling.

- + **More efficient intraregional dispatch in PacifiCorp.** The EIM's nodal dispatch software would improve the efficiency of PacifiCorp's system dispatch by better reflecting transmission constraints and congestion within PacifiCorp.
- + **Reduced flexibility reserve requirements in PacifiCorp and ISO.** By pooling variability in load and wind and solar output, PacifiCorp and ISO would each reduce the quantity of reserves required to meet flexibility needs.
- + **Reduced renewable energy curtailment in ISO.** By allowing generators in PacifiCorp's BAAs to reduce output when ISO faces an "over-generation" situation, an EIM would reduce the amount of renewable energy ISO would otherwise need to curtail.

This study calculates the benefits associated with these changes by comparing the total cost of operating the combined ISO and PacifiCorp systems under two cases: (1) a Benchmark Case, representing continuation of current scheduling and operating practices under "business-as-usual," and (2) an EIM Case, in which an EIM is established encompassing the PacifiCorp and ISO BAAs. The cost difference between the Benchmark Case and the EIM Case represents the total benefits of an EIM. The study also provides a high-level estimate of how these benefits might be apportioned among the ISO and PacifiCorp systems.

### 2.1.2 EIM COSTS

The costs of an EIM include those borne by the market operator to set up and operate the EIM, and those borne by market participants to participate in the EIM. The EIM requires some expansion of ISO's modeling and software capabilities, but by using ISO's



existing software, initial costs are significantly reduced relative to what they would be if new software development were needed.

Additional hardware and organizational costs may also be required. For instance, PacifiCorp may need to purchase some new metering or communications hardware to enable effective communication between parties. PacifiCorp may also seek some amount of staff training and organizational development to more fully take advantage of the market opportunities offered by the EIM.

ISO has estimated the costs of setting up and operating an EIM, as part of its engagement with ongoing regional EIM initiatives. ISO's proposed operator charges for the EIM use a "pay-as-you-go" approach, which allows the EIM to expand as new market participants join. The one-time upfront charge covers the cost of making the modeling, systems, and other preparations to include an entity in the EIM, and depends on the size of the BAA. Ongoing administrative charges cover costs to operate the EIM, and are based on the same cost structure as ISO's existing grid management charge and the EIM participant's level of usage. For a PacifiCorp-ISO EIM, ISO estimates that PacifiCorp would incur a one-time fixed charge of approximately \$2.1 million and \$1.35 million per year in administrative charges.<sup>13</sup>

Independent estimates of market participant costs were not developed for this study. A WECC-sponsored study of EIM costs estimated that each market participant would incur total capital startup costs of \$1-4 million and operating costs of \$1-4 million per year.<sup>14</sup>

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<sup>13</sup> Based on estimates from CAISO staff. Administrative charges per participant will likely fall as the number of participants grows. Other cost and risk allocation issues associated with the EIM, and the rules to address these issues, will be considered in a 2013 stakeholder process.

<sup>14</sup> WECC, 2011, "WECC Efficient Dispatch Toolkit Cost-Benefit Analysis (Revised)," WECC White Paper, p. 62, <http://www.wecc.biz/committees/EDT/EDT%20Results/EDT%20Cost%20Benefit%20Analysis%20Report%20-%20REVISED.pdf>.

In this case, PacifiCorp is assumed to be the only incremental market participant and no incremental costs would be required for existing ISO market participants.

Using these preliminary estimates of market operator and market participant costs, total fixed and operating costs for the PacifiCorp-ISO EIM would be on the order of \$3-6 million (one-time startup costs) and \$2-5 million per year (annual operating costs), respectively. PacifiCorp and ISO are actively working to develop specific start up and operating costs as part of initial efforts under the memorandum of understanding.

### **2.1.3 KEY MODELING ASSUMPTIONS**

Five key modeling assumptions are important for understanding the results in this study: 1) the use of hurdle rates, (2) hourly dispatch, (3) the treatment of flexibility reserves, (4) transfer capability limits between PacifiCorp and ISO, and (5) limits on hydropower contributions to reserves. This section provides a brief overview of the rationale for these assumptions.

#### **2.1.3.1 Hurdle rates**

Within the Western Interconnection's bilateral markets, there are a number of impediments to efficient trade of energy across BAA boundaries. These include:

- + The need, in some cases, for market participants to acquire point-to-point transmission service in order to schedule transactions from one BAA to another;
- + The current practice of some transmission providers requiring short-term transactions to provide real power losses for each transmission provider system that is utilized, resulting, in some cases, in multiple or "pancaked" losses requirements; and

- + Inefficiencies due to illiquid markets and imperfect information, such as the standard 16-hour “Heavy-Load Hour” and 8-hour “Light-Load Hour” day-ahead trading products defined by the Western Systems Power Pool, minimum transaction quantities of 25 MW, and the bilateral nature of transaction origination and clearing, among others.

In production simulation modeling, these impediments to trade are typically represented by “hurdle rates,” \$/MWh price adders that inhibit power flow over transmission paths that cross BAA boundaries. In this analysis, E3 used hurdle rates that were benchmarked to historical data, so that hourly power flows on major WECC paths in the simulation approximate the historical flow levels on those paths during a historical test year.<sup>15</sup>

An EIM would perform a security-constrained, least-cost dispatch across the entire EIM footprint for each 5-minute settlement period, eliminating the barriers listed above at the 5-minute timestep. This is represented in production simulation modeling by the removal of hurdle rates, which allows for more efficient (i.e., lower cost) dispatch.

### **2.1.3.2 Hourly dispatch**

While a PacifiCorp-ISO EIM would likely operate on a 5-minute timestep, E3 used GridView simulation runs with an hourly timestep to estimate the change in operating costs associated with an EIM. This was done in order to simplify the computational process and reduce model runtime, and because of the limited quantity of high-temporal resolution data available for the Western Interconnection.

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<sup>15</sup> This analysis used benchmarked hurdle rates from the WECC EIM study. See [http://www.wecc.biz/committees/EDT/Documents/E3\\_EIM\\_Benefits\\_Study-Phase\\_2\\_Report\\_RevisedOct2011\\_CLEAN2\[1\].pdf](http://www.wecc.biz/committees/EDT/Documents/E3_EIM_Benefits_Study-Phase_2_Report_RevisedOct2011_CLEAN2[1].pdf), pp 41-43.

This assumption introduces two potentially offsetting modeling inaccuracies. On the one hand, since hourly operations would continue to be performed using today's operating practices, the use of an hourly timestep might overestimate the potential benefits of an EIM, because changes in dispatch that are feasible on an hourly timestep might not be feasible on a 5-minute timestep due to ramping limitations. On the other hand, this method excludes: (1) savings due to more efficient dispatch of resources to meet net load variations inside the operating hour; and (2) savings from reductions in costs to meet potential intra-hour ramping shortages. Other studies have indicated that sub-hourly dispatch benefits may be substantial. Those benefits would be additive to the benefits reported here.

### **2.1.3.3 Flexibility reserves**

BAs hold reserves to balance discrepancies between forecasted and actual load within the operating hour. These "flexibility" reserves are in addition to the spinning and supplemental reserves carried against generation or transmission system contingencies.<sup>16</sup> Flexibility reserves generally fall into two categories: *regulation* reserves automatically respond to control signals or changes in system frequency on a time scale of a few cycles up to five minutes, while *load following* reserves provide ramping capability to meet changes in net loads between a 5-minute and hourly timescale.

Higher penetration of wind and solar energy increases the amount of both regulation and load following reserves needed to accommodate the uncertainty and variability inherent in these resources while maintaining acceptable balancing area control

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<sup>16</sup> This study assumes that contingency reserves would be unaffected by an EIM and that PacifiCorp would continue to participate in its existing regional reserve sharing agreement for contingency reserves in all scenarios.

performance. By pooling load and resource variability across space and time, total variability can be reduced, decreasing the amount of flexibility reserves required to ensure reliable operations. This reduces operating costs by requiring fewer thermal generators to be committed and operated at less efficient set points.

For this study, E3 performed statistical calculations of the quantity of flexibility reserves that would be required in both the Benchmark Case and the EIM Case. The reserve quantities are a function of the variability and uncertainty of the within-hour net load signal. These requirements decline when the calculations are performed for a larger geographic area and a more diverse portfolio of wind and solar resources. In keeping with the 5-minute operational timestep of a potential EIM, E3 assumed that the diversity benefit from an EIM results in savings from reduced load following reserves, but not regulation reserves. Other contingency reserves (spin and non-spinning reserves) were assumed not to change under the EIM operation.

There are two implicit assumptions embedded in this approach: (1) that PacifiCorp and ISO would carry the calculated levels of flexibility reserves in the Benchmark Case, and (2) the EIM would include a mechanism to take advantage of increased net load diversity by reducing the quantities of flexibility reserves that would need to be carried. With regard to the first assumption, while there is currently no defined requirement for BAs to carry load following reserves, all BAs must carry load following reserves in order to maintain control performance standards within acceptable bounds, and reserve requirements will grow under higher renewable penetration scenarios. ISO is in the process of introducing a “flexi-ramp” product for this purpose.

With regard to the second assumption, while the specific design of a potential PacifiCorp-ISO EIM has not been finalized, it is logical to assume that ISO’s flexi-ramp

requirements would be calculated in such a way as to maximize diversity benefits across the entire EIM footprint, within the context of its 5-minute operational timestep. However, it should be noted that this mechanism may not be in place at the time EIM becomes operational, and the ISO and PacifiCorp may require a period of operational experience before the full benefits of flexibility reserve savings can be achieved.

#### ***2.1.3.4 Transmission transfer capability***

PacifiCorp has several interconnections and contract transmission rights between the ISO and both the PacifiCorp East and PacifiCorp West BAAs that can potentially be utilized for EIM activity. Each interconnection has unique capabilities to facilitate beneficial interchange based upon existing facilities, path operators, legacy agreements, and incremental costs. Initiatives are underway to maximize the potential at each interconnection for the EIM.

Transmission transfer capability limits between PacifiCorp and ISO will constrain EIM benefits. These limits can be physical or contractual. If the transmission paths connecting PacifiCorp and ISO are congested, generators in PacifiCorp will not be able to provide additional imbalance energy to ISO, and vice versa. PacifiCorp and ISO anticipate initially relying on PacifiCorp transmission contract rights to the ISO to facilitate EIM transactions, as opposed to a “flow-based” transmission optimization, similar to those in use in the ISO and other organized markets, that would be unconstrained by contract limitations.

While reliance on existing contract path scheduling mechanisms will prevent achievement of full benefits at EIM startup, transmission transfer capability and associated EIM benefits would increase through potential contractual changes, new transmission construction, operational changes such as WECC-wide 15-minute

scheduling, and the addition of other EIM participants. In particular, as additional market participants join the EIM and a larger contiguous EIM area is formed, flow-based transmission usage will be explored, along with methods to limit impact to non-participating transmission systems. Flow-based transmission usage is expected to increase benefits to EIM market participants. In addition, a mechanism to increase the flexibility of existing transmission for intra-hour use could be pursued to increase the transfer capabilities and increase the value of EIM.

This report provides a range of benefits based, in part, on three different potential interchange capabilities between PacifiCorp and ISO, specifically 100, 400, and 800 MW.<sup>17</sup> The two parties have agreed in the memorandum of understanding to conduct an initial review of contracts. The findings from the ongoing review, collaboration with neighboring transmission path operators, and additional certainty on market design will inform total interconnection capabilities in the short-term as well as specific opportunities to add to those capabilities over time. The model also incorporates a 200 MW limit on east to west transfers between the PacifiCorp East and PacifiCorp West BAAs. For reduced renewable curtailment, E3 assumed that this transfer capability would not pose a constraint, given the relatively small quantity of curtailed energy in question.

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<sup>17</sup> For simplicity of modeling, transmission transfer capabilities are modeled at the California-Oregon Intertie (COI). This is a proxy used to demonstrate a general level of increased benefit with increasing interconnection capabilities, which may occur on other paths.

### **2.1.3.5 Limits on hydropower contributions to flexibility reserves**

Cost savings from reduced flexibility reserves are sensitive to assumptions about the availability of hydropower to provide reserves. Dispatchable hydroelectric resources only rarely generate at levels that approach maximum nameplate capacity due to limitations on water available for power generation. On many facilities, a portion of the “unloaded” capacity — the difference between the nameplate capacity and the actual generation — can be used to provide contingency and flexibility reserves. However, this unloaded capacity varies by facility and with continually-fluctuating river conditions, making it challenging to generalize for modeling purposes. This leads to uncertainty in the calculation of operating costs using production simulation models.

In order to address this uncertainty, E3 developed a range regarding the ability of hydro to provide flexibility reserves, which affect a significant component of potential EIM savings. In the high range, E3 assumed that up to 12% of the total nameplate capacity of hydropower generation is available to provide flexibility reserves, while in the low range, E3 assumed that up to 25% of hydropower nameplate capacity is available to provide flexibility reserves.<sup>18</sup> EIM benefits are higher in the case where hydro’s ability to provide flexibility reserves is restricted, because a higher proportion of reserves are being provided by thermal resources that can be optimized using the EIM dispatch software. Conversely, there are fewer cost savings available in the case where hydro provides a larger quantity of flexibility reserves with little, if any, variable cost.

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<sup>18</sup> The two scenarios used here reflect the low and high ends of a plausible range of values based on CAISO and PacifiCorp experience.



## 2.2 Methods

### 2.2.1 INTERREGIONAL DISPATCH SAVINGS

An EIM would reduce transactional friction between PacifiCorp and ISO and thus enable improved resource dispatch efficiency and reduced cost to serve load in both systems. E3 estimated these interregional dispatch savings by running parallel production cost simulations using GridView: one with a PacifiCorp-ISO EIM (EIM Dispatch Case) and one without the EIM (Benchmark Case).

The Benchmark Case simulates status quo operational arrangements, and includes hurdle rates to represent economic and non-economic barriers to trade, such as transmission tariff rates, losses, and lack of market liquidity. The EIM Dispatch Case simulates operations with an EIM in place by eliminating these hurdle rates between PacifiCorp and ISO, resulting in more efficient energy dispatch and lower production costs.<sup>19</sup> Interregional dispatch savings from an EIM are measured as the difference in production costs between the Benchmark and EIM Dispatch Cases. In eliminating hurdle rates, E3 implicitly assumed that no variable transmission costs are incurred for EIM transactions.

To calculate the interregional dispatch savings, E3 developed GridView production cost estimates for two cases. The first, a Benchmark Case, assumes hurdle rates are in place. The second, an EIM Dispatch Case, assumes alternately that there is 100, 400, and 800 MW of transmission transfer capability between the PacifiCorp and ISO systems, and that EIM transactions using this capability pay no hurdle rates. E3 scaled the

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<sup>19</sup> Only hurdle rates between PacifiCorp –West and ISO have been adjusted from the benchmark case. Hurdle rates were also used to simulate the need for market participants to acquire CO<sub>2</sub> allowances when delivering “unspecified” electric energy into California. These CO<sub>2</sub>-related hurdle rates were kept in place for both the Benchmark and the EIM Dispatch Cases.

interregional dispatch savings for lower levels of transmission transfer capability (100 MW and 400 MW) by assuming that the benefits are proportional to the change in intertie flows resulting from the EIM at each level of transfer capability.<sup>20</sup>

### 2.2.2 INTRAREGIONAL DISPATCH SAVINGS

In bilateral markets, load serving entities (LSEs) like PacifiCorp seek to minimize the cost of serving their loads through a combination of dispatching their own resources and trading energy subject to the physical limitations of the transmission system. This can result in significant additional dispatch costs to manage transmission congestion within the LSE's own service territories. In a nodal market, all transmission constraints are considered when determining optimal commitment<sup>21</sup> and dispatch of generators, and the efficient use of the transmission system.

While ISO currently uses nodal dispatch, PacifiCorp's unit commitment and dispatch do not take full advantage of all sub-hourly cost saving opportunities. A PacifiCorp-ISO EIM would provide 5-minute nodal price signals to generation resources throughout the EIM area, thus enabling more optimal generation and transmission dispatch in the PacifiCorp area. These efficiency improvements cannot be captured using the GridView software, which assumes perfectly efficient operations within each area.

To quantify the cost savings from using ISO's nodal dispatch software within PacifiCorp's BAAs, E3 assumed these savings would be proportional to the estimated savings from

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<sup>20</sup> Scaling factors of 0.617 (12% hydropower reserve cap) and 0.628 (25% hydropower reserve cap), applied to the 800 MW results, were used for the 100 MW transfer capability scenario, based on estimated changes in intertie flows. A 0.997 scaling factor, applied to the 800 MW results, was used in the 400 MW case for both hydropower assumptions.

<sup>21</sup> Under an EIM, commitment would remain the responsibility of the BA. An EIM would provide optimal real-time dispatch, but would not address commitment.

ISO's own transition to nodal pricing that occurred in 2009.<sup>22</sup> By assuming estimated cost savings scale with peak load, the benefits from nodal dispatch in PacifiCorp for 2017 would be:

$$\text{PacifiCorp 2017 savings} = \text{CAISO 2009 savings} * \frac{\text{PAC 2017 peak load}}{\text{CAISO 2009 peak load}}$$

or

$$\text{PacifiCorp 2017 savings} = \frac{\$105 \text{ MM}}{\text{yr}} * \frac{10,079 \text{ MW}}{45,486 \text{ MW}} = \frac{\$23 \text{ MM}}{\text{yr}}$$

Because there is some uncertainty about the extent to which ISO's nodal dispatch software will produce dispatch cost savings from PacifiCorp's generation, this study examines alternative low and high scenarios. In the low range scenario, the EIM is assumed to achieve 10% of the total \$23 million of available cost savings, which were calculated based on an hourly analysis. This assumption stems from the ISO's experience that its balancing market clears transactions totaling approximately 10% of total load. In the high range scenario, the EIM is assumed to achieve 100% of the total \$23 million of available cost savings. This scenario implicitly assumes that 5-minute EIM prices will inform market transactions that occur on an hourly basis, allowing more savings than would occur based only on the amount of imbalance energy clearing in the 5-minute market. As the non-EIM forward market becomes better informed by the EIM market, E3 would expect that the real-time nodal market applied to PacifiCorp would result in more than 10% savings.

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<sup>22</sup> See Frank A. Wolak, 2011, "Measuring the Benefits of Greater Spatial Granularity in Short-Term Pricing in Wholesale Electricity Markets, *American Economic Review* 101: 247-252. The estimates in this study are estimated annual cost reductions that resulted from the introduction of nodal pricing in California.

### 2.2.3 REDUCED FLEXIBILITY RESERVES

Currently, PacifiCorp and ISO meet their operating reserve requirements by procuring and utilizing existing generating capacity within their respective BAAs. An EIM would lower the total cost of procuring and utilizing flexibility reserves for both entities in two ways: (1) reducing flexibility reserve requirement quantities by combining PacifiCorp and ISO's forecast error for load and variable generation; and (2) enabling flexibility reserves to be procured from thermal or hydro resources anywhere in the EIM footprint, subject to transmission constraints. The result is that the combined cost of procuring flexibility reserves with an EIM is less than it would be if each entity procured them independently.

E3 estimated the cost savings from reduced flexibility reserves using the following three steps. First, flexibility reserve requirements were calculated for PacifiCorp and ISO as separate areas (Benchmark Case) and then again as a combined area (EIM Flexibility Reserve Case).<sup>23</sup> Flexibility reserve requirements were calculated separately for each hour using three years of 10-minute load, wind, and solar data for PacifiCorp and ISO. Calculations in the EIM Flexibility Reserve Case were constrained so that reductions in flexibility reserve requirements were less than or equal to the assumed transfer capability between PacifiCorp and ISO.

Next, E3 applied the flexibility reserve requirement calculations from above to production cost simulation runs for each case, using GridView. In the Benchmark Case and EIM Dispatch Cases, PacifiCorp and ISO must procure flexibility reserves from capacity located in their respective BAs to meet the requirements calculated for each

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<sup>23</sup> These results, when scaled back from 2017, are similar in size to the levels of reserves procured in each jurisdiction today for regulation and load following.

entity. In the EIM Flexibility Reserve Case, all PacifiCorp and ISO generation is eligible to meet the single flexibility reserve requirement for the EIM footprint, subject to transfer constraints.

Table 3 shows E3’s estimates of the combined minimum reserve requirements for PacifiCorp and ISO under the EIM. The standalone case represents no transfer capability between PacifiCorp and ISO, and is comprised of 608 MW of required reserves in PacifiCorp and 1,403 MW in ISO. As the Table shows, increasing transfer capability allows for greater diversity benefits, reducing minimum reserve holdings.

**Table 3. Estimated Total Minimum Reserve Holdings under the EIM in 2017**

PacifiCorp-ISO Transfer Capability	Minimum Reserve Holdings (MW)
Standalone (no EIM)	2,011
100 MW	1,932
400 MW	1,687
800 MW	1,583

As a final step, E3 calculated the difference in production costs between the EIM Dispatch Case and EIM Flexibility Reserve Case to estimate the annual benefit of reduced flexibility reserves, over and above the dispatch benefits. This yields the incremental savings associated with flexibility reserve reductions between the two cases. E3 benchmarked the cost savings using market prices for ancillary services in ISO, to ensure that these estimates were reasonable (See Technical Appendix).

Since the PacifiCorp-ISO EIM would be a 5-minute energy market, only the portion of savings associated with reductions in load following reserves (5-minute to hourly timescale) would accrue under an EIM. Each area would continue to procure and deploy regulation reserves independently. Since load following accounts for approximately 80%

of total flexibility reserve needs (load following plus regulation) in E3's calculations, E3 assumed that a PacifiCorp-ISO EIM could achieve 80% of total savings from reduced flexibility reserve requirements.

#### **2.2.4 REDUCED RENEWABLE ENERGY CURTAILMENT**

High penetrations of variable generation increase the likelihood of over-generation conditions. In these situations, curtailment of variable generation may be necessary since the system is not flexible enough to reduce the output from other resources located exclusively within the same BAA. Based on discussions with ISO, over-generation conditions and the curtailment of renewable generation are likely to be a long-term issue as additional wind and solar resources come online.

As a standalone BA, ISO schedules imports on an hour-ahead basis and may find it difficult to back down imports on shorter timescales if local renewable generation is higher or if load is lower than expected. An EIM could potentially avoid over-generation situations since it could enable ISO to reduce imports in real time from PacifiCorp rather than curtail renewables during minimum generation or ramp-constrained intervals.

E3 calculated the benefits of reduced energy curtailment in ISO by multiplying estimates of: (1) the annual amount of renewable energy curtailed when simulating ISO operations as a standalone entity without an EIM, and (2) the value of curtailed renewable energy (in \$/MWh). The result represents the cost of renewable energy curtailment that an EIM could help to avoid, assuming that PacifiCorp has generation available to back down during these situations.

To estimate the level of renewable energy curtailment in ISO, E3 developed a methodology that uses outputs from two sequential GridView model runs. In the first

run (representing unit commitment based on forecasted needs), projected solar, wind, and load profiles were used to estimate economic imports into ISO. In the second run (representing real-time dispatch), actual solar, wind, and load profiles were used along with minimum import limits set to the level of economic imports from the first simulation. This limit prevented the model from lowering the interchange below the level determined by the unit commitment process. This reduction in system flexibility resulted in approximately 120 GWh of renewable energy curtailed by ISO in 2022.

This is likely a conservative estimate of the level of renewable energy curtailment. Production simulation models are designed to utilize normative assumptions regarding load, hydro conditions, thermal resource outages, and other variables in order to produce reasonable, mid-range estimates of resource dispatch and prevailing power flows. However, renewable curtailment occurs during extreme events such as very high output of wind, solar and hydro resources combined with very low load conditions. These conditions are not well-represented in production simulation modeling inputs. Hence, renewable curtailment is likely to be understated in production simulation model outputs.

E3 used a \$90/MWh value of avoided renewable energy curtailment as the sum of three components: (1) renewable energy certificate (REC) value, assumed to be \$50/MWh; (2) production tax credit (PTC) value of \$20/MWh; and (3) the avoided production cost of the thermal unit that an EIM enables to dispatch down, estimated to be \$20/MWh.

E3 used the simulated renewable curtailment results to develop two scenarios for renewable energy curtailment in 2017. As a lower end estimate, E3 assumed that ISO renewable energy curtailment is 10% of the simulated value, or 12 GWh. As a higher end estimate, E3 assumed that renewable curtailment is 100% of the simulated value, or 120

GWh. This range of curtailment estimates was then multiplied by the value of avoided renewable energy curtailment to calculate lower end and higher end estimates of \$1.1 million (= 12 GWh \* 90/MWh) to \$10.8 million (= 120 GWh \* \$90/MWh) in benefits for reduced renewable energy curtailment in 2017.

## 2.3 EIM Scenarios

E3 estimated EIM benefits based on study year 2017. E3 chose this year, in consultation with ISO and PacifiCorp, to represent a period after the EIM was already operational but prior to any significant changes in load, generation, and transmission. In particular, E3's modeling analysis excludes: (1) a portion of the full build out of renewable resources necessary to meet California's 33% RPS; (2) expected retirements and replacements of ISO thermal generating capacity due to once-through-cooling (OTC) regulations; and (3) a number of planned and proposed transmission projects, such as Gateway West that have the potential to provide a substantial expansion of the quantity of flexible resources that would be able to participate in a 5-minute market.

E3 used scenario assumptions to inform how sensitive benefits are to: (1) the transmission transfer capability between ISO and PacifiCorp, which limits savings both from interregional dispatch and reduced flexibility reserves; (2) the amount of hydropower capacity that can provide flexibility reserves; (3) the extent to which nodal prices from an EIM would change PacifiCorp's dispatch and produce associated efficiency improvements; and (4) the extent of renewable energy curtailment that can be avoided through an EIM. These scenarios are designed to explore a wide range of potential benefit levels to reflect the limitations of existing tools to characterize all of the changes to system operations that would occur under an EIM, particularly the modeling of hydropower, reserves, and renewable curtailment. In addition, the



scenarios capture a range of uncertainties about the extent to which future industry developments would allow cost savings to occur both with and without an EIM.

**Table 4. Low and high range assumptions under low (100 MW), medium (400 MW), and high (800 MW) PacifiCorp-ISO transfer capability scenarios**

Assumption	Low transfer capability		Medium transfer capability		High transfer capability	
	Low range	High range	Low range	High range	Low range	High range
Maximum hydropower contribution to contingency and flexibility reserves*	25%	12%	25%	12%	25%	12%
Share of intraregional dispatch savings achieved	10%	100%	10%	100%	10%	100%
Share of identified renewable energy curtailment avoided	10%	100%	10%	100%	10%	100%

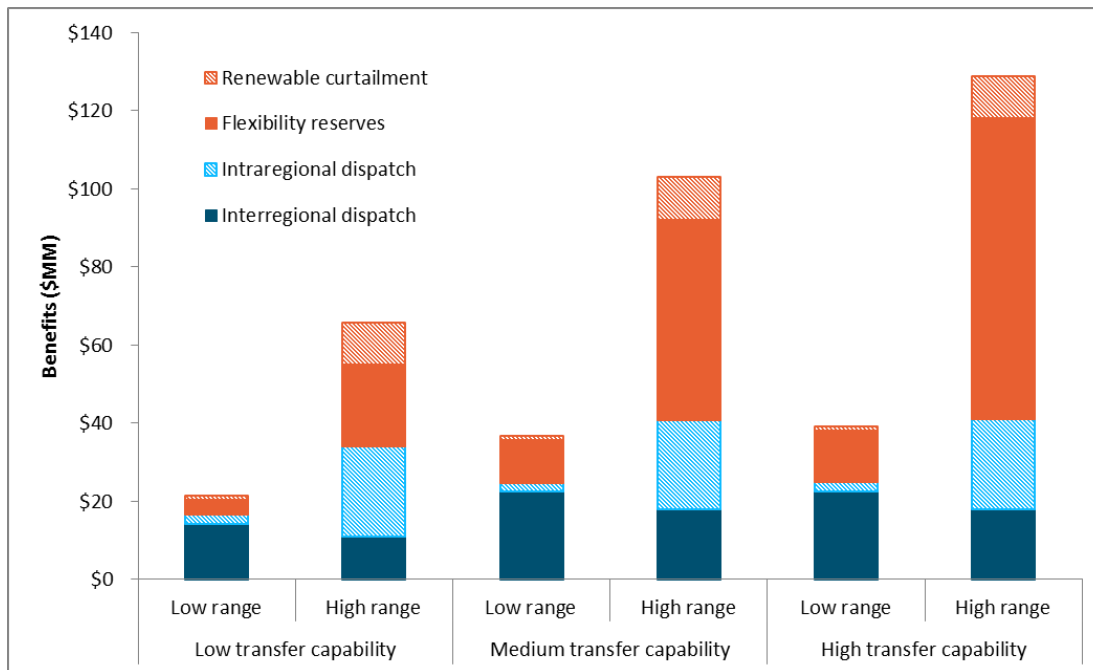
\* Percent of nameplate capacity for each project

The scenarios are organized around low, medium, and high scenarios for transmission transfer capability between PacifiCorp and ISO, with 100, 400, and 800 MW, respectively, in each case. Within each scenario, E3 calculated a low and high range of benefits (Table 4). The low range assumes: hydropower can contribute up to 25% of nameplate capacity toward flexibility reserves; PacifiCorp achieves 10% of estimated nodal dispatch savings; and the value of renewable energy curtailment is 10% of the full estimated value. The high range assumes: hydropower can contribute up to 12% of nameplate capacity toward contingency and flexibility reserves; PacifiCorp achieves 100% of estimated nodal dispatch savings; and the value of renewable energy curtailment is 100% of the full estimated value.

## 2.4 EIM Benefits

Figure 1 and Table 5 show the low and high range of EIM benefits for the low (100 MW), medium (400 MW), and high (800 MW) transfer scenarios, and the amount attributed to each component. Total annual benefits in 2017 range from \$21 million in the low range of the 100 MW transfer capability scenario, to \$129 million in the high range of the 800 MW transfer capability scenario (2012\$).

**Figure 1. Low and high range benefits under low (100 MW), medium (400 MW), and high (800 MW) PacifiCorp-ISO transfer capability scenarios (2012\$)**



**Table 5. Low and high range annual benefits in 2017 under low, medium, and high PacifiCorp-ISO transfer capability scenarios (million 2012\$)**

Benefit Category	Low transfer capability		Medium transfer capability		High transfer capability	
	Low range	High range	Low range	High range	Low range	High range
	Interregional dispatch	\$14.1	\$11.0	\$22.3	\$17.7	\$22.4
Intraregional dispatch	\$2.3	\$23.0	\$2.3	\$23.0	\$2.3	\$23.0
Flexibility reserves	\$4.0	\$20.8	\$11.0	\$51.3	\$13.4	\$77.1
Renewable curtailment	\$1.1	\$10.8	\$1.1	\$10.8	\$1.1	\$10.8
<b>Total benefits</b>	<b>\$21.4</b>	<b>\$65.6</b>	<b>\$36.7</b>	<b>\$102.8</b>	<b>\$39.2</b>	<b>\$128.7</b>

*Notes: Individual estimates may not sum to total benefits due to rounding.*

Differences in individual benefit categories provide important insights into the impact of scenario assumptions on the results.

- + Interregional dispatch savings range from \$14 million to \$22 million per year. Increasing PacifiCorp-ISO transfer capability from 100 MW in to 400 MW drives significant additional cost savings. However, the marginal benefit of additional transfer capability beyond 400 MW appears to be small.
- + Interregional dispatch savings are somewhat lower under the high range scenarios than under the low range scenarios because of interactions that occur between the hurdle rate and operating reserve aspects of the modeling. When the ability of hydropower to provide reserves is restricted, total production costs increase because more thermal generators are committed to provide reserves. These additional thermal generators tend to be higher-cost units, which may be operated at or near their minimum operating levels. This restricts the dispatch efficiency gains that are available due to the elimination of hurdle rates, because these higher-cost generators are less able to reduce their output when a lower-cost unit is available in a neighboring system.
- + Annual cost savings from reduced flexibility reserves range from \$4 million to \$77 million. These are driven largely by constraints on the ability of hydropower to provide contingency and flexibility reserves. This is a source of considerable

uncertainty, and more research is needed to understand hydro's ability to contribute toward flexibility reserve requirements under high penetrations of wind and solar. Transfer capability is also an important constraint, as benefits increase from \$4 million per year with 100 MW to \$13 million per year with 800 MW of transfer capability in the scenario where hydropower can contribute to up to 25% of flexibility reserves.

- + Annual cost savings from intraregional dispatch savings and reduced renewable energy curtailment range from \$3 million to \$34 million, suggesting that, although they are uncertain, both categories could be important contributors to EIM benefits. Because an EIM would provide an automated mechanism for facilitating wind curtailment solutions, as well as clearing any payment required in the event of curtailment, this is likely to be an important and growing EIM benefit going forward.

The results described here confirm that, even under conservative assumptions regarding the use of hydro for imbalance energy and the availability of transmission transfer capability, the incremental benefits of an EIM between PacifiCorp and ISO are likely to be larger than the preliminary estimates of the costs to implement and operate this market. The results also confirm that the benefits of an EIM can be quite substantial as participation grows, allowing more resources to participate and lowering the costs of both imbalance energy and the costs of providing adequate dynamic reserves.

## 2.5 Attribution of EIM Benefits

E3 assumed that the benefits of an EIM would be attributed to PacifiCorp and ISO as follows:

- + **Interregional dispatch savings.** Savings were split evenly between PacifiCorp and ISO to reflect: (1) the reduced cost to serve ISO load, since expensive internal generation is displaced by low-cost imports from PacifiCorp; and (2) additional revenues for PacifiCorp, since it exports additional power to ISO.
- + **Intraregional dispatch savings.** The savings were scaled to the PacifiCorp service area from a study of the ISO's nodal market, thus all benefits were attributed to PacifiCorp.
- + **Reduced flexibility reserves.** Benefits were allocated to PacifiCorp and ISO in proportion to their standalone need, resulting in a roughly 30/70 split, respectively.
- + **Reduced renewable energy curtailment.** All benefits of reduced curtailment were attributed to ISO, because the reduced curtailment would take place within the ISO footprint.

This simple approach allocates the total cost savings between the two parties and does not attempt to account for changes in market revenues relative to today's bilateral system. It is not intended to be a methodology for allocating costs and benefits. The actual net costs and benefits that would flow to the PacifiCorp and ISO systems might be different from the assumptions used here.

The attribution of benefits from a PacifiCorp-ISO EIM in 2017 is summarized in Tables 6 and 7. PacifiCorp achieves annual cost savings of \$10-54 million, with the range dependent on the extent to which PacifiCorp generators participate in the EIM and its nodal market, transfer limits, and the extent to which hydropower can provide flexibility reserves. Annual cost savings to ISO are \$11-74 million by 2017, with the range dependent on transfer limits, the extent to which hydropower can provide flexibility reserves, and the extent of renewable curtailment.

**Table 6. Attribution of EIM benefits to PacifiCorp in 2017 (million 2012\$)**

Benefit Category	Low		Medium		High	
	transfer capability		transfer capability		transfer capability	
	Low Range	High Range	Low Range	High Range	Low Range	High Range
Interregional dispatch	\$7.0	\$5.5	\$11.2	\$8.9	\$11.2	\$8.9
Intraregional dispatch	\$2.3	\$23.0	\$2.3	\$23.0	\$2.3	\$23.0
Flexibility reserves	\$1.2	\$6.1	\$3.2	\$14.9	\$3.9	\$22.5
Renewable curtailment	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
<b>Total benefits</b>	<b>\$10.5</b>	<b>\$34.6</b>	<b>\$16.7</b>	<b>\$46.8</b>	<b>\$17.4</b>	<b>\$54.4</b>

*Note: Attributed values may not match totals due to independent rounding.*

**Table 7. Attribution of EIM benefits to ISO in 2017 (million 2012\$)**

Benefit Category	Low		Medium		High	
	transfer capability		transfer capability		transfer capability	
	Low Range	High Range	Low Range	High Range	Low Range	High Range
Interregional dispatch	\$7.0	\$5.5	\$11.2	\$8.9	\$11.2	\$8.9
Intraregional dispatch	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Flexibility reserves	\$2.8	\$14.7	\$7.8	\$36.4	\$9.5	\$54.6
Renewable curtailment	\$1.1	\$10.8	\$1.1	\$10.8	\$1.1	\$10.8
<b>Total benefits</b>	<b>\$10.9</b>	<b>\$31.0</b>	<b>\$20.0</b>	<b>\$56.0</b>	<b>\$21.8</b>	<b>\$74.3</b>

*Note: Attributed values may not match totals due to independent rounding.*

## 3 Interpreting the Results

### 3.1 Conservative Nature of the Results

Because of the difficulties in modeling the operational complexities of an EIM, E3's approach was intended to use conservative to moderate assumptions to generate credible results, both as a standalone analysis and relative to other studies. Table 8 provides a high-level overview of the nature of assumptions (conservative, moderate, aggressive) used for each of the five identified categories of benefits, and an explanation of why the assumptions were considered to be conservative or moderate.

**Table 8. Categorization of assumptions used in this study**

Benefit Category	Assumptions (conservative, moderate, aggressive)	Rationale
Interregional dispatch	Conservative-Moderate	<ul style="list-style-type: none"> <li>E3 limited PacifiCorp-ISO transmission transfer capability in the low transfer capability scenario to 100 MW, which limited EIM benefits</li> <li>E3 used hurdle rates to inhibit interregional trade in Benchmark Case (moderate assumption)</li> <li>Hourly cost differences between natural gas-fired generators are understated in production simulation models due to the use of uniform heat rates assumptions and normalized system conditions; these models understated EIM benefits</li> </ul>
Intraregional dispatch	Conservative-Moderate	<ul style="list-style-type: none"> <li>E3 calculated nodal dispatch savings by scaling estimated ISO peak load-normalized savings by PacifiCorp peak load (moderate assumption); E3 assumed only 10% of these savings materialize for low range (conservative assumption)</li> </ul>
Flexibility reserves	Conservative	<ul style="list-style-type: none"> <li>E3 limited PacifiCorp-ISO transmission transfer capability in the low transfer capability scenario to 100 MW, which limited EIM benefits</li> <li>E3 included operating cost only; no capacity cost savings are included, which limited EIM benefits</li> <li>E3 allowed 25% of total hydropower capacity to contribute to flexibility reserves in the low range estimates, which limited EIM benefits</li> <li>E3 did not require lock-down of dispatch 45 minutes prior to the operating hour, as done in other studies, which would have raised the quantity of reserves required and increased EIM benefits</li> </ul>
Renewable curtailment	Conservative	<ul style="list-style-type: none"> <li>E3 did not evaluate renewable curtailment for PacifiCorp, which limited EIM benefits</li> <li>In low range estimate, E3 assumed wind and solar not producing significant over-generation (conservative assumption)</li> <li>Production simulation models understate the frequency with which low net load/high generation events occur due to their use of idealized operating assumptions; these models limit EIM benefits</li> </ul>
Within-hour dispatch	Conservative	<ul style="list-style-type: none"> <li>Production simulation analysis modeled at hourly level, omitting potential benefits of sub-hourly dispatch (other studies indicate that these benefits could be substantial)</li> </ul>



## 3.2 Comparison to other Studies

Several recent studies have examined the potential benefits of greater balancing area coordination in the Western Interconnection. These include:

- + **WECC EIM Analysis (completed in 2011)** — examined the benefits of an hourly EIM in parts of the WI region; undertaken by E3 for WECC;<sup>24</sup>
- + **PUC EIM Group Analysis (completed in 2012)** — examined the benefits of a 10-minute EIM in parts of the WI region; undertaken by the National Renewable Energy Laboratory (NREL) for the PUC-EIM Group;<sup>25</sup>
- + **WECC VGS (draft completed in 2012)** — examined the benefits of 10-minute bilateral scheduling for the entire WECC region; undertaken by the Pacific Northwest National Laboratory (PNNL) for WECC as part of the WECC Variable Generation Subcommittee (VGS);<sup>26</sup>
- + **NWPP EIM (ongoing)** — examining the benefits of 5-minute security constrained economic dispatch for the Northwest Power Pool (NWPP) footprint, undertaken by PNNL for the NWPP Market Assessment and Coordination (MC) Initiative using a 10-minute dispatch model.


The above studies can be broadly categorized into two different approaches. The first two studies, the WECC EIM and PUC Group EIM analyses, use hurdle rates to capture transactional friction between BAAs in the base case, which are removed in the EIM case. They also assume that an EIM will enable BAs to reduce the quantity of flexibility reserves that they would need to carry for wind and solar integration. The last two

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<sup>24</sup> See [http://www.wecc.biz/committees/EDT/EDT%20Results/E3\\_EIM\\_Benefits\\_Study-Phase\\_2\\_Report\\_RevisedOct2011\\_CLEAN2%5B1%5D.pdf](http://www.wecc.biz/committees/EDT/EDT%20Results/E3_EIM_Benefits_Study-Phase_2_Report_RevisedOct2011_CLEAN2%5B1%5D.pdf) for the final report.

<sup>25</sup> See <http://www.westgov.org/PUCEim/> for the PUC EIM website and link to the NREL final report.

<sup>26</sup> The draft final report, “Balancing Authority Cooperation Concepts to Reduce Variable Generation Integration Costs in the Western Interconnection,” is not yet publicly available.



studies assume transactional friction between balancing areas is not alleviated by an EIM on an hourly timestep, and that an EIM will not reduce the quantity of regulation and flexibility reserves required for wind and solar integration. Instead, they conduct detailed analysis of dispatch changes that would occur on a 10-minute timestep compared to a fixed hourly interchange schedule between BAAs.

The approach used in this study is consistent with the WECC EIM and PUC Group EIM analyses. It does benefit, however, from the NWPP EIM study assumption used to limit the amount of hydropower that would qualify and be available to provide contingency and flexible reserves. Table 9 (next page) provides a high-level comparison between the benefit estimates in this study and the four aforementioned studies, describing key drivers of differences.

The estimated annual benefits in this study are smaller than in other studies because of:

- + The smaller geographic footprint of this study, which covered only the PacifiCorp and ISO areas and not the larger Western Interconnection region;
- + The modeling scope in this study, which did not include sub-hourly dispatch; and
- + The modeling assumptions used in this study, which resulted in a smaller base case operating reserve requirement, and hence a smaller change in reserves in the EIM case, than the PUC EIM Group analysis.

The results in this study should thus be viewed as conservative relative to other studies.

**Table 9. Comparison of annual benefits and geographic scope between this study and other EIM studies**

Study (Organization)	Annual Benefits (\$MM)	Geographic Scope	Key Drivers of Differences with this Study
PacifiCorp-ISO EIM study	\$21-\$129 in 2017	PacifiCorp and ISO	
WECC EIM (E3)	\$141 in 2020	WECC excluding ISO and AESO	<ul style="list-style-type: none"> <li>• WECC EIM study had similar approach to this study</li> <li>• WECC EIM study had larger EIM footprint than this study</li> <li>• WECC study excluded intraregional dispatch savings; this study includes intraregional dispatch savings</li> <li>• No assessment of renewable curtailment reduction in WECC study; this study includes benefits of renewable curtailment reduction</li> </ul>
PUC EIM Group (NREL)	\$349 in 2020	WECC excluding ISO and AESO	<ul style="list-style-type: none"> <li>• PUC EIM study had larger EIM footprint than this study</li> <li>• PUC EIM study modeled 10-minute dispatch; this study models hourly dispatch</li> <li>• PUC EIM study required more reserve in base case due to earlier schedule lockdown, increasing EIM benefits; this study assumed later lockdown</li> <li>• PUC EIM study included regulation reserve savings for EIM; this study assumes no regulation reserve savings</li> </ul>
WECC VGS (PNNL)	Pending	Entire WECC	<ul style="list-style-type: none"> <li>• WECC VGS study had larger EIM footprint than this study</li> <li>• VGS study modeled 10-minute bilateral scheduling, not EIM</li> <li>• In VGS study, no savings due to reduced reserves or reduced transactional friction, which means all savings due to within-hour efficiency gains; this study includes savings from reduced reserves or transactional friction</li> </ul>
NWPP EIM (PNNL)	Pending	NWPP	<ul style="list-style-type: none"> <li>• Similar approach to WECC VGS study</li> <li>• Detailed results pending</li> </ul>

# Technical Appendix

## Technical Appendix

### Overview

This technical appendix provides a detailed description of the methods and assumptions used in calculating the benefits of more efficient interregional dispatch and reduced flexibility reserves from a PacifiCorp-ISO EIM. Following this overview, this appendix includes three sections. The first describes methods for calculating inputs to the Benchmark Case, including hurdle rates and statistical calculations used to estimate flexibility reserve requirements in the Benchmark Case. The second section describes the change in hurdle rates used in an EIM Dispatch Case. The third section describes the statistical calculations used to estimate a comparative benchmark for reserves in an EIM Flexibility Reserves Case and how transmission constraints were addressed in these calculations.

E3 estimated the benefits of more efficient interregional dispatch and reduced flexibility reserves using a combination of statistical analysis and production simulation modeling. All production simulation modeling was conducted using ABB's GridView model.<sup>1</sup>

E3 modeled three cases:

- **Benchmark Case**, reflecting a business as usual scenario that includes continued obstacles to interregional dispatch between PacifiCorp and ISO and separate procurement of flexibility reserves;
- **EIM Dispatch Case**, in which obstacles to more efficient interregional dispatch are removed but flexibility reserves are still procured separately; and
- **EIM Flexibility Reserve Case**, in which obstacles to more efficient interregional dispatch are removed and PacifiCorp and ISO pool flexibility reserves.

The Benchmark Case was developed using the Western Electricity Coordinating Council's (WECC's) Transmission Expansion Planning Policy Committee (TEPPC) 2022 Common Case as a starting point, with updates developed for ISO's Transmission Planning Process (TPP) GridView simulation to improve accuracy inside of California. Load forecasts, fuel price forecasts, generators, and transmission were also adjusted to reflect anticipated values and availability in 2017. The EIM Dispatch Case and EIM Flexibility Reserve Case were used to isolate the benefits of more efficient interregional dispatch and reduced flexibility reserves, respectively, relative to the Benchmark Case.

In the EIM Dispatch Case, E3 modeled the incremental benefits of more efficient interregional dispatch by eliminating the hurdle rates between PacifiCorp and ISO that are used to reflect impediments to regional electricity trades in the Benchmark Case.<sup>2</sup> In the EIM Flexibility Reserve Case, E3 modeled the

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<sup>1</sup> For more on GridView, see

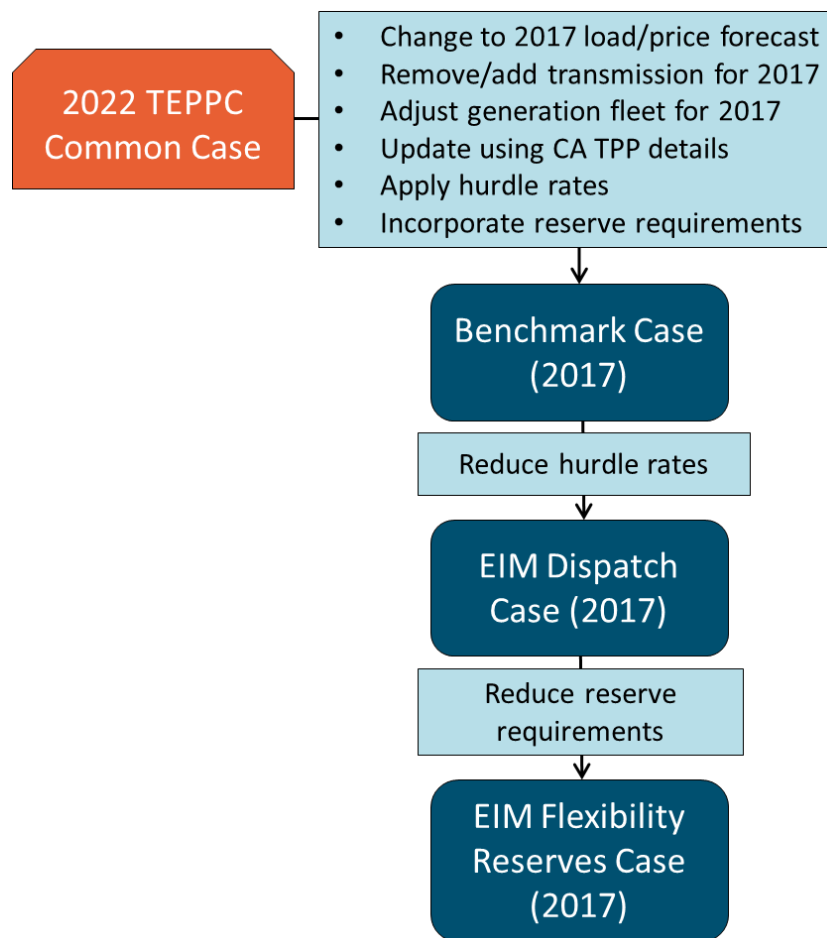
<http://www.abb.com/industries/db0003db004333/c12573e7003305cbc12570060069fe77.aspx>.

<sup>2</sup> A component of hurdle rates that reflects the need to acquire CO<sub>2</sub> allowances when delivering electricity from neighboring states into California, as required by California's greenhouse gas "cap-and-trade" program developed in compliance with AB32, was retained in all cases.

incremental benefits of reduced flexibility reserves by calculating the reduction in flexibility reserves that results from pooling load, wind, and solar variability between PacifiCorp and ISO, and then by reducing the amount of required reserves in GridView runs.

As described in the main report, within the EIM Dispatch Case and EIM Flexibility Reserve Case, E3 modeled the year 2017, to provide an estimate of near-term benefits from an EIM. Figure 1A illustrates E3’s modeling approach.

**Figure 1A. Modeling approach for calculating interregional dispatch and reduced flexibility reserve benefits**



The modeling was organized around three scenarios of interchange transfer capability between PacifiCorp and ISO: 100, 400, and 800 MW. Within each transfer capability scenario, E3 modeled low and high benefit ranges. In the low range scenario, E3 limited hydropower’s ability to contribute to contingency and flexibility reserves to 25% of nameplate capacity. In the high range scenario, E3 assumed that 12% of hydropower nameplate capacity can contribute to contingency and flexibility reserves. Production cost results for the interaction of all of these scenarios are described in this Appendix.

## Benchmark Case

The Benchmark Case used WECC’s TEPPC 2022 Common Case as a starting database. Inputs to the TEPPC database are developed from a collaborative stakeholder process, and are used in studies to assess regional economic transmission in the Western Interconnection. In addition, the TEPPC database has been used in ISO’s TPP, and in other studies of the benefits of an EIM throughout the Western Interconnection.<sup>3</sup>

## Adjustments to the TEPPC Common Case

In developing its 2017 TPP Case, ISO staff made adjustments to the TEPPC 2022 Common Case to improve transmission and generation modeling accuracy within California. E3 incorporated those adjustments and made further modifications to the TEPPC 2022 Common Case in three primary areas: (1) fuel price forecast, (2) load forecast, and (3) generation and transmission.

### Fuel price forecast

Natural gas prices were based on the ISO’s long-term procurement plan (LTPP), adjusted to match annual average Henry Hub fuel prices from NYMEX.<sup>4</sup> Table 1A shows fuel prices by region, for the TEPPC regions within the ISO and PacifiCorp BAAs.

**Table 1A. Average annual burnertip gas price (2012\$/MMBtu)**

Area	2017
PACE_ID	\$ 3.99
PACE_UT	\$ 3.81
PACE_WY	\$ 3.95
PACW	\$ 3.91
PG&E_BAY	\$ 4.09
PG&E_VLY	\$ 4.09
SCE	\$ 4.18
SDGE	\$ 3.86

### Load forecast

A load forecast for 2017 was provided directly by PacifiCorp for the PacifiCorp East and PacifiCorp West BAAs. For all other load areas, monthly peak and energy values were interpolated between 2006 historical data (provided by TEPPC by BA) and the 2022 forecasted value from TEPPC’s Data Working Group (DWG) based on the most recently available WECC Load-Resource Subcommittee (LRS) data submittals.

<sup>3</sup> ISO, 2013, *Draft 2012-2013 Transmission Plan*, <http://www.caiso.com/Documents/Draft2012-2013TransmissionPlan.pdf>; E3, 2011, *WECC EDT Phase 2 EIM Benefits Analysis & Results (October 2011 Revision)*, [http://www.wecc.biz/committees/EDT/EDT%20Results/E3\\_EIM\\_Benefits\\_Study-Phase\\_2\\_Report\\_RevisedOct2011\\_CLEAN2%5B1%5D.pdf](http://www.wecc.biz/committees/EDT/EDT%20Results/E3_EIM_Benefits_Study-Phase_2_Report_RevisedOct2011_CLEAN2%5B1%5D.pdf).

<sup>4</sup> A small adjustment was also implemented to use the same fuel prices for PG&E Bay and PG&E Valley load areas.

### Generation and transmission

Some generation and transmission projects were removed from the TEPPC 2022 Common Case, because they were not expected to be online by 2017, based on input from ISO and PacifiCorp. For modeling purposes, generation in 2017 was assumed to precede the majority of expected OTC-related retirements and replacements in California.

### Hurdle rates

The Benchmark Case utilized hurdle rates from the WECC EDT Phase 2 EIM Benefits Analysis, which were developed by calibrating simulation output to historical flow levels on WECC paths.<sup>5</sup> These historically-calibrated hurdle rates are adjusted to reflect the impact of anticipated CO<sub>2</sub> allowance cost on unspecified power imports into California in 2017. For power flows from PacifiCorp-West (PACW) to ISO, E3 used a value of \$21.07/MWh, which included a \$10.76/MWh cost for CO<sub>2</sub> allowances on PacifiCorp exports to ISO (Table 2A). This \$10.76/MWh adder was based on a default CO<sub>2</sub> emissions factor for a CCGT from the California Air Resources Board and a CO<sub>2</sub> price of \$24.66 (2012\$) per short ton of CO<sub>2</sub>. For power flows from ISO to PACW, E3 used a hurdle rate of \$3.97/MWh. E3 assumed no direct interties between ISO and PACE.

**Table 2A. Hurdle rates used in the Benchmark Case**

Case	Hurdle Rate (\$/MWh)			
	PACW → ISO			ISO → PACW
	CO <sub>2</sub> -related	Non-CO <sub>2</sub> related	Total	
Benchmark Case	\$10.76	\$10.31	\$21.07	\$3.97*

\*No CO<sub>2</sub>-related hurdle rate is applied to ISO exports to PACW because CO<sub>2</sub> permit cost under AB32 is directly modeled in the dispatch for generators located inside California.

### Flexibility reserves

To determine the production costs associated with flexibility reserve levels in the Benchmark Case, E3 calculated load following and regulation reserve requirements, summed the two, and then set the total as a constraint in GridView. Load following here is defined as the capacity needed to manage the difference between the hourly unit commitment schedule and 10-minute forecasted net load. Regulation is defined as the capacity needed to manage the difference between 10-minute forecasted net load and 10-minute actual net load.

Load following and regulation reserves were calculated using a common methodology based on the North American Electricity Reliability Corporation (NERC) Control Performance Standard 2 (CPS2).<sup>6</sup> CPS2 is designed to ensure that a BA maintains its area control error (ACE) – the difference between actual and scheduled power flows across interties to neighboring BAs – within reasonable bounds. Spinning

<sup>5</sup> See [http://www.wecc.biz/committees/EDT/EDT%20Results/E3\\_EIM\\_Benefits\\_Study-Phase\\_2\\_Report\\_RevisedOct2011\\_CLEAN2%5B1%5D.pdf](http://www.wecc.biz/committees/EDT/EDT%20Results/E3_EIM_Benefits_Study-Phase_2_Report_RevisedOct2011_CLEAN2%5B1%5D.pdf). The WECC Analysis reported hurdle rates in 2010\$, and those rates were adjusted to 2012\$ for this analysis.

<sup>6</sup> For more on NERC CPS, see <http://www.nerc.com/docs/oc/ps/tutorcps.pdf>.



reserve requirements) were set to equal 3% of load, which represents one-half of total operating reserves requirements (spinning plus non-spinning). Non-spinning reserve needs were not explicitly modeled because the simulation addresses reserve needs by increasing the level of generator commitment required, but is assumed for modeling that non-spinning reserve needs would typically be met with resources that do not require day-ahead unit commitment.

By benchmarking against ISO's current regulation procurement, wind integration studies performed by PacifiCorp, and in consultation with ISO and PacifiCorp, E3 chose to model a CPS2 compliance target which requires BAAs to secure load following reserves to meet 97% of forecasted load following demand, equivalent to 1.5% of the left-hand and right-hand tails of a distribution of load following needs (i.e., 10-minute forecasted net load minus hourly unit commitment). For regulation under this target, BAAs also secure regulation reserves to meet 94% of forecasted regulation demand, equivalent to 3% of the left-hand and right-hand tails of a distribution of regulation needs (i.e., 10-minute actual load minus 10-minute forecasted net load). This approach allows regulation reserves to meet load following needs, but not vice versa.

The regulation requirement percentage is lower than load following because regulation can be used to meet load following requirements. In the 3% of time periods with an unmet load following requirement, the residual load following error is added to the time-series regulation requirement. During these hours, if the system had unutilized regulation capacity or if regulation needs were in the opposite direction of the load following residual error, generator flexibility procured for regulation may be able to still satisfy the CPS2 requirement for that time period even though the system were short on load following resources.

Key steps in this analysis are shown graphically in Figure 2A.

- Step 1: Calculate a distribution of load following requirements. E3 used historical 10-minute wind, solar, and load data to forecast 10-minute net load and hourly unit commitment based on hourly net load. Forecasted hourly net load was then calculated for each 10-minute time period, using a linear 20-minute ramp across the top of the hour (see upper rightmost part of Figure 2A). A distribution of load following requirements was calculated as the difference between the 10-minute and hourly net load forecasts in each 10-minute period.
- Step 2: Calculate load following up and down needs. These were calculated using the 1.5 and 98.5 percentiles of these distributions, respectively, consistent with the chosen CPS2 compliance target. Figure 3A shows an example of the distribution for load following requirements and the points associated with the 1.5 and 98.5 percentiles.
- Step 3: Calculate a distribution of regulation requirements. A distribution of regulation requirements was calculated as the difference between the 10-minute net load forecast and 10-minute actual net load values. Residual load following errors were added to the regulation distributions to allow for the fact that regulation reserves can also be used for load following.
- Step 4: Calculate final regulation requirements as the 3<sup>rd</sup> and 97<sup>th</sup> percentiles of this distribution, representing regulation down and up needs, respectively.

Figure 2A. Flexibility reserve calculation steps

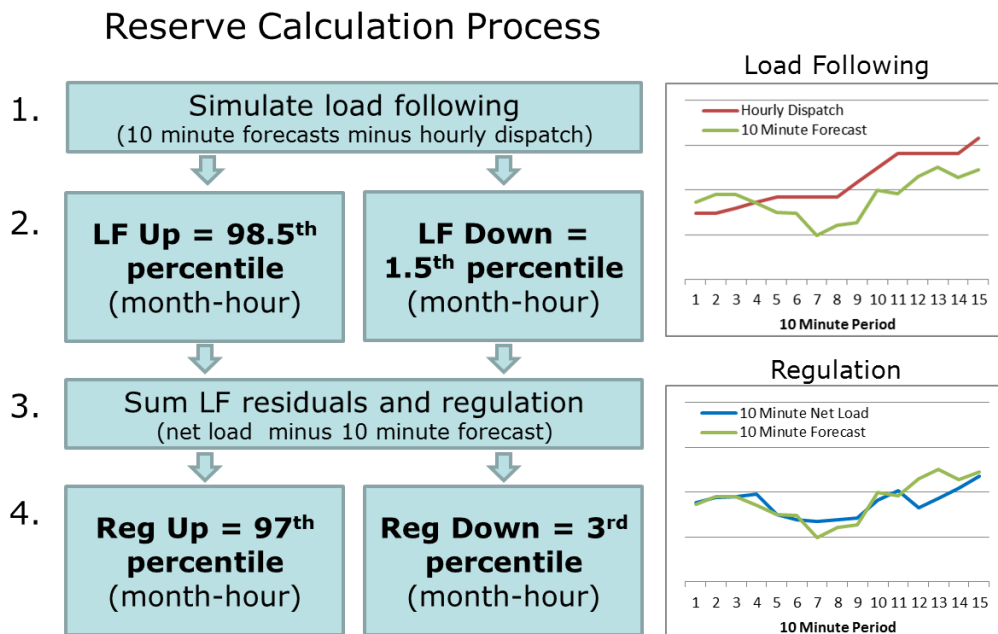
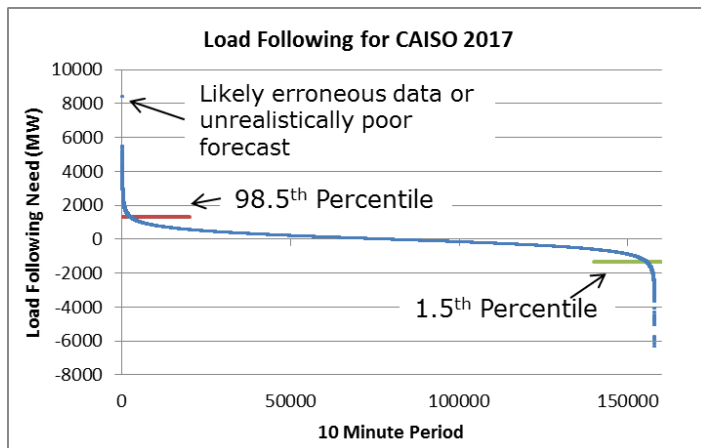


Figure 3A. Load following needs associated with the 1.5 and 98.5 percentiles



To calculate net load, E3 used three years of 10-minute load and modeled renewable production data. Years 2004 to 2006 were used in the analysis because of data availability in the Western Wind Integration Dataset. Solar PV was modeled using data from Solar Anywhere and 10-minute load data was provided by PacifiCorp and ISO. The load data provided was scaled to 2017 by both annual energy and peak load to account for load growth. Forecasts for 10-minute wind, solar, and load were created using linear regression and were extensively benchmarked. The following table shows renewable assumptions used for 2017.

**Table 3A. Renewable assumptions for 2017 reserve calculations<sup>7</sup>**

Area	Wind Installed (MW)	Solar Installed (MW)
PacifiCorp East	1,638	-
PacifiCorp West	635	-
PacifiCorp Combined	2,272	-
ISO	6,228	5,483
PacifiCorp and ISO (pooled)	8,501	5,483

In the Benchmark Case, regulation and load following were calculated separately for PacifiCorp East, PacifiCorp West, and ISO, and were implemented in GridView as separate constraints for each BAA. Table 4A shows the resulting load following up and regulation up reserve requirements for PacifiCorp East, PacifiCorp West, and ISO. The GridView modeling configuration used does not have the ability to model load following down and regulation down.

**Table 4A. Estimated load following up and regulation up reserve requirements for PacifiCorp East, PacifiCorp West, and ISO in 2017**

Area	Average Regulation Up (MW)	Average Load Following Up (MW)
PacifiCorp East	103	313
PacifiCorp West <sup>8</sup>	45	146
PacifiCorp Combined	115	357
ISO <sup>9</sup>	276	1,128

<sup>7</sup> The study did not incorporate the most current renewable resource capacity in PacifiCorp, which results in understating total installed wind capacity in PacifiCorp's BAAs by 280 MW. As of 2013 PacifiCorp will have 1,758 MW of installed wind capacity in PacifiCorp East and 795 MW of installed wind capacity in PacifiCorp West.

<sup>8</sup> In the Benchmark and EIM Cases, E3 assumed that PacifiCorp East is able to transfer 200 MW to PacifiCorp West within the hour but with no transfer capability in the reverse direction for EIM transactions. The hourly load following requirement applied to PacifiCorp West is reduced for this transfer capability, and a separate reserve requirement is applied to the Combined PacifiCorp area which reflects diversity of wind and load variability across the two PacifiCorp BAAs.

<sup>9</sup> The applied common methodology for determining regulation and load following results in conservative lower amount of regulation requirements used in ISO production and lower regulation and load following 20 minute requirements than has been calculated using other methodologies.

## EIM Dispatch Case

In the EIM Dispatch Case, E3 modeled reduced transactional friction between PacifiCorp and ISO from the EIM by removing the non-CO<sub>2</sub> hurdle rates in the Benchmark Case. In this case, the PACW → ISO hurdle rate still includes the \$10.76/MWh cost for CO<sub>2</sub> allowances on PacifiCorp flows to ISO (Table 5A).

**Table 5A. Hurdle rates for the Benchmark and EIM Dispatch Cases**

Case	Hurdle Rate (\$/MWh)			
	PACW → ISO			ISO → PACW
	CO <sub>2</sub> -related	Non-CO <sub>2</sub> related	Total	
Benchmark Case	\$10.76	\$10.31	\$21.07	\$3.97
EIM Dispatch Case	\$10.76	\$0.00	\$10.76	\$0.00*

*\*No CO<sub>2</sub>-related hurdle rate is applied to ISO exports to PACW because CO<sub>2</sub> permit cost under AB32 is directly modeled in the dispatch for generators located inside California.*

Eliminating hurdle rates enables GridView to dispatch more generation in the PacifiCorp BAAs to serve needs in the ISO BAA when more efficient units are available, and vice-versa. Reduced transactional friction lowers total production costs. As described in the main text, for the EIM Dispatch Case E3 used an 800 MW static transfer limit on the California-Oregon Intertie (COI) as a proxy for transfer capability between the PacifiCorp and ISO systems.

Table 6A shows production costs in the Benchmark Case, the EIM Dispatch Case, and cost savings (Benchmark Case – EIM Dispatch Case production costs), for the 100, 400, and 800 MW transfer capability scenarios under both hydro assumptions. As described in the main body, production cost savings from the 800 MW scenario were scaled to 100 and 400 MW based on relative changes in intertie flows. Most of the savings stemming from increased flows between the Benchmark Case and the EIM Dispatch Case were captured with 400 MW of transfer capability.

**Table 6A. Production cost savings in the EIM Dispatch Case for different hydropower flexibility scenarios and assumptions about transfer capability between PacifiCorp and ISO (Million 2012\$)**

Transfer Capability (MW)	25% Hydro Reserve Cap			12% Hydro Reserve Cap		
	100	400	800	100	400	800
EIM Dispatch Case	\$14.1	\$22.3	\$22.4	\$11.0	\$17.7	\$17.8

As described in this report, GridView assumes perfect, security-constrained, least-cost dispatch within both the ISO and PacifiCorp footprints. The EIM Dispatch Case thus captures the incremental benefits from more efficient dispatch between PacifiCorp and ISO assuming that PacifiCorp already uses nodal dispatch. The savings from moving to nodal dispatch in PacifiCorp are estimated separately under “intra-regional dispatch savings” and described in Section 2.2.2 of this report.

## EIM Flexibility Reserves Case

E3 calculated within-hour regulation and load following reserves for the EIM Flexibility Reserves Case using the same approach as in the Benchmark and EIM Dispatch Cases, except that net load profiles for each BA were summed before the calculation and transmission constraints were enforced to ensure realistic reserve sharing. By summing the net load profiles for PacifiCorp and ISO, diversity in forecast errors and net load ramps reduces the reserves that each BAA is required to hold, relative to the Benchmark Case.

Table 7A shows the pooled load following up and regulation up reserve requirements for PacifiCorp and ISO in 2017, prior to enforcing transmission constraints between BAs.

**Table 7A. Pooled load following and regulation up reserve requirements for PacifiCorp and ISO in 2017**

Area	Average Regulation Up (MW) <sup>10</sup>	Average Load Following Up (MW)
PacifiCorp and ISO (pooled)	310	1,255

Transmission limits were enforced on the results in the above table as a set of five separate constraints in the GridView cases, shown below for the scenario where 100 MW of transfer capability exists between PacifiCorp and ISO. These five constraints ensure that each BA holds the necessary reserves given transfer limits. The constraints also reflect the assumption that PacifiCorp East is able to transfer 200 MW to PacifiCorp West within the hour but with no transfer capability in the reverse direction.

1.  $PACW_{pooled\ reserves} \geq \max(PACW_{benchmark\ case} - 200\ MW, 0)$
2.  $PACE_{pooled\ reserves} \geq PACE_{benchmark\ case}$
3.  $CAISO_{pooled\ reserves} \geq \max(CAISO_{benchmark\ case} - 100\ MW, 0)$
4.  $PacifiCorp_{pooled\ reserves} \geq \max(x - 100\ MW, 0)$
5.  $PAC\&\ CAISO_{pooled\ reserves} \geq \max(x + CAISO_{benchmark\ case} - 100\ MW, PAC\&\ CAISO_{no\ transfer\ limit})$

where:  $x = \max(PACW_{benchmark\ case} + PACE_{benchmark\ case}, PacifiCorp_{benchmark\ case})$

<sup>10</sup> Reductions to both regulation and load following requirements were modeled in the EIM Flexibility Reserves Case, but resulting cost savings were multiplied by the share that load following reserves (80%) represent relative to total flexibility reserves (load following plus regulation), to account for the fact that the EIM will only affect reserves above a 5-minute timestep.

Table 8A shows production cost savings for the four transfer capability scenarios and two hydropower flexibility scenarios. As described in the main text, cost savings were multiplied by the share that load following reserves (80%) represent relative to total flexibility reserves (load following plus regulation), to account for the fact that the EIM will only affect reserves above a 5-minute timestep.

**Table 8A. Production cost savings in the EIM Dispatch and EIM Flexibility Reserve Cases for different hydropower flexibility scenarios and assumptions about transfer capability between PacifiCorp and ISO (Million 2012\$)**

Transfer Capability (MW)	25% Hydro Reserve Cap			12% Hydro Reserve Cap		
	100	400	800	100	400	800
EIM Dispatch Case	\$14.1	\$22.3	\$22.4	\$11.0	\$17.7	\$17.8
EIM Flexibility Reserve Case	\$4.0	\$11.0	\$13.4	\$20.8	\$51.3	\$77.1
Total Both Cases	\$18.1	\$33.3	\$35.8	\$31.8	\$69.0	\$94.9

E3 benchmarked the results from the EIM Flexibility Reserve Case by multiplying reductions in hourly load following component of flexibility reserve quantities by ISO regulation prices. Annual savings from reduced flexibility reserves were calculated as the difference between reserve costs with no transfer capability (i.e., 0 MW) and reserve costs with transfer capability (i.e., 100, 400, or 800 MW) between PacifiCorp and ISO. Consistent with the approach taken for the GridView modeling, only savings in load following up reserve costs were assumed to be achievable through an EIM.

The results of this benchmarking exercise (AS price-based results) are shown in Table 9A, using ISO AS market prices from 2010, 2011, and an average of the two years. Given that PacifiCorp is more dependent than ISO on thermal resources to provide flexibility reserves, the benchmarking results in the below table are conservatively low (i.e., ISO AS prices are likely to be lower than implied AS prices in PacifiCorp because hydropower provides a significant amount of AS in ISO). With this in mind, the EIM Flexibility Reserve Case results (Table 8A) appear reasonable compared to the benchmarking results below.

**Table 9A. Results from flexibility reserve benefits benchmarking analysis (Million 2012\$)**

Transfer Capability	2010 AS Prices	2011 AS Prices	Average 2010/2011 AS Prices	EIM Flex. Reserve Case (25% Hydro Reserve Cap)	EIM Flex. Reserve Case (12% Hydro Reserve Cap)
100 MW	\$7.3	\$4.5	\$5.7	\$4.0	\$20.8
400 MW	\$24.3	\$14.8	\$18.8	\$11.0	\$51.3
800 MW	\$29.6	\$17.6	\$22.7	\$13.4	\$77.1

**CONFIDENTIAL**

Docket No. UM-\_\_\_\_\_

Exhibit PAC/105

Witness: Stefan A. Bird

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF THE STATE OF OREGON**

**PACIFICORP**

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**CONFIDENTIAL**  
**Exhibit Accompanying Direct Testimony of Stefan A. Bird**

**May 2013 Business Case**

**April 2014**

**THIS EXHIBIT IS CONFIDENTIAL  
AND IS PROVIDED UNDER  
SEPARATE COVER**



**CONFIDENTIAL**

Docket No. UM-\_\_\_\_\_

Exhibit PAC/106

Witness: Stefan A. Bird

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF THE STATE OF OREGON**

**PACIFICORP**

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**CONFIDENTIAL**  
**Exhibit Accompanying Direct Testimony of Stefan A. Bird**  
**July 2013 Investment Appraisal Document**

**April 2014**

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Docket No. UM-\_\_\_\_  
Exhibit PAC/107  
Witness: Stefan A. Bird

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF THE STATE OF OREGON**

**PACIFICORP**

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**Exhibit Accompanying Direct Testimony of Stefan A. Bird  
Memorandum of Understanding between PacifiCorp, CAISO, and BPA**

**April 2014**

Contract No. 14TX-15995

**NON-BINDING**  
**MEMORANDUM OF UNDERSTANDING**  
**executed by the**  
**UNITED STATES OF AMERICA**  
**DEPARTMENT OF ENERGY**  
**acting by and through the**  
**BONNEVILLE POWER ADMINISTRATION**  
**and**  
**PACIFICORP**  
**and**  
**CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION**

This NON-BINDING MEMORANDUM OF UNDERSTANDING (MOU) is executed by the UNITED STATES OF AMERICA, Department of Energy, acting by and through the BONNEVILLE POWER ADMINISTRATION (BPA), PACIFICORP, and the CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION (CAISO). BPA, PacifiCorp, and CAISO are sometimes referred to individually as "Party" and collectively as "Parties".

**RECITALS**

This document is a non-binding MOU among BPA, PacifiCorp, and CAISO to incorporate, in good faith, the discussion principles identified herein. This MOU identifies potential Energy Imbalance Market (EIM) coordination and facilitation principles, which may lead to the development of EIM operating procedures to be agreed to among BPA, PacifiCorp, and CAISO.

PacifiCorp and CAISO are implementing the EIM, scheduled to begin operation October 1, 2014. BPA has several interests and roles with respect to EIM coordination, including, but not limited to, BPA is: (1) a Transmission Provider which provides transmission and other services to PacifiCorp Energy, a marketing function division of PacifiCorp and a transmission customer of BPA; (2) an adjacent Transmission Provider to both PacifiCorp and CAISO, whose transmission facilities PacifiCorp intends to use for EIM participation; (3) the Path Operator for the northern portion of the California-Oregon Intertie (COI); and (4) an entity with obligations to deliver power to customers within PacifiCorp's Balancing Authority Areas which are served by PacifiCorp in its role as a Transmission Provider and Balancing Authority.

Similarly, PacifiCorp has several interests and roles with respect to EIM coordination, including, but not limited to, PacifiCorp is: implementing the EIM together with CAISO, as the Market Operator, pursuant to the Implementation Agreement dated April 30, 2013<sup>1</sup> (Implementation Agreement), and a BPA transmission customer, through PacifiCorp Energy, that has purchased transmission and other services on BPA's system, including rights over the COI.

CAISO's interests include, but are not limited to, CAISO is: implementing the EIM, as the Market Operator, together with PacifiCorp pursuant to the Implementation Agreement, and the Path Operator of the southern portion of the COI.

Because the EIM represents a significant regional effort, PacifiCorp, CAISO, and BPA seek to enable the EIM and to avoid potential adverse impacts to BPA and its customers.

Coordinated EIM operation provides an opportunity to improve operational effectiveness in a cost-effective manner.

The following constitutes a general summary of the understandings of the Parties for the proposed EIM:

**1. TERM**

This MOU will continue until the earlier of: (1) mutually agreed to EIM operating procedures are adopted by the Parties and the EIM has been in operation for one year; (2) two years from the date the MOU is executed by the Parties; or (3) termination upon 30-days' notice in writing by any of the Parties.

**2. PRINCIPLES FOR COORDINATION AND FACILITATION OF THE EIM**

BPA, PacifiCorp, and CAISO have developed principles intended to coordinate and enable implementation of the EIM on BPA's system among the Parties. The Parties agree to develop operating procedures as needed consistent with the following principles and with applicable statutory requirements:

- (a) This MOU does not create any rights for any Party, commit BPA to provide a specific service, or otherwise obligate the Parties to enter into any specific operational or commercial framework. The Parties will continuously evaluate the EIM to assure a long-term, balanced operational framework, informed by stakeholder feedback and actual EIM performance, that is consistent with agreed-upon principles herein to allow for market go-live on October 1, 2014;

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<sup>1</sup> *Order Accepting Implementation Agreement*, 143 FERC ¶ 61,298 (June 28, 2013).

- (b) Development of a framework that provides for use of BPA's transmission system consistent with Open Access principles, including the terms and conditions for transmission service provided pursuant to BPA's Open Access Transmission Tariff (OATT). BPA will provide reliable transmission service to its customers in a manner consistent with the quality and reliability of service required by its OATT and any other existing agreements;
- (c) Development of a framework that provides for use of PacifiCorp's transmission system consistent with Open Access principles, including the terms and conditions for transmission service provided pursuant to PacifiCorp's OATT. PacifiCorp will provide reliable transmission service to its customers in a manner consistent with the quality and reliability of service required by its OATT and any other existing agreements;
- (d) Operation of the transmission system will be consistent with NERC and WECC reliability standards and will maintain or improve system reliability; and
- (e) The Parties agree that costs will be allocated consistent with cost causation, recognizing mutual benefits.

### **3. PROJECT PLAN, KEY MILESTONES, AND DELIVERABLES**

The Parties will develop and maintain a project plan to achieve key deliverables on specific timelines (Project Plan). The Parties will support, in good faith, the following key milestones and deliverables:

- (a) Initial Project Plan developed and approved by all Parties – February 28, 2014;
- (b) Full Market Simulation – July 8, 2014 (Full Design of Operational Framework); and
- (c) Go-Live – October 1, 2014 (Completed and Delivered Operational Framework).

### **4. COORDINATION AND OUTREACH**

PacifiCorp and CAISO have developed extensive outreach plans to engage stakeholders in the process of implementing the EIM. In parallel with those efforts, BPA is engaged in an effort, including its own extensive stakeholder outreach, to facilitate coordination of the EIM, and to responsibly manage any potential short-term and long-term impacts of the EIM to BPA and its customers. Accordingly, PacifiCorp, CAISO, and BPA will continue to work together, in good faith, to identify and address operational issues of concern prior to go-live October 1, 2014. PacifiCorp, CAISO, and BPA anticipate continued involvement in each other's ongoing EIM-related stakeholder processes, including collaboration in the development or review of EIM-related documents and materials to support the operating procedures, as appropriate.

Before go-live of the EIM, and during the operation of the EIM, PacifiCorp will continue to provide BPA with information necessary for BPA's facilitation of the EIM, including, but not limited to, a list of contracts and associated generating resources that it intends to use to participate in the EIM.

**5. DEVELOPMENT OF EIM OPERATING PROCEDURES**

PacifiCorp, CAISO, and BPA anticipate developing operating procedures consistent with the following principles and with applicable statutory requirements (EIM Operating Procedures):

- (a) The EIM should not adversely affect the reliability of the bulk electric system;
- (b) BPA should have sufficient visibility and controls with respect to EIM resources' use of BPA's transmission system dynamically to maintain system reliability and quality of service for its customers;
- (c) The EIM should operate within the limits of existing transmission rights and any applicable operational constraints, as appropriate;
- (d) Review at regular intervals the actual performance of the EIM Operating Procedures in terms of system reliability;
- (e) PacifiCorp and CAISO should provide visibility over current and forecasted operations to BPA through the sharing of appropriate system data. At a minimum, the data being shared between CAISO to BPA will be the binding fifteen-minute schedules plus any pertinent advisories, as well as the five-minute market flow data;
- (f) At a minimum, BPA will share with CAISO the five-minute rate of change limits and upper/lower limits that will be enforced in five-minute markets;
- (g) EIM resources should operate within jointly developed operational controls to ensure the reliable operation of the EIM relative to all transmission flow impacts:
  - (1) While BPA may agree that PacifiCorp and CASIO may operate EIM resources within applicable limits, this operational flexibility would be reconsidered if any of these coordination or facilitation principles were violated;
  - (2) BPA has the ability to take appropriate actions at all times consistent with Open Access principles to maintain reliability of its system;
  - (3) In the future, if there are additional competing needs for use of this operational flexibility, the coordination and facilitation principles described herein will be reconsidered consistent with Open Access principles; and

- (4) An operational review of existing BPA Dynamic Transfer Capacity business practices should occur as part of a separate process.
- (h) The EIM should not affect PacifiCorp's obligation to provide service to BPA's transfer customers in accordance with the terms of its OATT and existing agreements, as they may be modified or replaced with successor agreements; nor should the EIM adversely impact service to BPA's transfer service customers;
- (i) PacifiCorp should promptly notify BPA in writing of any change in its relevant contracts or generating resources with sufficient notice to allow BPA to assess the impacts of any such changes;
- (j) The Parties agree to meet as needed to review project scope, conduct a project performance plan evaluation, and work collaboratively in good faith to resolve any issues;
- (k) The Parties will work together to develop metrics to measure performance against these standards and establish a process for making mutually agreed upon changes; and
- (l) The EIM Procedures will be consistent with the rights of COI owners and capacity holders.

**6. NON-BINDING NATURE OF MOU**

This MOU is not a binding and enforceable contract but is intended to serve as a basis for further discussion, study, analysis, and negotiations between the Parties with respect to the EIM. This MOU does not constitute an offer, agreement or commitment.




7. **LIMITATION OF LIABILITY**

Each of the Parties acknowledges and agrees that the other Parties shall not be liable to it for any claim, loss, cost, liability, damage, or expense, whether at law or in equity, including but not limited to any direct damage or any special, indirect, exemplary, punitive, incidental, or consequential loss or damage (including any loss of revenue, income, profits, or investment opportunities or claims of third party customers), arising out of or directly or indirectly related to any other Party's performance or nonperformance under this MOU. The rights and obligations under this Section 7 shall survive the expiration and termination of this MOU.


8. **SIGNATURES**

The Parties have executed this MOU as of the last date indicated below.

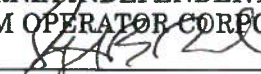
PACIFICORP

By:   
Name: PATRICK ZEIDAN  
(Print/Type)  
Title: Pres./CEO Pacific Power  
Date: 2/14/14

UNITED STATES OF AMERICA  
Department of Energy  
Bonneville Power Administration

By:   
Name: Curtis E. Mainer  
(Print/Type)  
Title: Administrator + CEO (Acting)  
Date: 2/14/14

CALIFORNIA INDEPENDENT  
SYSTEM OPERATOR CORPORATION

By:   
Name: Steve Barberich  
(Print/Type)  
Title: Pres + CEO  
Date: 2/14/14

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