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**VIA ELECTRONIC FILING**

Attention: Filing Center  
Public Utility Commission of Oregon  
201 High Street SE, Suite 100  
P.O. Box 1088  
Salem, Oregon 97308-1088

**Re: Docket UM 1829 – In the Matter of Blue Marmot V LLC vs Portland General Electric Company**

Attention Filing Center:

Attached for filing in the above-captioned docket is Portland General Electric Company's Supplemental Testimony and Exhibit of Aaron Rodehorst and Geoffrey Moore (PGE/700-701).

Please contact this office with any questions.

Sincerely,

Alisha Till  
Legal Assistant

Attachment

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

**UM 1829**

Blue Marmot V LLC  
Blue Marmot VI LLC  
Blue Marmot VII LLC  
Blue Marmot VIII LLC  
Blue Marmot IX LLC,

Complainants,

v.

Portland General Electric Company,

Defendant.

**PORTLAND GENERAL ELECTRIC COMPANY  
SUPPLEMENTAL TESTIMONY OF  
AARON RODEHORST AND GEOFFREY MOORE**

**October 16, 2018**

## INTRODUCTION AND SUMMARY

1 **Q. Please state your names.**

2 A. Our names are Aaron Rodehorst and Geoffrey Moore.

3 **Q. Have you previously filed testimony in this case?**

4 A. Yes. Mr. Rodehorst previously filed Response Testimony addressing the Western Energy  
5 Imbalance Market (EIM) on behalf of Portland General Electric Company (PGE) on  
6 January 12, 2018 (hereinafter EIM Response Testimony).<sup>1</sup> Mr. Moore previously filed  
7 Response Testimony addressing policy issues on January 12, 2018 (hereinafter Policy  
8 Response Testimony).<sup>2</sup> In addition, Mr. Rodehorst and Mr. Moore filed Surrebuttal  
9 Testimony addressing the EIM (hereinafter EIM Surrebuttal Testimony) on August 30,  
10 2018.<sup>3</sup>

11 **Q. What is the purpose of your Supplemental Testimony?**

12 A. The purpose of our Supplemental Testimony is limited to responding to the new study  
13 presented in the Sur-Surrebuttal Testimony of Keegan Moyer, filed on September 18,  
14 2018.<sup>4</sup>

15 **Q. Please summarize your testimony.**

16 A. For the first time in his Sur-Surrebuttal Testimony, Mr. Moyer sought to quantify the  
17 impact to PGE's EIM benefits of displacing EIM transfers to accommodate delivery of the  
18 Blue Marmots' output via the interface between PacifiCorp and PGE (the PACW-PGE  
19 interface). Mr. Moyer's new analysis purports to demonstrate that PGE's EIM benefits  
20 will be only minimally affected if PGE uses 50 MW of transmission capacity reserved for

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<sup>1</sup> PGE/200.

<sup>2</sup> PGE/100.

<sup>3</sup> PGE/500.

<sup>4</sup> Blue Marmot/500.

1 EIM participation to accommodate delivery of the Blue Marmots’ output during those  
2 times when the Blue Marmots’ solar qualifying facilities (QFs) are generating. Our  
3 Supplemental Testimony discusses the fundamental flaws in Mr. Moyer’s analysis, which  
4 cause him to underestimate the potential impacts to PGE’s EIM benefits and render his  
5 conclusion invalid.

6 First, we explain that the impact of accepting QF output on PGE’s EIM benefits in  
7 the coming decades cannot be quantified accurately based solely on the first 12 months of  
8 PGE’s EIM operations. It is unreasonable to expect that the level and pattern of PGE’s  
9 EIM transfers will remain constant in the future, and therefore any estimate based solely  
10 on the first year of EIM operations is of little relevance to quantifying future impacts.

11 Next, we explain that, even if it were appropriate to attempt to quantify the impacts  
12 at this time, Mr. Moyer’s approach is undermined by two significant and invalid  
13 assumptions: that EIM transfers will remain unchanged in the future, and that the Blue  
14 Marmots will be the only QFs delivering via the PACW-PGE interface if they prevail in  
15 this case. In reality, we expect that the level and number of EIM transfers will increase  
16 over time. We also anticipate that, if the Commission allows the Blue Marmots to deliver  
17 via the PACW-PGE interface, then PGE will be forced to accept *at least* 117 MW of QF  
18 output at that same location, and potentially more.

19 Our testimony then turns to a more in-depth and technical review of Mr. Moyer’s  
20 analysis. Specifically, we describe the impact of: (1) correcting unreasonable rounding  
21 assumptions regarding QF schedules; (2) incorporating the September transfer data that  
22 was not available when Mr. Moyer filed his testimony; and (3) adding lost transfers from  
23 the winter season that Mr. Moyer excluded from consideration in his analysis. We also

1 explain that both of Mr. Moyer’s methodologies used to estimate the value of the lost  
2 transfers are flawed, and PGE’s more accurate methodology yields a result near the high  
3 end of Mr. Moyer’s estimated range. And finally, we note that Mr. Moyer relies upon an  
4 estimate of PGE’s overall EIM benefits that is much too high.

5 At the conclusion of our testimony, in an effort to present a more complete picture  
6 of the potential impacts of QF deliveries on EIM benefits in the future, we describe a  
7 supplementary analysis in which we increase EIM transfers by 20% and examine a range  
8 of QF-delivery amounts. Our scenarios of increased QF delivery at the PACW-PGE  
9 interface and increased EIM transfers demonstrate that the potential impact of QFs on  
10 PGE’s EIM benefits is significant—ranging from a detriment of approximately \$290,000  
11 to \$2.2 million *annually*.

12 In sum, if the Commission accepts the validity of efforts to quantify the impacts to  
13 EIM benefits at this early stage, it should find the potential impact of QF deliveries to be  
14 much greater than Mr. Moyer asserts. And if the Commission determines that PGE must  
15 give up EIM-dedicated transmission to QFs, the EIM benefits anticipated by PGE’s  
16 customers are likely to diminish significantly—thereby harming PGE’s customers.

### CRITIQUE OF MR. MOYER’S ANALYSIS

17 **Q. Please briefly summarize Mr. Moyer’s transfer and benefit analysis.**

18 A. Mr. Moyer acknowledges that QF deliveries and EIM transfers cannot use the same  
19 transmission capacity in the same hour.<sup>5</sup> Therefore, he first compared the Blue Marmots’  
20 solar generation profile with EIM transfers occurring from October 1, 2017, when PGE  
21 joined the EIM, through August 31, 2018, to determine the amount by which EIM transfers

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<sup>5</sup> Blue Marmot/500, Moyer/19.

1 occurring in the summer season would have been diminished if PGE had used capacity  
2 currently dedicated to the EIM to accept the Blue Marmots' delivery.<sup>6</sup> Once he arrived at  
3 the amount by which he believes EIM transfers would have been reduced, he used two  
4 different methodologies to estimate the value of the EIM transfers lost—which he  
5 concluded to be either \$5 or \$13/MWh.<sup>7</sup> He then compared his estimate of the total value  
6 of transfers that would have been lost during the first year of EIM participation to the value  
7 of PGE's EIM benefits, as reported by the California Independent System Operator  
8 (CAISO), to arrive at his conclusion that benefits would decrease by approximately 1%.

9 **Q. Please summarize your criticisms of Mr. Moyer's analysis.**

10 A. We have several criticisms of Mr. Moyer's analysis, all of which support our view that he  
11 has significantly underestimated the potential impacts to PGE's EIM benefits. *First*, Mr.  
12 Moyer's analysis is not relevant, because PGE is very early in its EIM participation and  
13 there are insufficient data available to meaningfully estimate the impacts to benefits.  
14 *Second*, Mr. Moyer's analysis incorporates two major invalid assumptions. Specifically,  
15 he erroneously assumes that EIM transfer levels will stay the same in the future, and he  
16 also assumes that if the Blue Marmots are delivering to the PACW-PGE interface, they are  
17 the only QFs who will have the right to do so. *Third*, Mr. Moyer's results are further  
18 undermined by his failure to account for transfers lost in the winter and to make realistic  
19 assumptions about QF scheduling practices. *Fourth*, neither of the methodologies Mr.  
20 Moyer uses to estimate the value of transfers lost is valid. *And finally*, Mr. Moyer's  
21 reliance on the CAISO's total benefits estimate is misplaced, because the CAISO

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<sup>6</sup> Blue Marmot/500, Moyer/30-32.

<sup>7</sup> Blue Marmot/500, Moyer/35-36.

1 significantly overstates PGE’s EIM benefits.

2 **1. Insufficient Data for a Meaningful Estimate**

3 **Q. Please explain your first criticism—that Mr. Moyer’s attempt to quantify the benefits**  
4 **that would be lost is premature and based on insufficient data.**

5 A. Mr. Moyer’s analysis is based on transfers that occurred during the first 11 months of  
6 PGE’s EIM participation.<sup>8</sup> PGE strongly disagrees that any meaningful estimate regarding  
7 the Blue Marmots’ impact on PGE’s EIM operations over the coming decades can be  
8 calculated based on such limited and preliminary data. PGE is very early in its EIM  
9 operations, and we expect EIM transfers to increase in the future.

10 **Q. Why does PGE expect that transfers will increase in the future?**

11 A. There are two primary reasons. First, in general PGE expects EIM transfers to increase as  
12 more entities join the EIM. Currently, five new entities plan to join over the next three  
13 years,<sup>9</sup> and several other utilities—including the Bonneville Power Administration, Avista  
14 Corporation, and NorthWestern Energy—are exploring joining in the future.<sup>10</sup> Second,  
15 PGE expects that an increasing presence of renewable resources both in PGE’s Balancing

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<sup>8</sup> Blue Marmot/500, Moyer/30.

<sup>9</sup> The five entities are: Balancing Authority of Northern California/Sacramento Municipal Utility District (2019), Seattle City Light (2020), Salt River Project (2020), Los Angeles Department of Water & Power (2020), and Public Service Company of New Mexico (2021). Western Energy Imbalance Market, “Join EIM”, <https://www.westerneim.com/Pages/JoinEIM.aspx>.

<sup>10</sup> Bonneville Power Administration, Presentation for EIM Stakeholder Meeting at 9 (Oct. 11, 2018), <https://www.bpa.gov/Projects/Initiatives/EIM/Doc/20181011-October-11-2018-EIM-Stakeholder-Mtg.pdf> (reflecting “EIM Go Live” in 2022); *In the Matter of the Joint Application of Hydro One Ltd. and Avista Corp. for an Order Authorizing Proposed Transaction*, Docket U-170970, Joint Testimony in Support of Settlement Stipulation at 29 (June 21, 2018) (“Commitment 59 in the Settlement . . . commits Avista to hold workshops with the Commission and interested stakeholders to review the EIM analysis it will release by the end of 2018 and to discuss prudent next steps.”); *NorthWestern Resource Plan Update* at 4 (July 2018) [http://www.northwesternenergy.com/docs/default-source/documents/etac/2018/etac\\_07-2018-ascend.pdf](http://www.northwesternenergy.com/docs/default-source/documents/etac/2018/etac_07-2018-ascend.pdf) (“NWE will likely participate in the EIM in the next 5 years”).

1 Authority Area (BAA) and in other EIM BAAs will result in more transfers. All else being  
2 equal, more renewable resources should increase the variability in sub-hourly imbalance  
3 that the EIM will respond to, and the increased variability should result in increased  
4 transfers—so long as sufficient transfer capability is available.

5 **Q. Are you suggesting that PGE is holding open the full capacity of the PACW-PGE**  
6 **interface just in case the capacity is needed for EIM transfers in the future?**

7 A. No, certainly not. As an initial matter, our prior testimony explained that PGE already is  
8 making regular use of the path's full capacity for transfers.<sup>11</sup> And, customers are already  
9 realizing benefits from the use of the path's full capacity for the EIM. However, the point  
10 we are trying to make is that it is too early for the Commission to determine precisely how  
11 much of the path's capacity will be used for EIM transfers in the coming years and at what  
12 times, and similarly it is too early for the Commission to determine precisely what level of  
13 benefits will be lost if the Company is required to use that capacity to accommodate the  
14 Blue Marmots' output—and the output of other QFs as well. Moreover, the stakes of  
15 attempting to make this determination at this early date are high. Any decision to require  
16 PGE to give up EIM capacity to QFs will impact EIM benefits for many years to come.

17 **2. Two Major Invalid Assumptions**

18 **Q. Please explain your second criticism—that Mr. Moyer makes two significant, invalid**  
19 **assumptions.**

20 A. Mr. Moyer makes two important and incorrect assumptions that cause him to significantly  
21 underestimate the potential impacts to PGE's EIM benefits. First, by basing his analysis  
22 on PGE's first year of EIM participation alone, Mr. Moyer incorrectly assumes that the

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<sup>11</sup> PGE/500, Rodehorst-Moore/8-10.



1 level of EIM transfers will not change in the future. However, as we explained above, PGE  
2 expects that EIM transfers are likely to increase in the coming years. And as transfers  
3 increase, the impact to benefits can also be expected to increase.

4 Second, Mr. Moyer assumes that the 50-MW Blue Marmots will be the only QFs  
5 that ever deliver via the PACW-PGE interface. In reality, if the Commission determines  
6 that the Blue Marmots may use EIM-dedicated capacity to deliver, then *at a minimum*,  
7 PGE will have to give up a total of 117 MW of EIM capacity. As explained in Mr. Greene’s  
8 testimony,<sup>12</sup> prior to learning of the constraint at the PACW-PGE interface, PGE already  
9 had executed contracts with three QFs—with a combined capacity of 67 MW—that wish  
10 to deliver their output via the PACW-PGE interface. Since that time, the Company has  
11 received other requests from QFs that also wish to do the same. Therefore, if the Blue  
12 Marmots’ position is accepted in this case, PGE will lose much more than just 50 MW of  
13 capacity, and therefore it is unreasonable to base impact estimates on the assumption that  
14 only the Blue Marmots will deliver.

15 We will examine the extent to which increased transfers and increased amounts of  
16 QF deliveries could affect PGE’s EIM benefits later in our testimony.

17 **3. Other Unrealistic Assumptions and Exclusion of Relevant Data**

18 **Q. Before explaining your next criticisms and their impacts, can you confirm that you**  
19 **were initially able to replicate Mr. Moyer’s results?**

20 **A.** Yes. We reviewed Mr. Moyer’s analysis and were able to reproduce his results for the  
21 transfer value lost from October 2017 through August 2018 using data available from the

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<sup>12</sup> PGE/100, Greene-Moore/13-14; PGE/400, Greene/21.

1 CAISO and Mr. Moyer's workpapers.

2 **Q. As you revised Mr. Moyer's analysis to determine the impact of your critiques, did**  
3 **you use the same methodology as Mr. Moyer?**

4 A. Generally speaking, yes. We first determined the quantity of transfers lost, and then  
5 multiplied that quantity by Mr. Moyer's estimated value of \$13/MWh of transfers lost. As  
6 we will explain in more depth in the next subsection of our testimony, Mr. Moyer's  
7 methodology resulting in the \$13/MWh estimate is flawed, because it is based upon the  
8 CAISO's benefits reports,<sup>13</sup> which overestimate PGE's EIM benefits. However, because  
9 our estimated value of \$11/MWh is not significantly different from Mr. Moyer's, and for  
10 the sake of making comparisons to Mr. Moyer's results, we will use Mr. Moyer's  
11 \$13/MWh estimate as we explain our corrections and changes to his analysis.

12 As we reproduce, update, and revise Mr. Moyer's analysis, we assign the \$13/MWh  
13 value to only the 15-minute market transfer data for simplicity. In contrast, Mr. Moyer  
14 assigns value to the approximate average of the 5- and 15-minute markets.<sup>14</sup> Although we  
15 assign value to slightly different quantities of transfers lost than Mr. Moyer does,<sup>15</sup> the  
16 differences are not material to the outcomes of our analysis. In essence, both PGE and  
17 Mr. Moyer are using simplified methods that account for *total* quantities of transfers lost,  
18 but effectively ignore the actual value of *incremental* changes in the lost-transfer quantity  
19 that occur in the 5-minute market.<sup>16</sup> While we acknowledge that there is monetary value

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<sup>13</sup> Blue Marmot/500, Moyer/35.

<sup>14</sup> Blue Marmot/500, Moyer/35 n.23.

<sup>15</sup> While Mr. Moyer used 4,500 MWh (i.e., an approximate average of 4,913 MWh in the 15-minute market and 4,378 MWh in the 5-minute market), PGE is using 4,913 MWh as the quantity of transfers lost, prior to any of PGE's updates or revisions to the transfer analysis.

<sup>16</sup> For example, if the quantity of transfers lost in the 15-minute market was 100 MW and the related quantity in the 5-minute market was 105 MW, PGE's method would assume 100 MW was lost, while Mr. Moyer's method would

1 in the 5-minute market, the 15-minute market displaces more PGE generation, and  
2 therefore more EIM benefit is derived from the 15-minute market. Moreover, our approach  
3 of focusing the analytical examples on the 15-minute market is consistent with both our  
4 own and Mr. Moyer's approaches throughout this proceeding.

5 **Q. Please explain your third criticism—that Mr. Moyer failed to make realistic**  
6 **assumptions regarding scheduling practices and excluded relevant data.**

7 A. In quantifying the amount of EIM transfers the Blue Marmots would displace, Mr. Moyer  
8 determined the Blue Marmots' schedules by applying standard rounding practices to their  
9 estimated generation, instead of consistently rounding up, and Mr. Moyer's approach is not  
10 representative of realistic scheduling practices. He also neglected to account for transfers  
11 lost in the winter and was unable to incorporate data for September that was not available  
12 when he filed his testimony.

13 **Q. Please describe Mr. Moyer's rounding approach and explain why it is unrealistic.**

14 A. To account for the fact that transmission scheduling occurs in whole MWs only, Mr. Moyer  
15 applied standard rounding practices when the Blue Marmots were projected to generate a  
16 fraction of a MW. As an example, if the Blue Marmots were projected to generate 40.4  
17 MW, Mr. Moyer rounded their projected schedule to 40 MW, and if they were expected to  
18 generate 40.5 MW, he rounded their schedule up to 41 MW. However, this is not how we  
19 would expect QFs to schedule, because it would cause them to be unable to deliver a

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assume 102.5 MW was lost. The *actual* incremental loss would have been 5 MW (105 – 100). And the total value of the transfers lost could be approximated by multiplying the 100-MW loss by margins based on 15-minute market settlement data and multiplying the 5-MW loss by margins based on 5-minute market settlement data. Neither PGE's nor Mr. Moyer's method seeks to capture the lost 5-MW quantity, or to price it with the 5-minute market settlement data that would have been applicable to the incremental transfer. In other words, neither method is identifying the value of the actual 5-minute market transfer that is *incremental* to the 15-minute market.

1 fraction of their output. Instead, we would expect QFs to always round up, and so we  
2 changed the schedule data to round up to the nearest whole MW. This change resulted in  
3 a small increase in the value of 15-minute-market transfers that would have been lost  
4 between October 2017 and August 2018 to \$63,904.

5 **Q. Do you expect QFs to schedule to within one MW of their actual generation?**

6 A. No, as we explained in our Surrebuttal Testimony, QFs are economically incented to  
7 schedule in excess of their expected generation to ensure they are able to receive the  
8 maximum contract price for any amount generated.<sup>17</sup> However, for purposes of this  
9 analysis, to produce results that can be compared with Mr. Moyer's, we have not attempted  
10 to account for this practice.

11 Nevertheless, it is important to keep QFs' scheduling incentives in mind when  
12 evaluating the effects of accepting QF output, because if QFs over-schedule as PGE  
13 expects, their impact on benefits would increase accordingly. In other words, PGE believes  
14 that both Mr. Moyer's and PGE's benefits analyses are conservative because they assume  
15 the Blue Marmots and other QFs will schedule with perfect accuracy and will not over-  
16 schedule.

17 **Q. Please describe the benefit impact of incorporating the data from September that was  
18 not available when Mr. Moyer conducted his analysis.**

19 A. When Mr. Moyer filed his testimony, he only had access to transfer data through August,  
20 and so he estimated the total annual impact to be \$63,000 by extrapolating from 11 months

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<sup>17</sup> PGE/500, Rodehorst-Moore/13-14.

1 of data.<sup>18</sup> We now have access to September transfer data,<sup>19</sup> which we incorporated into  
2 our analysis. Our results show that Mr. Moyer underestimated the total annual impact of  
3 accepting the Blue Marmots' output during the first year of EIM operations, and that the  
4 reduction in benefits, using actual September data, would have been \$85,969.

5 **Q. You criticize Mr. Moyer for failing to consider transfers lost during the winter season.**  
6 **Why is it necessary to include the impact of winter transfers lost?**

7 A. Mr. Moyer's approach of looking only at summer transfer data<sup>20</sup> incorrectly underestimates  
8 the impact to EIM transfers, because the Blue Marmots are expected to generate year-  
9 round. Although the path's transfer capability is higher in the winter, the Blue Marmots'  
10 generation would still displace some transfers during this time.

11 **Q. Have you calculated the impact on Mr. Moyer's analysis of correcting the rounding**  
12 **approach, adding September data, and including winter transfers?**

13 A. Yes. Correcting these two flaws and adding actual September transfer data yields an  
14 increased estimate of lost EIM benefits. Specifically, if the rounding approach is corrected,  
15 and data for September and the winter season are added, Mr. Moyer's analysis yields an  
16 estimate of lost EIM benefits of \$89,790 for the first year of PGE's EIM operations alone.  
17 However, it is important to emphasize that the Blue Marmots' draft PPAs are for 18-year  
18 terms.<sup>21</sup> Therefore, even accepting Mr. Moyer's analysis framework and assumptions, the  
19 total impact to customers of accepting the Blue Marmots' deliveries via the PACW-PGE

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<sup>18</sup> Blue Marmot/500, Moyer/36.

<sup>19</sup> PGE notes that for a portion of September, an outage caused the path to be de-rated to 159 MW. The de-rate likely increased the benefit impact of accepting the Blue Marmots' output in September, because only 109 MW of transfer capability were available for EIM transfers in all hours. De-rates similar to this one will happen in the future, from time to time, for maintenance and other types of recurring work.

<sup>20</sup> Blue Marmot/500, Moyer/31.

<sup>21</sup> See, e.g., Blue Marmot/201, Talbott/12 ("This Agreement shall terminate on 18 years after effective date . . .").

1 interface would be many times the annual value—even if the EIM activity experienced  
2 during PGE’s first year of participation continued unchanged in the future and no other  
3 QFs, existing or otherwise, elected to deliver via the PACW-PGE interface.

4 **4. Invalid Valuation Methodologies**

5 **Q. Please explain your fourth criticism—that Mr. Moyer’s methodologies for valuing**  
6 **transfers lost are both incorrect.**

7 A. Mr. Moyer uses two different methodologies to estimate the value of a MWh of transfers  
8 lost. One methodology yielded \$5/MWh and the other yielded \$13/MWh. We believe that  
9 both of Mr. Moyer’s methodologies are incorrect. However, because our own valuation  
10 estimate is similar to the high end of Mr. Moyer’s range, we present results based upon the  
11 \$13/MWh value throughout our testimony, so that our numbers can be easily compared to  
12 Mr. Moyer’s results. Exhibit 701 shows how the values we discuss in our testimony would  
13 change using our estimate.

14 **Q. Please explain why you disagree with Mr. Moyer’s estimate of \$5/MWh for the value**  
15 **of lost imports.**

16 A. Mr. Moyer’s \$5/MWh estimate is based on “shadow price” data.<sup>22</sup> The CAISO tariff  
17 defines a shadow price as “the marginal value of relieving a particular constraint.”<sup>23</sup> In  
18 other words, the shadow price represents the value of relaxing a constraint (e.g., the  
19 transmission path rating) when the market determines that limit is “binding.” In the case  
20 of EIM transfers, the shadow price is *not* the price of the imbalance energy transferred.  
21 Instead, shadow prices represent the value of the next incremental MW of transfer

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<sup>22</sup> Blue Marmot/500, Moyer/35-36.

<sup>23</sup> Cal. Ind. Sys. Operator Corp., Fifth Replacement Electronic Tariff, App’x A Master Definition Supplement at 141, [https://www.caiso.com/Documents/AppendixA\\_Definitions\\_Aug1\\_2014.pdf](https://www.caiso.com/Documents/AppendixA_Definitions_Aug1_2014.pdf).

1 capability *only when transfers are occurring at the transfer limit*. According to Mr.  
2 Moyer's workpapers, shadow prices were non-zero in only 65 out of a total of 128,058  
3 market intervals during the period Mr. Moyer analyzed.

4 In essence, Mr. Moyer's methodology assumes that EIM transfers have value only  
5 when transfers are occurring at the path's limit and the EIM desires to transfer additional  
6 energy via that path. As Mr. Moyer frequently emphasizes,<sup>24</sup> this is not always the case.  
7 Because Mr. Moyer has not applied the shadow-price concept correctly, his methodology  
8 and the resulting \$5/MWh estimate should be rejected out of hand.

9 **Q. Please explain why you disagree with Mr. Moyer's estimate of \$13/MWh for the value**  
10 **of lost imports.**

11 A. Mr. Moyer's methodology resulting in the \$13/MWh estimate is flawed, because it is based  
12 upon the CAISO's benefits reports,<sup>25</sup> which overestimate PGE's EIM benefits.

13 **Q. Please explain why the benefits reported by the CAISO are overstated.**

14 A. The values reported in the CAISO EIM benefits reports are not actual benefits accrued by  
15 PGE nor do they reflect the benefits attributed to EIM in PGE's ratemaking processes.  
16 PGE has identified several key categories of assumptions that can lead to an overestimation  
17 of benefits in the CAISO report. While not an exhaustive list, examples of these categories  
18 include:

19 **Production Costs:** The CAISO method assumes that PGE's bids always reflect its  
20 costs. However, there are instances where PGE's bids are not PGE's costs, and our internal  
21 assessment can account for these differences.

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<sup>24</sup> Blue Marmot/400, Moyer/22-23; Blue Marmot/500, Moyer/34.

<sup>25</sup> Blue Marmot/500, Moyer/35.

1           **Generator Instructions:** The CAISO method assumes that a generator always  
2 follows the instructions issued by the market (i.e. instructions to increase or decrease  
3 output). In practice, generators do not always follow the market’s instructions, and this  
4 often results in a cost not captured by the CAISO method.

5           **Slack Variables:** Because the CAISO is measuring EIM results relative to a  
6 “counterfactual” (i.e., a modeled view of PGE’s BAA without the EIM), the CAISO must  
7 make assumptions about prices when the model exhausts the generation needed to meet  
8 PGE’s imbalance energy in the “counterfactual” case. These assumptions often prove to  
9 be inaccurate.

10           For example, the CAISO model accounts for only those resources that are  
11 scheduled in the market; if PGE does not schedule a peaking resource to dispatch, the  
12 “counterfactual” case does not consider it. Therefore, when generation is needed for  
13 imbalance purposes, instead of starting a peaking resource as PGE would often do in  
14 reality, the CAISO model assumes that PGE’s highest bid in the market is always the cost  
15 of the remaining generation required.<sup>26</sup> The CAISO’s incorrect assumption about the  
16 imbalance energy price in the “counterfactual” makes the “counterfactual” cost artificially  
17 higher, resulting in a higher reported benefit of EIM participation. This “slack variable,”  
18 which is a model construct limited to the CAISO report, is triggered more frequently than  
19 PGE originally anticipated, and it is one of the key assumptions that PGE has advocated  
20 the CAISO should change in order to more accurately represent EIM benefits.

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<sup>26</sup> PGE’s highest bids in the market can be greater than the cost of one of its peaking resources, particularly if PGE is using bids to manage energy-limited resources.



1 **Q. What value for the EIM transfers lost does PGE believe is correct, and how did you**  
2 **arrive at this number?**

3 A. PGE believes \$11/MWh is a more accurate estimate of the value of transfers that would  
4 have been lost in the first year of the EIM's operations if PGE had given up 50 MW of  
5 capacity on the PACW-PGE path to a 50-MW solar QF such as the Blue Marmots. PGE  
6 arrived at this number by using a software tool (i.e., PCI P&L Analyzer) to compile CAISO  
7 settlement data (i.e., the charges and credits that apply to PGE's participation in the EIM)  
8 and compare the CAISO settlement data to the costs of the associated incremental  
9 generation that PGE either incurs or avoids to produce an assessment of actual benefits.  
10 To derive the \$11/MWh, PGE calculated the implied margin specific to generator  
11 movement in the 15-minute market. From October through August, the margin has been  
12 as small as approximately \$3/MWh and as large as approximately \$22/MWh. The margin,  
13 weighted by volume, is approximately \$11/MWh.

14 **5. Incorrect Total Benefits**

15 **Q. Please explain your fifth criticism—that Mr. Moyer's conclusion regarding the**  
16 **percent impact is wrong because he relies upon the CAISO's reported benefits.**

17 A. Mr. Moyer calculates the percent impact to PGE's EIM benefits using the CAISO's  
18 estimate of PGE's total EIM benefits, which is significantly higher than both PGE's  
19 estimated and actual EIM benefits. We would note that, in the past, the Commission has  
20 supported a utility's use of an actual-results benefit methodology, rather than relying on  
21 the CAISO's reported benefits.<sup>27</sup>

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<sup>27</sup> *In the Matter of PacifiCorp, dba Pacific Power, 2017 Transition Adjustment Mechanism*, Docket No. UE 307, Order No. 16-482 at 14-16 (Dec. 20, 2016).

1 **Q. What are PGE’s estimated and actual EIM benefits to date?**

2 A. Currently, PGE has actual settlement data available from October 2017 through August  
3 2018.<sup>28</sup> For these months, the total EIM benefit attributable to generator movement is \$5.7  
4 million. For rates effective January 1, 2019, PGE attributed a gross benefit of  
5 approximately \$5 million.<sup>29</sup>

6 **Q. Have you calculated the percent of these benefits that would have been lost in the first**  
7 **year of operation, based on your revisions to Mr. Moyer’s benefit analysis?**

8 A. Yes, based on PGE’s corrected benefit-impact estimate of \$89,790 and a total-benefit  
9 estimate of \$5 million, 2% of EIM benefits would have been lost in the first year had PGE  
10 been accepting the Blue Marmots’ deliveries during that time. However, PGE’s customers  
11 will be harmed if any benefits they anticipate are lost, regardless of the percentage those  
12 benefits represent. And, as we have discussed, both Mr. Moyer’s and PGE’s impact  
13 estimates are relevant only if PGE’s EIM transfers remain unchanged in the future and the  
14 Blue Marmots are the only QFs delivering. Both scenarios are highly unlikely.

#### **IMPACTS TO BENEFITS OF ADDITIONAL QFS AND INCREASED TRANSFERS**

15 **Q. Please provide context for your supplement to Mr. Moyer’s analysis.**

16 A. The results discussed above are based on the transfers and pricing that occurred in PGE’s  
17 first year of EIM operations. As we explained above, we think it is too early in PGE’s EIM  
18 experience to conduct this type of analysis. However, because Mr. Moyer sought to do so,  
19 and because his approach relied upon two significant, incorrect assumptions, we used his  
20 methodology to analyze additional scenarios that demonstrate the impacts of varying these

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<sup>28</sup> Due to CAISO settlement timelines, PGE’s evaluation of September benefits is not yet complete.

<sup>29</sup> See *In the Matter of Portland Gen. Elec. Co., Request for a General Rate Revision*, Docket No. UE 335, PGE/300, Niman-Kim-Batzler/13, Table 1 (Feb. 15, 2018).

1 important assumptions.

2 **Q. What additional scenarios did you analyze?**

3 A. To demonstrate the potential impacts of additional QFs, we analyzed a range of scenarios  
4 in which the amount of QF output delivering via the PACW-PGE interface exceeds the 50  
5 MW of the Blue Marmots. To demonstrate the potential impacts of increased transfers, we  
6 applied a 20% increase to all existing transfers and observed the effect of accepting the  
7 Blue Marmots and also additional QF output.

8 **Q. Why did you analyze increased levels of QF delivery when the Blue Marmots are the  
9 only QF party to this case?**

10 A. As we have already explained, we expect that if the Commission opens the door in this  
11 proceeding and allows the Blue Marmots' deliveries, PGE will be unable to prevent  
12 additional QFs from delivering via the PACW-PGE interface. We wanted to understand  
13 the potential effects on PGE's EIM participation under these circumstances.

14 **Q. What amounts of additional QF generation did you analyze and why?**

15 A. We first analyzed the addition of 67 MW of QFs—10 MW of baseload and 57 MW of  
16 solar—to represent the 10-MW geothermal, 10-MW solar, and 47-MW solar QFs currently  
17 under contract for delivery via the PACW-PGE interface. We then analyzed the impact of  
18 additional 50-MW blocks of solar QFs, as well as an additional 10-MW block of baseload  
19 QFs, because we expect that the majority of future QFs delivering to PGE from the PACW  
20 BAA will be solar resources, with a small portion of baseload.

21 **Q. What was the result of accepting additional QF delivery?**

22 A. As expected, the amount of EIM benefit lost annually increased with the amount of QF  
23 generation modeled, as reflected in the table below.

**Table 1: Annual Benefit Impact Under Additional-QF Scenarios.**

Scenario		Annual Impact <sup>30</sup>
A	Only Blue Marmots (50 MW)	\$89,790
B	All Executed QFs (117 MW Total QF)	\$292,378
C	Add 10 MW of Baseload (127 MW Total QF)	\$350,151
D	Add 50 MW of Solar (177 MW Total QF)	\$583,583
E	Add 50 MW of Solar (227 MW Total QF)	\$881,844
F	Add 50 MW of Solar (275 MW Total QF)	\$1,277,223
G	Add 33 MW of Solar (310 MW Total QF) <sup>31</sup>	\$1,602,754

1 **Q. Please explain how you analyzed the potential impact of increased transfers.**

2 A. We re-ran each of the QF-generation scenarios described above but increased all transfers  
 3 that occurred by 20%. We did not, however, add any new transfers. In other words, if  
 4 there were 0 MW of transfers during a given interval in the first year of operations, our  
 5 scenarios did not add transfers and instead maintained the 0-MW value. This is a very  
 6 conservative modeling approach, because we would expect not only increased transfer  
 7 magnitude but also increased transfer volume in the future.

8 **Q. How did you decide to model a 20% increase in transfers?**

9 A. We based our estimate on an analysis completed by Energy + Environmental Economics  
 10 (E3) when PGE was evaluating joining the EIM.<sup>32</sup> As part of that analysis, PGE and E3  
 11 evaluated a set of scenarios to examine the benefits of participating in the EIM under  
 12 various conditions. In particular, E3 examined a “High RPS Case” relative to a “Base  
 13 Scenario” in the same model year. Relative to the “Base Scenario,” participating in the  
 14 EIM under the “High RPS Case” produced more benefits (measured in dollars), because

<sup>30</sup> Dollar values based on Mr. Moyer’s \$13/MWh estimate, for comparison.

<sup>31</sup> 310 MW is the total capacity of PGE Merchant’s transmission reservations on the PACW-to-PGE path.

<sup>32</sup> *In the Matter of Portland Gen. Elec. Co., 2013 Integrated Resource Plan*, Docket No. LC 56, Comparative Analysis of Western EIM and NWPP MC Intra-Hour Energy Market Options (Nov. 6, 2015).

1 the EIM identified generating resources in other EIM BAAs that could manage the  
2 additional energy imbalance at a lower cost.

3 To obtain a reasonable estimate for the transfer increase that could be expected with  
4 increased renewables, PGE obtained the transfer activity in the modeled scenarios from  
5 E3, and we looked at the percentages by which transfers increased in the “High RPS Case”  
6 over the “Base Scenario.” Relative to the “Base Scenario,” total annual imports from the  
7 PACW BAA under the “High RPS Case” increased by approximately 20%<sup>33</sup> in the study  
8 year. As we have noted, there are other factors in addition to increased renewables that  
9 could lead to increased transfers in the future, so a 20% transfer increase estimate is likely  
10 conservative.

11 **Q. How did the impacts to benefits change with increased transfers?**

12 A. As expected, the effect on benefits was much greater in the 20% transfer-increase  
13 scenarios, as reflected in the table and figure below.

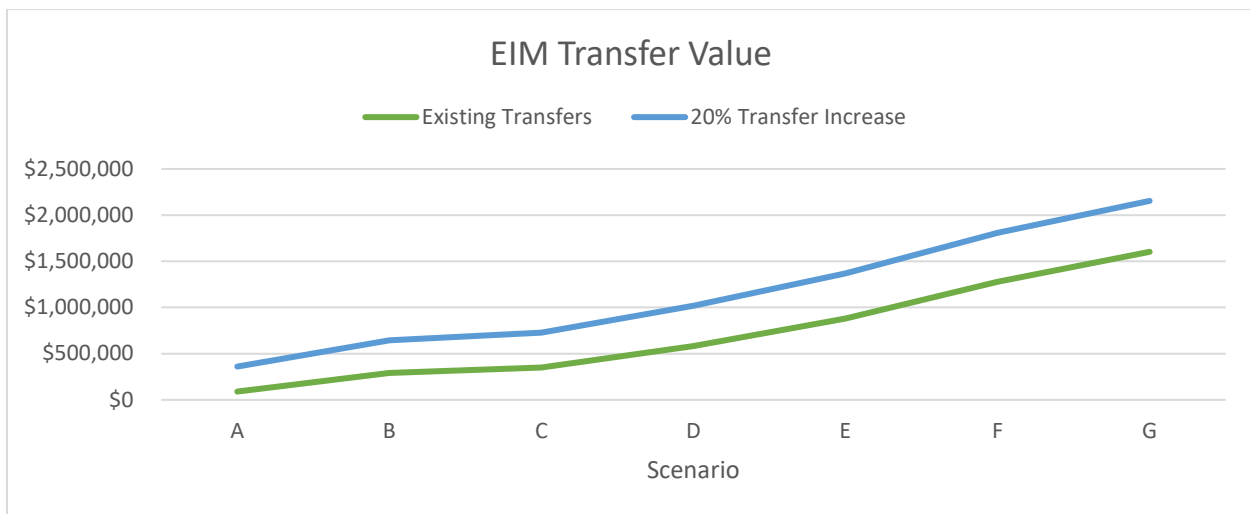
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<sup>33</sup> For the study year, the average increase was 22%. This percent change varied with on- and off-peak hours and by month. The average transfer increase was 18% in hours that are generally off-peak hours (hours ending 1-6, 23-24) and 25% increase in hours that are generally on-peak hours (hours ending 7-22). The individual monthly averages also vary, with January and February experiencing transfer increases of 66% and 79%, respectively, and July and August experiencing decreases of 12% and 5%, respectively.

**Table 2: Annual Benefit Impact Under Additional-QF and 20%-Transfer-Increase Scenarios.**

Scenario		Annual Impact <sup>34</sup> with existing transfers	Annual Impact <sup>35</sup> with 20% increase in existing transfers
A	Only Blue Marmots (50 MW)	\$89,790	\$360,357
B	All Executed QFs (117 MW Total QF)	\$292,378	\$643,028
C	Add 10 MW of Baseload (127 MW Total QF)	\$350,151	\$726,069
D	Add 50 MW of Solar (177 MW Total QF)	\$583,583	\$1,017,821
E	Add 50 MW of Solar (227 MW Total QF)	\$881,844	\$1,369,876
F	Add 50 MW of Solar (275 MW Total QF)	\$1,277,223	\$1,807,763
G	Add 33 MW of Solar (310 MW Total QF) <sup>36</sup>	\$1,602,754	\$2,154,270

**Figure 1: Annual Benefit Impact Under Additional-QF and 20%-Transfer-Increase Scenarios.**



1 Because the Blue Marmots’ draft PPAs are for 18-year terms,<sup>37</sup> we would expect that the

<sup>34</sup> Dollar values based on Mr. Moyer’s \$13/MWh estimate for comparison.

<sup>35</sup> Dollar values based on Mr. Moyer’s \$13/MWh estimate for comparison.

<sup>36</sup> 310 MW is the total capacity of PGE Merchant’s transmission reservations on the PACW-to-PGE path.

<sup>37</sup> See, e.g., Blue Marmot/201, Talbott/12 (“This Agreement shall terminate on 18 years after effective date . . .”).

1 total impact to customers of accepting the Blue Marmots' deliveries via the PACW-PGE  
2 interface would be many times the annual values presented in Tables 1 and 2.

3 **Q. What do you conclude from these results?**

4 A. Mr. Moyer significantly underestimates the potential impact to EIM benefits of using EIM-  
5 dedicated transmission to accept QF output. A Commission decision that requires PGE to  
6 accept the Blue Marmots' delivery via the PACW-PGE interface would require PGE to  
7 accept at least 117 MW of QF deliveries via the interface and would cause PGE's EIM  
8 benefits to decrease. The decrease will be greater if, as we expect, the pattern and volume  
9 of EIM transfers increase in the future, and if even more QFs are allowed to deliver at the  
10 interface. As recognized by the Commission, the EIM is already providing PGE's  
11 customers with economic benefits,<sup>38</sup> and PGE expects that those benefits will only increase  
12 over time. By contrast, QF purchases do not result in economic benefits for PGE's  
13 customers—at best, customers remain indifferent. Accordingly, PGE believes that *any*  
14 decrease in the EIM benefits in which PGE's customer have already invested will harm  
15 customers. And as our updates to Mr. Moyer's analysis show, the impacts to customers  
16 are likely much greater than he anticipates.

17 **Q. Does this conclude your Supplemental Testimony?**

18 A. Yes.

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<sup>38</sup> See *In the Matter of Portland General Electric Co. Request for a General Rate Revision*, Docket No. UE 319, Order No. 17-384 at 2-3 (Oct. 9, 2017).

**BEFORE THE PUBLIC UTILITY COMMISSION  
OF OREGON**

**UM 1829**

**Portland General Electric Company**

**Exhibit 701 to Supplemental Testimony of  
Aaron Rodehorst and Geoffrey Moore**

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October 16, 2018



<b>Scenario</b>		<b>Annual Impact with Existing Transfers (\$11/MWh)</b>	<b>Annual Impact with Existing Transfers (\$13/MWh)</b>
A	Only Blue Marmots (50 MW)	\$75,976	\$89,790
B	All Executed QFs (117 MW Total QF)	\$247,397	\$292,378
C	Add 10 MW of Baseload (127 MW Total QF)	\$296,282	\$350,151
D	Add 50 MW of Solar (177 MW Total QF)	\$493,801	\$583,583
E	Add 50 MW of Solar (227 MW Total QF)	\$746,175	\$881,844
F	Add 50 MW of Solar (275 MW Total QF)	\$1,080,727	\$1,277,223
G	Add 33 MW of Solar (310 MW Total QF)	\$1,356,177	\$1,602,754

<b>Scenario</b>		<b>Annual Impact with 20% Increase in Existing Transfers (\$11/MWh)</b>	<b>Annual Impact with 20% Increase in Existing Transfers (\$13/MWh)</b>
A	Only Blue Marmots (50 MW)	\$304,917	\$360,357
B	All Executed QFs (117 MW Total QF)	\$544,101	\$643,028
C	Add 10 MW of Baseload (127 MW Total QF)	\$614,366	\$726,069
D	Add 50 MW of Solar (177 MW Total QF)	\$861,233	\$1,017,821
E	Add 50 MW of Solar (227 MW Total QF)	\$1,159,126	\$1,369,876
F	Add 50 MW of Solar (275 MW Total QF)	\$1,529,646	\$1,807,763
G	Add 33MW of Solar (310 MW Total QF)	\$1,822,844	\$2,154,270