

Davison Van Cleve PC

Attorneys at Law

TEL (503) 241-7242 • FAX (503) 241-8160 • jog@dvclaw.com
Suite 450
1750 SW Harbor Way
Portland, OR 97201

August 3, 2018

Via Electronic Filing

Public Utility Commission of Oregon
Attn: Filing Center
201 High St. SE, Suite 100
Salem OR 97301

Re: In the Matter of PACIFICORP, dba PACIFIC POWER
2019 Transition Adjustment Mechanism
Docket No. UE 339

Dear Filing Center:

Please find enclosed the Alliance of Western Energy Consumers' ("AWEC") Motion to Admit Pre-filed Testimony and Exhibits and its Proposed Cross-Examination Exhibits in the above-referenced docket.

The confidential portions of AWEC's cross-examination exhibits are being handled in accordance with Order No. 16-128 and will follow to the Commission via Federal Express.

Thank you for your assistance. If you have any questions, please do not hesitate to call.

Sincerely,

/s/ Jesse O. Gorsuch
Jesse O. Gorsuch

Enclosures

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that I have this day served the **confidential portions of AWEC's cross-examination exhibits** upon the parties shown below by mailing copies via First Class U.S. Mail, postage prepaid, and by sharing copies via the Huddle workspace in this docket.

Dated this 3rd day of August, 2018.

Sincerely,

/s/ Jesse O. Gorsuch

Jesse O. Gorsuch

CITIZENS' UTILITY BOARD OF OREGON

Robert Jenks (C)
Michael Goetz (C)
610 SW Broadway, Suite 400
Portland, OR 97205
bob@oregoncub.org
mike@oregoncub.org

PACIFICORP

Katherine McDowell (C)
McDowell, Rackner &
Gibson, PC
419 SW 11th Ave., Suite 400
Portland, OR 97204
Katherine@mrg-law.com

PACIFICORP

Matthew McVee (C)
Chief Regulatory Counsel
825 NE Multnomah Street
Suite 1800
Portland, OR 97232
Matthew.mcvee@pacificorp.com

OPUC STAFF

Scott Gibbens (C)
Public Utility Commission of Oregon
201 High Street, Suite 100
Salem, OR 97301
scott.gibben@state.or.us

PUC STAFF - DEPARTMENT OF JUSTICE

Sommer Moser (C)
Kaylie Klein (C)
PUC Staff – Dept. of Justice
Business Activities Section
1162 Court St. NE
Salem, OR 97301-4096
sommer.moser@doj.state.or.us
kaylie.klein@state.or.us

CALPINE ENERGY

Gregory M. Adams (C)
Richardson Adams, PLLC
P.O. Box 7218
Boise, ID 83702
greg@richardsonadams.com

CALPINE ENERGY

Kevin Higgins (C)
Energy Strategies LLC
215 State St., Suite 200
Salt Lake City, UT 84111-2322
khiggins@energystrat.com

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UE 339

In the Matter of)
PACIFICORP, dba PACIFIC POWER) MOTION TO ADMIT PRE-FILED
2019 Transition Adjustment Mechanism.) TESTIMONY AND EXHIBITS AND
) PROPOSED CROSS-EXAMINATION
) EXHIBITS OF THE ALLIANCE OF
) WESTERN ENERGY CONSUMERS
_____)

The Alliance of Western Energy Consumers (“AWEC”) moves for admission into the record of this proceeding the following pre-filed testimony and exhibits submitted on behalf of AWEC, as well as AWEC’s proposed cross-examination exhibits. AWEC’s cross-examination exhibits are attached to this Motion. Pursuant to conversations with PacifiCorp, AWEC understands that PacifiCorp is willing to stipulate to their admission into the record of this proceeding. Accordingly, as stated in PacifiCorp’s Stipulated Motion to Modify the Procedural Schedule, filed on August 2, 2018 in the above-referenced docket, AWEC is willing to waive its right to cross-examine witnesses in this proceeding.

<u>Exhibit</u>	<u>Description</u>
AWEC/100	Opening Testimony of Bradley G. Mullins
AWEC/101	Qualification Statement of Bradley G. Mullins
Confidential AWEC/102	Historical Forward Price Curve Forecast Error Analysis 2007-2016

<u>Exhibit</u>	<u>Description</u>
Confidential AWEC/103	Historical Forward Price Curve Forecast Error Analysis 2010-2016
AWEC/104	Response to Discovery Regarding 300 MW Transmission Link
<u>Cross-Exam Exhibit</u>	<u>Description</u>
AWEC/200	PacifiCorp Response to AWEC Data Request 0011 and attachment
Confidential AWEC/201	PacifiCorp Response to AWEC Data Request 0012 and attachments
Confidential AWEC/202	PacifiCorp Response to AWEC Data Request 0013 and attachment
AWEC/203	Excerpt of Response Testimony of Bradley G. Mullins in WUTC Docket UE-152253

The Affidavit of Bradley G. Mullins attesting to the truth and accuracy of his testimony and exhibit filings, as well as his testimony in support of the stipulation filed in this proceeding, is attached.

Dated this 3rd day of August, 2018.

Respectfully submitted,

DAVISON VAN CLEVE, P.C.

/s/ Tyler C. Pepple

Tyler C. Pepple

1750 SW Harbor Way, Suite 450

Portland, Oregon 97201

(503) 241-7242 (phone)

(503) 241-8160 (facsimile)

tcp@dvclaw.com

Of Attorneys for the

Alliance of Western Energy Consumers

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UE 339

In the Matter of

PACIFICORP, dba PACIFIC POWER

2019 Transition Adjustment Mechanism.

AFFIDAVIT OF
BRADLEY G. MULLINS

I, BRADLEY G. MULLINS, being first duly sworn on oath, depose and say:

1. My name is Bradley G. Mullins. I am an independent consultant testifying on behalf of the Alliance of Western Energy Consumers ("AWEC") in this matter.

2. I sponsored testimony and exhibit filings (AWEC/100-104 and Stipulating Parties/100) on behalf of AWEC and the Stipulating Parties in this matter.

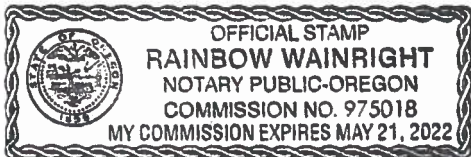
3. To the best of my knowledge, my pre-filed testimony and exhibits are true and accurate. If I were asked the same questions today, my answers would be the same.

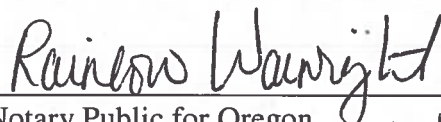
SIGNED this 3rd day of August, 2018.



BRADLEY G. MULLINS

SUBSCRIBED AND SWORN to before me this 3rd day of August, 2018.





Notary Public for Oregon
My Commission Expires: 5/21/2022
Multnomah County

UE 339 / PacifiCorp
July 31, 2018
AWEC Data Request 0011

AWEC Data Request 0011

Please provide a breakdown of all EIM costs, separated by expense and capital that PacifiCorp included in its initial filing by FERC account and the amount included in each account.

Response to AWEC Data Request 0011

Please refer to Attachment AWEC 0011 which provides the breakdown of all energy imbalance market (EIM) costs, separated by expense and capital.

OR - UE 339
AWEC 0011

Attachment AWEC 0011

PacifiCorp
Oregon 2019 TAM

Capital Investment		CY 2019 - 13 Month Average	
		Total	Oregon
Asset class	FERC Account	Company	Allocated
Intangible (Software)	303	10,667,106	2,850,764
Computer Hardware	391	78,332	20,934
Generation Meters	315	3,507,808	937,455
Transmission Meters	353	738,458	197,352
Comm Equip	397	1,424,328	380,649
		16,416,032	4,387,153

Depreciation Reserve Balances		CY 2019 - 13 Month Average	
		Total	Oregon
Asset class	FERC Account	Company	Allocated
Intangible (Software)	111IP	(10,416,589)	(2,783,813)
Computer Hardware	108GP	(72,318)	(19,327)
Generation Meters	108SP	(611,495)	(163,421)
Transmission Meters	108TP	(70,896)	(18,947)
Comm Equip	108GP	(362,335)	(96,833)
		(11,533,634)	(3,082,341)

Depreciation Expense		12 Months Ending Dec-19	
		Total	Oregon
Asset class	FERC Account	Company	Allocated
Intangible (Software)	403IP	1,035,550	276,749
Computer Hardware	403GP	13,635	3,644
Generation Meters	403SP	164,977	44,090
Transmission Meters	403TP	12,843	3,432
Comm Equip	403GP	75,472	20,170
		1,302,476	348,084

OR - UE 339
AWEC 0011

Attachment AWEC 0011

PacifiCorp

Oregon 2019 TAM

Twelve Months Ended June 30, 2018

O&M:	<u>FERC Account</u>	<u>Total</u>	<u>Oregon Allocated</u>
On-going operations	560	11,881	3,175
On-going operations	928	183,020	48,912
Admin Fee	561	1,233,881	329,752
		<u>1,428,782</u>	<u>381,839</u>

OR - UE 339
AWEC 0011

Attachment AWEC 0011

EIM Cost - NPC Items - Wheeling (\$)		2019	2019	2019	2019	2019
FERC	Year Month	1	2	3	4	5
	565 EIM GMC BID TRNS FEE	922	842	943	896	921
	565 EIM GMC TRNSACT CHRG	122,783	115,207	126,584	121,141	120,325

OR - UE 339
AWEC 0011

Attachment AWEC 0011

2019	2019	2019	2019	2019	2019	2019
6	7	8	9	10	11	12
892	966	949	831	900	877	928
125,598	124,281	108,014	98,997	122,179	117,141	116,668

UE 339 / PacifiCorp
July 31, 2018
AWEC Data Request 0012

AWEC Data Request 0012

Please provide all materials PacifiCorp provided to stakeholders at the two workshops referenced in PAC/400, Wilding/8:22-9:5.

Response to AWEC Data Request 0012

Please refer to the Confidential Attachment AWEC 0012.

Confidential information is designated as Protected Information under Order No. 16-128 and may only be disclosed to qualified persons as defined in that order.

Despite PacifiCorp's diligent efforts, certain information protected from disclosure by the attorney-client privilege or other applicable privileges or law may have been included in its responses to these data requests. PacifiCorp did not intend to waive any applicable privileges or rights by the inadvertent disclosure of protected information, and PacifiCorp reserves its right to request the return or destruction of any privileged or protected materials that may have been inadvertently disclosed. Please inform PacifiCorp immediately if you become aware of any inadvertently disclosed information.

Energy Imbalance Market Status Update

January 21, 2015



CONFIDENTIAL
SUBJECT TO GENERAL PROTECTIVE ORDER

Let's turn the answers on.

Purpose

- UE 287 settlement called for workshops to discuss:
 - Operation of EIM
 - Methodology for calculating EIM-related benefits
 - Potential options for addressing EIM-related costs and benefits from January 1, 2016 forward
- PacifiCorp agreed to address EIM-related costs and benefits in its 2016 TAM filing

EIM Operation

Did EIM Deliver at Go-live?

- November/December experience – What worked
 - Effective centralized dispatching with Security Constrained Economic Dispatch model
 - PacifiCorp BAA's and Participating Resources were successfully integrated into all CAISO EIM market systems
 - Significant use of inter-tie and imports of lower-cost resources into California
 - Initial period of artificially high prices associated with infeasible schedules mitigated by market improvements and FERC tariff waiver

EIM Prices 15-Minute Market (FMM)



EIM Challenges and Corrections Post Go-live

- System Integration
 - Software code, resource data and vendor systems required updates to improve data transfer to CAISO systems
- Real-time coordination
 - Coordinating new balancing tools and EIM systems with Grid Ops was challenging
- Outage management
 - Vendor interfaces had difficulty transferring resource constraints into the ISO OMS Systems
- Additional Resources
 - C&T added 3,000+ MW's of Participating resources in mid-November to provide additional flexibility to the Market Operator during system contingencies such as generator outages and bid range

Realized EIM Benefits

- CAISO EIM benefit study
 - The CAISO is preparing a report to assess aggregate system benefits based on actual EIM operations that is planned to be published at the end of January
 - Benefits are being realized even though certain market conditions are not as favorable as those assumed in the E3 EIM benefit study published March 2013.
 - The E3 study assumed transmission available south of Malin is equal to the transmission available north of Malin for EIM utilization at all times. However, the CAISO does not reserve transmission south of Malin for utilization by EIM. During times where there is day-ahead Malin congestion, south of Malin transmission is unlikely to be available for EIM.
 - PacifiCorp can still utilize its transmission rights to maximize day-ahead value. However, if transmission rights are utilized on a forward basis they cannot also be used for EIM.
 - The E3 study was based on natural gas prices near \$4/mmbtu while current northwest gas prices are below \$3/mmbtu. The drop in natural gas prices corresponds to drops in power prices and a tighter price spread between dispatchable resources which decreases imbalance costs and EIM benefits.

Realized EIM Benefits

- Transfer capability and inter-regional benefits
 - EIM has been consistently utilizing 15-minute transfer capacity into California and dynamic transfer capability between the two PacifiCorp BAAs
 - EIM transfers to California have averaged 75 MW to 125 MW an hour in the first couple months of EIM operation and have been as high as 300 MWs.
- Renewable integration benefits
 - Reduced cost of balancing to address changes in variable energy resource production

Realized EIM Benefits

- Situational Awareness
 - EIM improves the awareness of the system operator due to 5-minute real-time and forward looking data
 - EIM produces data on all inputs to the real-time market; congestion, energy, losses, transmission & generation curtailments, flow limits, transfer limits, etc.
 - This data is being used by the CAISO and monitoring groups such as the Market Surveillance Committee to analyze and improve on market systems and market design elements
- System stability through new technology
 - Entrance into EIM has given PacifiCorp the opportunity to integrate newer technologies in metering, automatic generation control systems, outage management and wind forecasting to better assimilate our large and diverse geographic footprint into the WECC region

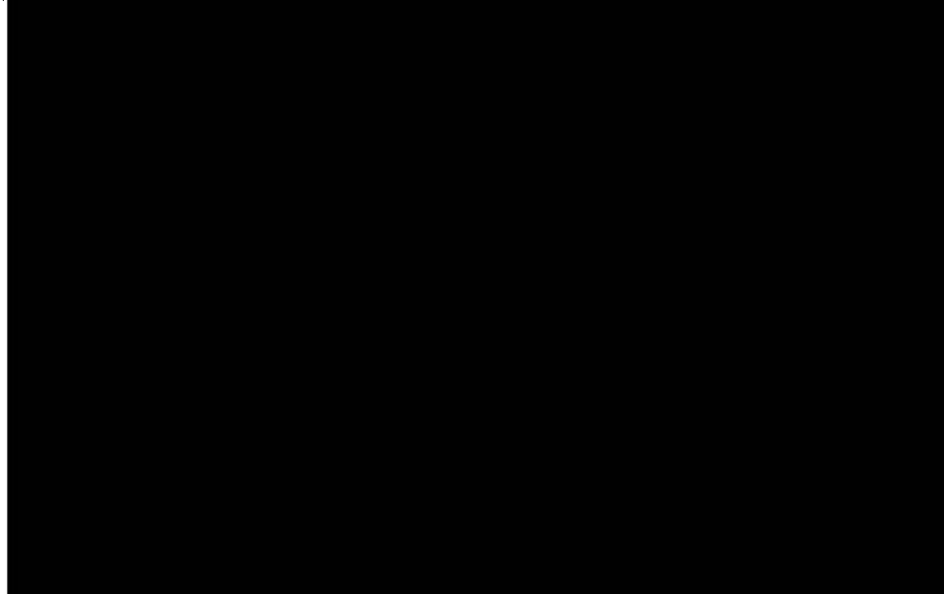
Calculating EIM Benefits

Calculating EIM Benefits

- Straightforward to quantify incremental benefits of transacting with CAISO in EIM
 - Benefits result from net transfers between PacifiCorp and CAISO
 - Benefits result from reduced ramping reserve requirement
- Additional EIM benefits difficult to quantify
 - The CAISO is preparing a report to assess aggregate system benefits based on actual EIM operations that is planned to be published at the end of January
 - Likely to include estimated benefit of reducing within-hour imbalance costs and improving intra-regional dispatch for PacifiCorp

December 2014 Preliminary EIM Benefits

- Inter-regional benefits (net transfers between PacifiCorp and CAISO)



- Reduced ramping reserve requirement
 - Preliminary results for [REDACTED] result in [REDACTED] reserve savings for every 100 MW available transmission capacity

- [REDACTED]

CONFIDENTIAL
SUBJECT TO GENERAL PROTECTIVE ORDER

EIM Costs and Benefits in 2016 TAM

EIM Benefits vs. GRID

- EIM benefits incremental to GRID model include inter-regional benefits and reduced ramping reserve requirement
 - Derated COI transfer capability available in GRID to sell forward or for EIM
 - GRID model allowed to sell into COB market up to historical levels
 - Remaining COI capacity not utilized for forward sales available for EIM transactions in test period
 - Margin from EIM-related transactions with CAISO reflected as a reduction to NPC
 - Actual transactions analyzed to determine COI capacity set aside for EIM and capacity utilized for energy transfers
 - Historical EIM transaction margin applied to test period EIM volume
 - Reserve requirement in GRID reduced to reflect diversity benefit reported by CAISO
 - Actual diversity benefit expressed as MW savings per 100 MW of transfer capacity
 - Actual ratio applied to derated COI transfer capability available in GRID for EIM
 - Additional reserve savings reflected due to NV Energy participation during 2016 test period
- GRID model optimizes dispatch of PacifiCorp generation units within its balancing authority areas with a security constrained economic dispatch model
 - Actual plant dispatch prior to EIM was not optimized on a real-time basis by a security constrained economic dispatch model
- GRID model does not include imbalance costs
 - Within hour imbalance costs are not included
 - GRID model forecasts optimal hourly solutions based on current system data forecast of future system conditions

2016 EIM Benefits in GRID

- Inter-regional benefits calculated using December 2014 experience
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - EIM transactions will be limited during spring runoff due to COI congestion
 - Margin from EIM-related sales to CAISO (exports) reflected as a increased wholesale sales (reducing NPC)
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - Margin from EIM-related purchases from CAISO (imports) reflected as reduction to purchased power expenses (reducing NPC)
 - [REDACTED]
 - [REDACTED]
 - Reserve requirement in GRID reduced to reflect diversity benefit reported by CAISO
 - [REDACTED]
 - [REDACTED]

CONFIDENTIAL
SUBJECT TO GENERAL PROTECTIVE ORDER

2016 TAM

- NPC forecast for 2016 will be reduced for EIM-related benefits incremental to GRID model forecast
 - [REDACTED]
 - Benefits will be updated and refined as additional data is gathered

	UE 287 Settlement	[REDACTED]
Interregional Dispatch	Not Specified	[REDACTED]
Flexibility Reserves	Not Specified	[REDACTED]
Test Period EIM Benefits	\$6.7m	[REDACTED]

- EIM-related costs were included in UE 287 to match associated benefits. The Company is currently evaluating whether a general rate case will be filed in 2015.
- The TAM guidelines were revised in UE 263 (2013 general rate case) to allow the Company more flexibility with respect to the timing of GRCs (i.e. GRCs do not need to be filed March 1).
- The Company proposes to include EIM-related costs as part of the 2016 TAM. If a GRC is filed in 2015, non-NPC related costs would be reflected in GRC and removed from TAM.


Energy Imbalance Market Status Update

March 11, 2015



Let's turn the answers on.

Purpose

- UE 287 settlement called for workshops to discuss:
 - Operation of EIM
 - Methodology for calculating EIM-related benefits
 - Potential options for addressing EIM-related costs and benefits from January 1, 2016 forward
 - PacifiCorp agreed to address EIM-related costs and benefits in its 2016 TAM filing
 - First meeting held January 21, 2015
 - Second meeting purpose:
 - Discuss CAISO benefits report
 - Update TAM EIM benefits calculation
- 

CAISO EIM Benefit Study



Realized EIM Benefits

- CAISO EIM benefit study
 - The CAISO published the first quarterly report February 11, 2015, assessing aggregate system benefits based on actual EIM operations in November and December 2014.
 - Calculated inter- and intra-regional dispatch benefits
 - Captures benefit of more efficient dispatch on a 15-minute basis
 - Does not include benefits of reduced flexibility reserves
 - Total PacifiCorp benefits estimated at \$4.73 million for November and December 2014
 - Total estimated benefit to EIM footprint is \$5.97 million

CAISO Benefit Calculation

- CAISO EIM benefit study
 - Benefits to PacifiCorp are calculated by comparing the cost of EIM optimized dispatch to a counterfactual cost of dispatch without EIM optimization
 - Assuming no intra-hour transfers between PacifiCorp and CAISO
 - Counterfactual mimics PacifiCorp’s pre-EIM manual dispatch to meet demand
 - Using a limited pool of flexible resources

BAA	November	December	Total
ISO	\$0.65	\$0.59	\$1.24
PACE	\$1.05	\$1.26	\$2.31
PACW	\$1.39	\$1.03	\$2.42
Total	\$3.09	\$2.88	\$5.97

Table 1: Estimated benefits shown are in the millions and accrued for the last two months in 2014.

Calculating EIM Benefits for the 2016 TAM

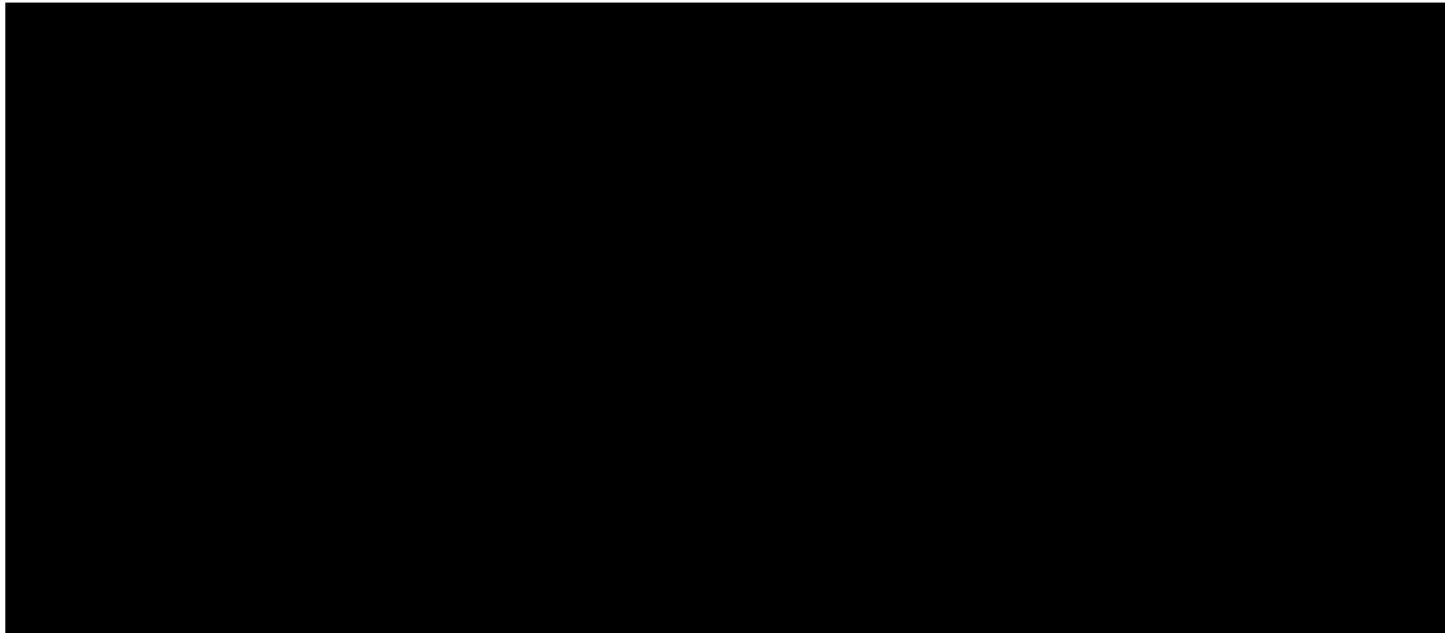


EIM Benefits vs. GRID

- EIM benefits incremental to GRID model include inter-regional benefits and reduced ramping reserve requirement
 - Derated COI transfer capability available in GRID to sell forward or for EIM
 - Margin from EIM-related transactions with CAISO reflected as a reduction to NPC
 - Reserve requirement in GRID reduced to reflect diversity benefit reported by CAISO
- GRID model optimizes dispatch of PacifiCorp generation units within its balancing authority areas with a security constrained economic dispatch model
 - Actual plant dispatch before EIM was not optimized on a real-time basis by a security constrained economic dispatch model
- GRID model does not include within hour imbalance costs
 - GRID model forecasts optimal hourly solutions based on current system data forecast of future system conditions

December 2014 and January 2015 Preliminary EIM Benefits

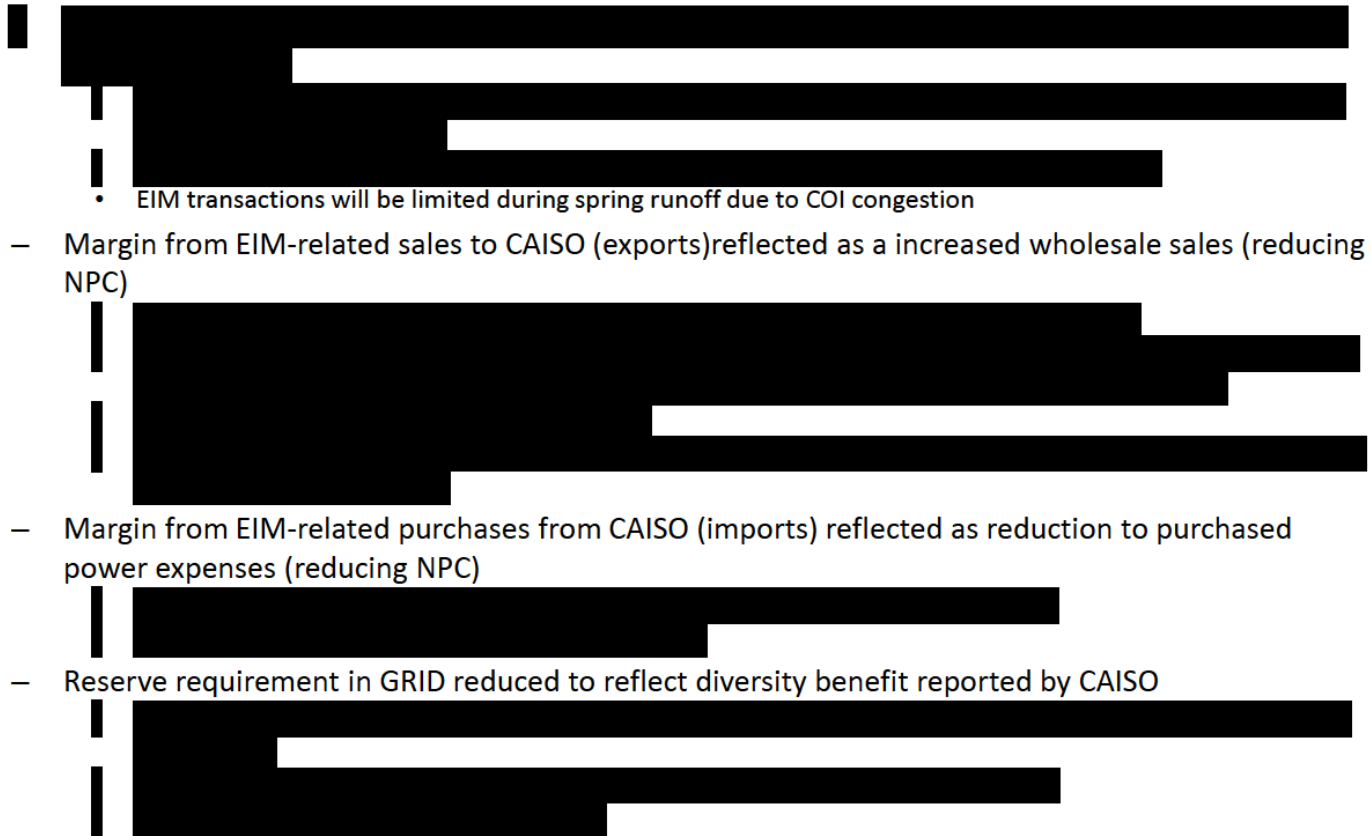
- Inter-regional benefits (net transfers between PacifiCorp and CAISO)



CONFIDENTIAL
SUBJECT TO GENERAL PROTECTIVE ORDER

Updated 2016 EIM Benefits in GRID

- Inter-regional benefits calculated using December 2014 and January 2015 experience



- EIM transactions will be limited during spring runoff due to COI congestion

- Margin from EIM-related sales to CAISO (exports) reflected as a increased wholesale sales (reducing NPC)

- Margin from EIM-related purchases from CAISO (imports) reflected as reduction to purchased power expenses (reducing NPC)

- Reserve requirement in GRID reduced to reflect diversity benefit reported by CAISO

CONFIDENTIAL
SUBJECT TO GENERAL PROTECTIVE ORDER

Updated 2016 TAM

- NPC forecast for 2016 will be reduced for EIM-related benefits incremental to GRID model forecast

█ [REDACTED]

	UE 287 Settlement	Preliminary 2016 TAM Benefits Based on Dec 2014 – Jan 2015
Inter-regional Dispatch	Not Specified	█
Flexibility Reserves	Not Specified	█
Test Period EIM Benefits	\$6.7m	█

- Benefits will be updated and refined as additional data is gathered

UE 339 / PacifiCorp
July 31, 2018
AWEC Data Request 0013

AWEC Data Request 0013

Please provide all materials PacifiCorp provided to stakeholders at the workshops held to discuss EIM benefits following the 2017 TAM referenced in PAC/400, Wilding/10:13-19.

Response to AWEC Data Request 0013

Please refer to the Confidential Attachment AWEC 0013.

Confidential information is designated as Protected Information under Order No. 16-128 and may only be disclosed to qualified persons as defined in that order.

Despite PacifiCorp's diligent efforts, certain information protected from disclosure by the attorney-client privilege or other applicable privileges or law may have been included in its responses to these data requests. PacifiCorp did not intend to waive any applicable privileges or rights by the inadvertent disclosure of protected information, and PacifiCorp reserves its right to request the return or destruction of any privileged or protected materials that may have been inadvertently disclosed. Please inform PacifiCorp immediately if you become aware of any inadvertently disclosed information.

Oregon 2017 TAM

Energy Imbalance Market

February 9, 2017



Energy Imbalance Market Outline

- Daily operations and bid submission
- California Independent System Operator (ISO) EIM benefit explanation
- EIM revenue/cost calculation of the import/export
- EIM dispatch cost to facilitate the import/export
- Total EIM benefit calculation

EIM Day-Ahead Setup

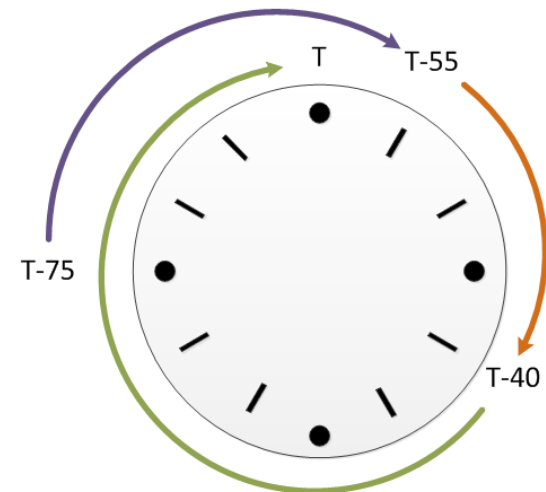
- Variables considered in the day-ahead setup
 - Reserve requirement
 - Load
 - EIM flex requirements
 - Plant operating costs (\$/MWh)
- The day-ahead schedule includes known updates for ramp capability, max and min capacity, outages and unit testing requirements
- Bids are submitted by end-of-day for all participating resources in EIM
 - Includes fuel price, unit heat rate, variable operation and maintenance and a ten percent adder

EIM Resources

- Participating resources that are bid into the market are optimized by the ISO market model every fifteen minutes and again every five minutes to achieve the least-cost dispatch to serve load across the EIM footprint
 - PacifiCorp has chosen to maximize its participating resources to allow the most efficient optimization of the system within the hour
- Non-participating resources are not optimized by the ISO market model within the hour and maintain an hourly base schedule
 - Non-participating resources include resources that are shared units and not under PacifiCorp's operational control as well as run-of-river and constrained hydro resources
 - Hunter 1&2
 - Cholla
 - Craig
 - Hayden
 - Hydro resources other than Swift 1 and Yale

Market Timeline

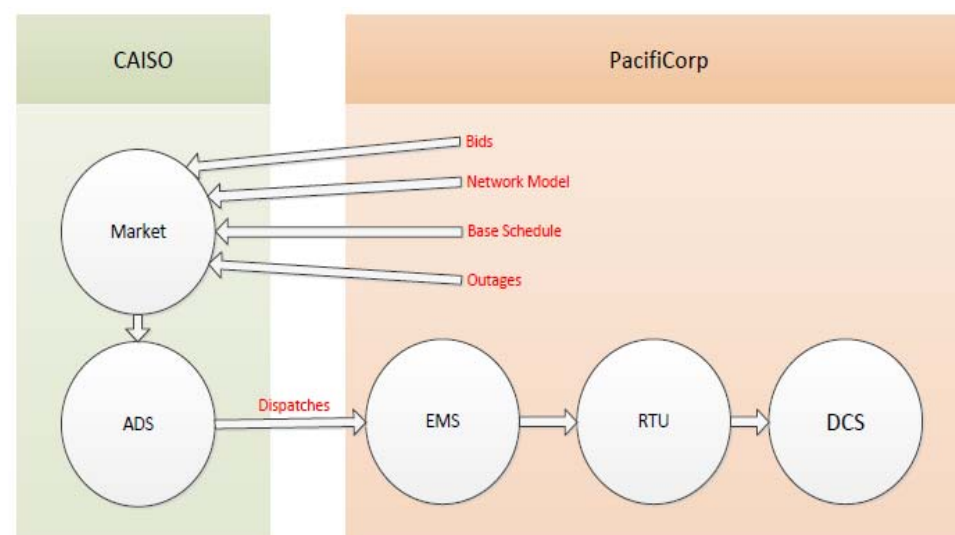
- Base Schedule Balancing Test
- Bid Capacity Range Test
- Flex Ramp Required Sufficiency Test



5

EIM Plant Dispatch

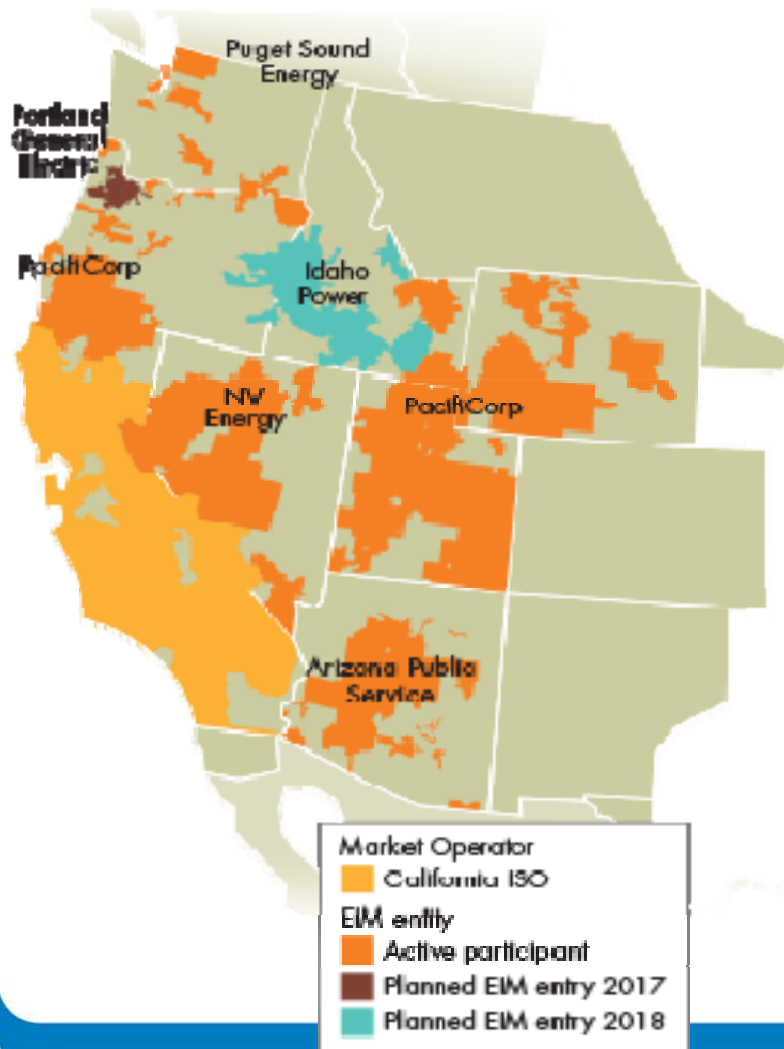
- Coordinating dispatches with plant operators
- Plant status feedback
- Data flow and generation control



Daily Bid Prices

- PacifiCorp is currently bidding in its thermal resources consistent with the DEB to accurately reflect the operating cost of its units
- Resource operating requirements for hydro facilities requires PacifiCorp to provide the market a correct price signal that can be at or below the DEB
 - During high run-off conditions PacifiCorp may submit a bid for the hydro resources that reflect a lower incremental cost and allow the resource to be dispatched first and decremented last in the PacifiCorp stack of resources
 - During periods of normal hydro operations PacifiCorp will maximize its hydro resource bid to the DEB price
- It is in the best interest of PacifiCorp to accurately reflect its cost of operations at each plant in order to achieve the most efficient market outcome in the reliable operation of the system.
- The ISO utilizes PacifiCorp's resource bids to create a "stack" of resources that is used by the market model to solve for a least-cost dispatch solution to meet demand

Energy Imbalance Market Expansion



- Arizona Public Service Company and Puget Sound Energy went live October 1, 2016
- Portland General Electric - Fall 2017
- Idaho Power - Spring 2018
- Entities exploring future entry
 - CENACE
 - Baja CA
 - Balancing Authority of Northern California (BANC)
 - Los Angeles Department of Water & Power (LADWP)
 - Seattle City Light (SCL)

EIM Benefits in the TAM



- EIM benefits reflected in the TAM continue to grow as the EIM expands with new entities

ISO EIM Benefit Calculation

- The California ISO utilizes a counter-factual analysis to calculate the EIM Benefits of each participant
 - The ISO estimates both intra and inter-regional EIM benefits in its analysis
- The intra-regional EIM benefit calculates what the costs would have been to serve load within each Balancing Area if the EIM did not exist
 - The ISO determines the load change within each area and utilizes the “stack” of resources within each area to determine what the dispatch would have been

EIM Benefits

- PacifiCorp calculates its EIM benefits based on the transfers that occur in the market and does not calculate the intra-regional benefits
 - All resources in the EIM footprint are put into a “stack” with highest cost resources at the top and lowest cost resources at the bottom. Dispatch of the stack of resources moves from bottom to top in order to serve demand at the lowest cost.
 - EIM Imports allow PacifiCorp to avoid dispatching more expensive resources
 - EIM Exports allow PacifiCorp to earn a margin on available capacity on its resources

EIM Stack and Dispatch Example

Day	hour	Interval	BAA	Price	Segment (MW)	Resource	Unit minimum (MW)	Unit maximum (MW)	Base Schedule (MW)	EIM Dispatch (MW)	Difference (MW)
1-Jul-15	16	6	ISO	\$80.0	200	California Resource	100	200	200	100	(100)
1-Jul-15	16	6	PACW	\$45.0	150	Yale	80	150	99	80	(19)
1-Jul-15	16	6	PACE	\$25.0	600	Lake Side 2	300	600	500	519	19
1-Jul-15	16	6	PACE	\$24.0	500	Current Creek	250	500	400	500	100

Total MW	1,199	1,199	-
Total Cost	\$3,546	\$3,048	(\$498)

- Illustrative example of one five-minute interval in the EIM where the load did not change from the base schedule of 1,199 MW to the EIM dispatch of 1,199 MW
- All resources in the EIM Footprint are re-dispatched within their operating constraints to produce the least-cost dispatch solution, taking into consideration transmission constraints, resource ramping constraints and reserve requirements

EIM Transfers

Day	hour	Interval	BAA	Price	Segment (MW)	Resource	Unit minimum (MW)	Unit maximum (MW)	Base Schedule (MW)	EIM Dispatch (MW)	Difference (MW)
1-Jul-15	16	6	ISO	\$80.0	200	California Resource	100	200	200	100	(100)
1-Jul-15	16	6	PACW	\$45.0	150	Yale	80	150	99	80	(19)
1-Jul-15	16	6	PACE	\$25.0	600	Lake Side 2	300	600	500	519	19
1-Jul-15	16	6	PACE	\$24.0	500	Current Creek	250	500	400	500	100

Total MW	1,199	1,199	-
Total Cost	\$3,546	\$3,048	(\$498)

- The above dispatch example shows that ISO resources decreased (net) in EIM 100 MW, PACW decreased 19 MW and PACE increased 119 MW
- Looking at resource dispatch that correspond with the changes in EIM, PACW transferred 100 MW to ISO and PACE transferred 119 MW to PACW so that all systems would have balanced

EIM Revenue Calculation of Transfer

- PacifiCorp uses the 15-minute (FMM) and 5-minute (rtd) prices and volumes to calculate the EIM Revenue of the transfer
- Using the previous slides EIM Dispatch example, the following table shows prices and transfers that correspond with the actual EIM dispatch

	PACE FMM	PACW FMM	CAISO FMM
Price	\$25.00	\$25.00	\$80.00
Transfer Volume	50	50	-50
Revenue	\$104.17	\$218.75	-\$218.75

	PACE rtd	PACW rtd	CAISO rtd
Price	\$25.00	\$25.00	\$80.00
Transfer Volume	69	50	-50
Revenue	\$143.75	\$218.75	-\$218.75

	PACE RTD	PACW RTD	CAISO RTD
Actual Transfer Volume	119	100	-100
Total Revenue	\$247.92	\$437.50	-\$437.50

$PACE\ FMM\ Revenue = ((\$25 + \$25)/2) * 50/12 = \$104.17$
 $PACW\ FMM\ Revenue = ((\$25 + \$80)/2) * 50/12 = \$218.75$
 $CAISO\ FMM\ Revenue = ((\$25 + \$80)/2) * -50/12 = -\218.75

$PACE\ FMM\ Revenue = ((\$25 + \$25)/2) * 69/12 = \$143.75$
 $PACW\ FMM\ Revenue = ((\$25 + \$80)/2) * 50/12 = \$218.75$
 $CAISO\ FMM\ Revenue = ((\$25 + \$80)/2) * -50/12 = -\218.75

$PACE\ RTD\ Revenue = \$104.17 + \$143.75 = \$247.92$
 $PACW\ RTD\ Revenue = \$218.75 + \$218.75 = \$437.5$
 $CAISO\ RTD\ Revenue = -\$218.75 + -\$218.75 = -\$437.5$

PacifiCorp EIM Dispatch Cost

- In the example provided PACW exported 100 MW to ISO and was paid \$437.50
- The cost to serve that export was the cost it paid to PACE for the transfer of 119 MW or \$247.92
- PACE costs to serve the 119 MW transfer was the 100 MW provided by Current Creek and 19 MW provided by Lake Side 2

Day	hour	Interval	BAA	Price	Segment (MW)	Resource	Unit minimum (MW)	Unit maximum (MW)	Base Schedule (MW)	EIM Transfer Dispatch (MW)	Transfer (MW)
1-Jul-15	16	6	PACE	\$25.0	600	Lake Side 2	300	600	500	519	19
1-Jul-15	16	6	PACE	\$24.0	500	Current Creek	250	500	400	500	100

Transfer MW 119
Transfer Cost \$2,875.00
Five-Minute Total Cost \$239.58

PacifiCorp EIM Benefit Calculation

- The transfer revenue that was calculated for PACW and PACE is added together and the dispatch Cost to facilitate the transfer is subtracted to calculate the marginal revenue or EIM benefit for the five-minute interval
- The benefit for the ISO was its avoided cost of \$80/MWh for 100 MW, or \$666.67, at a cost of only \$437.50
- The example also illustrated an intra-regional benefit of utilizing PACE resources to displace the Yale resource (19 MW)
 - The total EIM benefit (shown on slide 10) of \$498.00 was \$427.08 of inter-regional benefit and \$71.25 of intra-regional benefit

	Revenue	Cost	EIM Benefit
PACW	\$437.50	\$247.92	\$189.58
PACE	\$247.92	\$239.58	\$8.33
ISO	-\$437.50	\$666.67	\$229.17
Total	\$685.42	\$487.50	\$427.08

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,)	
)	
Complainant,)	
)	
v.)	DOCKET UE-152253
)	
PACIFIC POWER & LIGHT COMPANY,)	
)	
Respondent.)	
_____)	

**CONFIDENTIAL RESPONSE
TESTIMONY OF BRADLEY G. MULLINS**

ON BEHALF OF

BOISE WHITE PAPER, L.L.C.

**CONFIDENTIAL PER PROTECTIVE ORDER IN
WUTC DOCKET UE-152253**

(REDACTED VERSION)

March 17, 2016

1 period, consisting primarily of payroll and benefits expenses for various organizations
2 involved with power supply.^{47/} Because the Company's accounting records identify these
3 costs as General Office expense, I recommend that the expenses booked as such be
4 allocated using the SO factor, consistent with the WCA Manual.

5 **I. Cholla O&M**

6 **Q. WHAT IS YOUR ADJUSTMENT TO CHOLLA O&M?**

7 A. The Company's revenue requirement proposal contains a credit of \$97,000 related to
8 O&M expense at the Cholla power facility in Arizona. In response to Boise Data
9 Request 054, the Company indicated that this credit was incorrectly allocated to
10 Washington rates.^{48/} Removing this credit results in an increase to revenue requirement
11 of \$0.1 million.

12 **J. EIM Costs**

13 **Q. WHAT IS YOUR RECOMMENDATION RELATED TO EIM COSTS?**

14 A. In the Company's 2014 GRC, the Commission declined to include any of the costs or
15 benefits associated with the Company's ongoing participation in the EIM with the
16 CAISO.^{49/} In this case the Company has proposed to include the costs associated with
17 participation in the EIM. Yet, because base net power costs will not be updated,
18 customers will not receive any benefit from the sub-hourly market in base rates. Rather,
19 the benefits will flow through the PCAM, subject to its various design elements.

^{47/} The underlying accounting data have been provided in Mr. Mullins' confidential workpapers.

^{48/} Exh. No. BGM-5C at 20 (the Company's Response to Boise DR 054).

^{49/} Dockets UE-140762 *et al.*, Order 08 at ¶ 89.

1 Accordingly, consistent with the matching principle, I propose to remove the costs
2 associated with the EIM from base rates, to be recovered through the PCAM, subject to
3 its various design elements.

4 **Q. WHY IS THIS RATEMAKING APPROPRIATE?**

5 A. I believe that it would violate the matching principle to include the costs associated with
6 the EIM in base rates, while excluding the corresponding EIM benefits from base net
7 power costs. When asked about this, the Company stated that it disagreed that the
8 matching principle will be violated because “energy imbalance market (EIM) benefits
9 will flow through the Company’s net power costs (NPC) and will be reflected in the
10 annual power cost adjustment mechanism (PCAM) filings.”^{50/} I agree. In order to be
11 fair, however, I recommend that the costs also be passed through the PCAM.

12 **Q. HOW MUCH BENEFIT HAS THE COMPANY RECOGNIZED AS A RESULT**
13 **OF ITS PARTICIPATION IN THE EIM?**

14 A. As detailed in Table 5, below, over calendar year 2015 the Company was attributed
15 approximately \$26.2 million in benefits related to the EIM. Table 5 details the quarterly
16 benefits associated with the market, calculated by the CAISO in the respective quarterly
17 benefits reports.

^{50/} Exh. No. BGM-5C at 10 (the Company’s Response to Boise DR 014).

Table 5
Actual 2015 EIM Benefits per EIM Quarterly Benefits Report (\$millions)
Available at: <https://www.caiso.com/informed/Pages/EIMOverview/Default.aspx>

Q1	\$ 3.82
Q2	7.72
Q3	8.52
Q4	6.17
Total	\$ 26.23

1 These benefits are notwithstanding the Company’s claim in the 2014 GRC that
2 EIM costs and benefits were not yet sufficiently known and measurable to include in this
3 filing.^{51/} Yet, using a simplified rolled-in allocation based on an SG factor, these benefits
4 amount to approximately \$2.2 million in benefits attributable to Washington.^{52/}

5 **Q. HOW MUCH REVENUE REQUIREMENT ASSOCIATED WITH EIM IS**
6 **REFLECTED IN THE TEST PERIOD?**

7 A. Based on its response to Boise Data Request 016, the Company has booked
8 approximately \$16.2 million in EIM related capital costs, on a total-company basis.^{53/}
9 Based on its response to Boise Data Request 017, the Company has booked
10 approximately \$1.8 million in EIM-related O&M expenses on a total-company basis.^{54/}
11 These expenditures amount to approximately \$0.4 million of Washington revenue
12 requirement reflected in the Company’s filing related to the EIM.

^{51/} Dockets UE-140762 *et al.*, Exh. No. GND-1CT at 7:7-9.
^{52/} Allocated to Washington using an 8.2% SG Factor.
^{53/} Exh. No. BGM-5C at 11-12 (the Company’s Response to Boise DR 016).
^{54/} Id. at 13-14 (the Company’s Response to Boise DR 017).

1 **Q. WHAT IS YOUR RECOMMENDATION WITH THESE COSTS?**

2 A. I recommend that this \$0.43 million of revenue requirement be removed from base rates
3 and recovered through the PCAM mechanism, subject to the various PCAM design
4 elements. In the alternative, I would support a reduction to base net power costs in the
5 amount of \$2.2 million, to reflect the benefits discussed above.

6 **K. Hydro Deferral Balance**

7 **Q. WHAT IS YOUR RECOMMENDATION RELATED TO THE RESIDUAL**
8 **BALANCE IN THE COMPANY'S HYDRO DEFERRAL ACCOUNT?**

9 A. In response to Boise Data Request 019, the Company indicated that there is an
10 approximate \$132,174 credit balance in the hydro deferral account approved by the
11 Commission in Docket UE-080220.^{55/} In response to Boise Data Request 048, the
12 Company indicated that this credit balance was the result of the Company over-collecting
13 the deferral balance.^{56/} In Response to Boise Data Request 049, the Company indicated
14 that it would not oppose refunding the credit balance to customers.^{57/}

15 **Q WHAT DO YOU PROPOSE?**

16 A. I propose that the Company apply the credit balance as a reduction to the rate increase
17 proposed in this proceeding. Refunding this balance through revenue requirement results
18 in an approximate \$0.1 million reduction to Washington revenue requirement.

^{55/} Id. at 15-16 (the Company's Response to Boise DR 019).

^{56/} Id. at 18 (the Company's Response to Boise DR 048).

^{57/} Id. at 19 (the Company's Response to Boise DR 049).