

**BEFORE THE PUBLIC UTILITY COMMISSION**

**OF OREGON**

**UM 1802**

In the Matter of )  
 )  
 )  
Investigation into PacifiCorp's Non-Standard )  
Avoided Cost Pricing. )  
 )  
 )  
\_\_\_\_\_ )

**REPLY TESTIMONY OF**

**KEVIN C. HIGGINS**

**ON BEHALF OF**

**RENEWABLE ENERGY COALITION AND  
THE COMMUNITY RENEWABLE ENERGY ASSOCIATION**

**May 5, 2017**

1 **I. INTRODUCTION**

2 **Q Please state your name and business address.**

3 A My name is Kevin C. Higgins. My business address is 215 South State Street,  
4 Suite 200, Salt Lake City, Utah, 84111.

5 **Q By whom are you employed and in what capacity?**

6 A I am a Principal with Energy Strategies, LLC. Energy Strategies is a private  
7 consulting firm specializing in economic and policy analysis applicable to energy  
8 production, transportation, and consumption.

9 **Q On whose behalf are you testifying in this proceeding?**

10 A My testimony is being sponsored by the Renewable Energy Coalition (the  
11 “REC”) and the Community Renewable Energy Association (“CREA”).

12 **Q Please describe your professional experience and qualifications.**

13 A My academic background is in economics, and I have completed all coursework  
14 and field examinations toward a Ph.D. in Economics at the University of Utah. In  
15 addition, I have served on the adjunct faculties of both the University of Utah and  
16 Westminster College, where I taught undergraduate and graduate courses in  
17 economics. I joined Energy Strategies in 1995, where I assist private and public  
18 sector clients in the areas of energy-related economic and policy analysis,  
19 including evaluation of electric and gas utility rate matters.

20 Prior to joining Energy Strategies, I held policy positions in state and local  
21 government. From 1983 to 1990, I was economist, then assistant director, for the  
22 Utah Energy Office, where I helped develop and implement state energy policy.  
23 From 1991 to 1994, I was chief of staff to the chairman of the Salt Lake County

1 Commission, where I was responsible for development and implementation of a  
2 broad spectrum of public policy at the local government level.

3 **Q Have you ever testified before this Commission?**

4 A Yes. I have testified in twenty-four prior proceedings in Oregon, including six  
5 PacifiCorp general rate cases, UE 263 (2013), UE 246 (2012), UE 210 (2009), UE  
6 179 (2006), UE 170 (2005), and UE 147 (2003). I have also participated in eight  
7 PacifiCorp Transition Adjustment Mechanism (“TAM”) proceedings, UE 307  
8 (2017 TAM), UE 296 (2016 TAM), UE 264 (2014 TAM), UE 245 (2013 TAM),  
9 UE 227 (2012 TAM), UE 216 (2011 TAM), UE 207 (2010 TAM), and UE 199  
10 (2009 TAM), as well as the PacifiCorp Five-Year Opt-Out case, UE 267 (2013)

11 In addition, I have testified in five PGE general rate cases, UE 283 (2014),  
12 UE 262 (2013), UE 215 (2010), UE 197 (2008), and UE 180 (2006); the PGE  
13 Opt-Out case, UE 236 (2012); and the PGE restructuring proceeding, UE 115  
14 (2001).

15 I also testified in the 2017 Inter-Jurisdictional Allocation proceeding, UM  
16 1050 (2016) and Phase II of the Investigation into Qualifying Facility Contracting  
17 and Pricing, UM 1610 (2015).

18 **Q Have you testified before utility regulatory commissions in other states?**

19 A Yes. I have testified in approximately 190 proceedings on the subjects of utility  
20 rates and regulatory policy before state utility regulators in Alaska, Arizona,  
21 Arkansas, Georgia, Idaho, Illinois, Indiana, Kansas, Kentucky, Michigan,  
22 Minnesota, Missouri, Montana, Nevada, New Mexico, New York, North  
23 Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Utah, Virginia,

1 Washington, West Virginia, and Wyoming. I have also prepared affidavits that  
2 have been filed with the Federal Energy Regulatory Commission and prepared  
3 expert reports in state and federal court proceedings involving utility matters. My  
4 involvement in the determination of avoided costs dates back to the initial  
5 Qualifying Facility (“QF”) buyback rates established for the Utah Power & Light  
6 Company in 1984.

7 **II. OVERVIEW AND CONCLUSIONS**

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

9 A My understanding is that the purpose of this proceeding is to review whether the  
10 Partial Displacement Differential Revenue Requirement (“PDDRR”) method can  
11 be used to set renewable avoided cost rates, and, if so, how to calculate those  
12 rates. Against that backdrop, my testimony generally responds to the proposal of  
13 PacifiCorp (or the “Company”) witness Daniel MacNeil to calculate avoided cost  
14 prices for non-standard renewable QFs using limited modifications to the PDDRR  
15 method. In particular, I address the Company’s proposal to calculate avoided  
16 costs for renewable QFs by assuming the QF would partially defer the next major  
17 renewable resource of the same type in the Company’s integrated resource plan  
18 (“IRP”) preferred portfolio. I also address the Company’s proposal for  
19 establishing the queue used in determining the avoided cost pricing for any given  
20 QF.

21 My testimony recommends several modifications to the Company’s  
22 approach that would more reasonably implement the PDDRR method for setting  
23 renewable avoided cost prices.

1

2 **Q Please summarize your primary conclusions and recommendations.**

3 A I offer the following primary conclusions and recommendations:

4 (1) The Company's proposal to limit the deferral of a renewable resource  
5 to resources *of the same type* as the QF is unduly restrictive and unreasonable.  
6 Instead, any renewable QF should be able to have its avoided cost pricing  
7 determined based on deferral of the next renewable resource irrespective of type,  
8 with appropriate adjustments for capacity equivalence. The total avoided capacity  
9 and energy cost that results will reasonably reflect the avoided cost of the deferred  
10 resource within the framework of the PDDRR method that has been accepted by  
11 the Commission, and is therefore a reasonable basis for pricing power produced  
12 by non-standard renewable QFs.

13 (2) I recommend that the Commission rule affirmatively that the 2017  
14 Wyoming Wind resource identified in PacifiCorp's 2017 IRP should be  
15 considered as partially displaceable or deferrable for the purpose of determining  
16 avoided capacity and energy costs. The Company has not sufficiently explained  
17 its assertion made in discovery that, because this resource is linked to Energy  
18 Gateway transmission and expiring production tax credits ("PTCs"), it cannot be  
19 partially displaced or deferred by resources outside of Wyoming Northeast. In  
20 addition, the Commission should consider whether Oregon QFs should be  
21 credited with avoided transmission costs for partially displacing or deferring the  
22 2021 Wyoming Wind resource.

1           (3) The Company's proposal to allow a prospective renewable QF the  
2           option of having its avoided cost pricing based on the next deferrable thermal  
3           resource, while reasonable in concept, does not allow the QF to compare the  
4           pricing results from the available options prior to selecting its preferred pricing  
5           stream. The implementation of this option should be modified to allow the QF to  
6           have access to the avoided cost pricing information for each of the available  
7           pricing options at the outset of the pricing process.

8           (4) The Company proposes to use the same QF queuing assumptions used  
9           in Utah, in which all QFs with signed contracts *plus* all QFs that have begun the  
10          power purchase agreement process are included in the QF pricing queue. In my  
11          opinion, the Utah queuing assumptions understate avoided costs. A more  
12          reasonable queuing approach is the one used in Wyoming, in which only QFs  
13          with signed contracts are included in the QF pricing queue. I recommend  
14          adoption of this latter queuing approach in Oregon as being more representative  
15          of avoided costs, and thus more reasonable. The Commission could also consider  
16          a modification to the Wyoming approach in which the indicative pricing provided  
17          to a QF was not subject to change for a specified time, such as 60-90 days.

18          (5) The Company has proposed to eliminate the market price floor from  
19          the non-standard avoided cost calculation. My understanding is that the adoption  
20          of a market price floor accompanied the Commission's decision to adopt the  
21          PDDRR method in UM 1610. Consequently, it appears that the Company's  
22          proposed change is directed to a previously resolved issue and is outside the scope  
23          of this proceeding.

1 **III. PACIFICORP'S PROPOSAL TO USE THE PDDRR METHOD TO**  
2 **CALCULATE AVOIDED COSTS FOR NON-STANDARD RENEWABLE**  
3 **QFS**

4  
5 **Q What is your understanding of the Commission's current framework for**  
6 **avoided cost pricing for non-standard QFs in the PacifiCorp service**  
7 **territory?**

8 A As explained in Order No. 16-174, the Commission has authorized PacifiCorp to  
9 use the PDDRR method to determine a starting point for non-standard QF  
10 contract negotiations.<sup>1</sup> Non-standard QFs are baseload and wind QFs with a  
11 maximum capacity greater than 10 MW and solar QFs with a maximum capacity  
12 greater than 3 MW.

13 Rates for avoided cost purchases from standard QFs are provided in a  
14 published tariff, which contains both standard avoided cost pricing and renewable  
15 avoided cost pricing.

16 **Q Are you familiar with the PDDRR method?**

17 A Yes, I participated in the avoided cost proceeding in Wyoming in which  
18 PacifiCorp initially proposed the PDDRR method, and in subsequent proceedings  
19 in which the PDDRR was addressed.

20 **Q Generally, how does the PDDRR method calculate avoided cost?**

21 A The PDDRR method is an IRP-based approach to determining avoided cost which  
22 provides prices to QF projects that are directly derived from comparison to the  
23 Company's least-cost plan. The method is designed to pay QFs the same costs  
24 that the Company avoids based on its long-term least-cost plan.<sup>2</sup> Specifically, to

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<sup>1</sup> UM 1610, Order No. 16-174 at 2.

<sup>2</sup> Because the costs of Company-owned resources are recovered from customers over longer periods than QF contracts (e.g., 40 years for thermal unit versus 15-20 years for a QF contract) and the cost recovery of Company-owned assets is front-end loaded, the capacity cost to ratepayers over the first fifteen years of a Company-owned asset is actually greater than the capacity cost to ratepayers of a

1 calculate avoided costs, two GRID model runs are performed, one reflecting the  
2 current IRP resource portfolio, and a second one with the QF project seeking  
3 pricing included as a resource and the next deferrable resource decremented by  
4 the size of the QF. If the next deferrable resource is a thermal plant, it has been  
5 typically modeled as a combined-cycle combustion turbine, consistent with past  
6 IRPs, although the next thermal resource in the 2017 IRP is a simple-cycle  
7 combustion turbine scheduled for 2029. The difference in the two GRID runs  
8 forms a portion of the value created by adding the QF to the portfolio. The other  
9 portion, the capacity deferral value, is based on the timing of the next deferrable  
10 plant in the IRP.

11 **Q What approach has PacifiCorp proposed for calculating avoided cost pricing**  
12 **for non-standard renewable QFs?**

13 A As explained by Mr. MacNeil, PacifiCorp is proposing to calculate avoided cost  
14 prices for non-standard renewable QFs using limited modifications to the PDDRR  
15 method. As I stated above, in general, the PDDRR method assumes that QFs  
16 partially displace the Company's next thermal resource in the IRP based on the  
17 QFs' capacity contributions. In this proceeding, PacifiCorp is proposing a  
18 variation on this approach for renewable QFs. Specifically, avoided costs for  
19 renewable QFs would be calculated by assuming renewable QFs would partially  
20 defer the next major renewable resource *of the same type* in the Company's IRP  
21 preferred portfolio. The Company's proposal also allows a prospective QF the  
22 option of having its avoided cost pricing based on the next deferrable thermal

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fifteen-year QF contract that is based on the avoided cost of that same Company-owned asset, all things being equal. This is due to the unequal time periods for recovery.



1 resource, although the QF must specify its preference for either a renewable or  
2 non-renewable pricing stream at the time of their pricing request.<sup>3</sup>

3 **Q What is your assessment of PacifiCorp's proposed approach to determining**  
4 **avoided cost pricing for non-standard renewable QFs?**

5 A I believe there are some positive aspects to the Company's proposal, but also  
6 some elements that require refinement to ensure a fair and level playing field for  
7 QFs of differing resource types.

8 **Q What aspects of the Company's proposal do you support?**

9 A I think it is reasonable to adapt the PDDRR for renewable QFs to provide avoided  
10 cost pricing based on the deferral of the next renewable resource in the IRP. I  
11 also think it is reasonable to allow a prospective QF the option of having its  
12 avoided cost pricing based on the next deferrable thermal resource, if that is the  
13 QF's preference. So, in these areas, I believe PacifiCorp is moving in the right  
14 direction.

15 **Q What aspects of the Company's proposal require modification in your**  
16 **opinion?**

17 A There are three major aspects of PacifiCorp's proposal that I believe should be  
18 modified:

19 (1) The Company's proposal to limit the deferral of a renewable resource  
20 to resources *of the same type* as the QF is unduly restrictive and unreasonable.  
21 This limitation should be relaxed as I discuss below.

22 (2) The Company's proposal to allow a prospective renewable QF the  
23 option of having its avoided cost pricing based on the next deferrable thermal

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<sup>3</sup> Direct Testimony of Daniel MacNeil, pp. 8-9.

1 resource, while reasonable in concept, does not allow the QF to compare the  
2 pricing results from the available options prior to selecting its preferred pricing  
3 stream. PacifiCorp's proposal should be modified to allow the QF to have access  
4 to the avoided cost pricing information for each of the available pricing options  
5 (e.g., for any deferrable renewable options as well as any deferrable thermal  
6 option) at the outset of the pricing process.

7 (3) The Company's proposal presumes that the QF queuing assumptions  
8 used in Utah in connection with the PDDRR method, in which all QFs with  
9 signed contracts *plus* all QFs that have begun the power purchase agreement  
10 process are included in the QF pricing queue, will also be employed in Oregon.  
11 In my opinion, the Utah queuing assumptions are certain to understate avoided  
12 costs. A more reasonable queuing approach to use in connection with the  
13 PDDRR method is the one used in Wyoming, in which only QFs with signed  
14 contracts are included in the QF pricing queue. I generally recommend adoption  
15 of this latter queuing approach in Oregon as being more representative of avoided  
16 costs, and thus more reasonable.

17 **1. Renewable QFs Should Not Be Limited to Deferring Resources of the**  
18 **Same Type**

19  
20 **Q Why do you believe the Company's proposal to limit the deferral of a**  
21 **renewable resource to resources *of the same type* as the QF is unduly**  
22 **restrictive and unreasonable?**

23 **A** Under the Company's proposal, a renewable QF could only be credited with  
24 avoiding the cost of a renewable resource of the same type, i.e., a wind QF could  
25 only be credited with deferring a wind plant in the IRP, a solar QF could only be  
26 credited with deferring a solar plant in the IRP, and so on. The implication of this

1 restriction is that a renewable QF with a resource not included in PacifiCorp's  
2 IRP, such as biomass, might be precluded from obtaining avoided cost pricing  
3 based on deferring any renewable facilities at all.<sup>4</sup> Similarly, a renewable QF  
4 using a resource that the Company plans to add relatively late in the IRP, such as  
5 solar, would be precluded from being credited with deferring any renewable  
6 facilities that are added earlier in the IRP, such as wind.

7           These restrictions are unreasonable because they prevent a renewable QF  
8 from being fairly compensated for its ability to defer renewable plants that  
9 PacifiCorp is planning to add, solely because the QF's resource type differs from  
10 the resource type that the Company is planning to add in its IRP. Implicit in  
11 PacifiCorp's advocacy for these restrictions is the notion that the Company is  
12 somehow unable to partially (or wholly) defer a wind or solar plant when a  
13 biomass QF timely comes on line, and is unable to partially (or wholly) defer a  
14 wind plant when a solar QF timely comes on line. This premise strikes me as  
15 highly implausible. When considering adding new resources in its IRP, the  
16 Company must consider the impact of long-term QF contracts on the need for  
17 Company-owned capacity after taking account of the capacity characteristics of  
18 the QF resources. This evaluation must be performed irrespective of QF resource  
19 type. The idea, say, that new solar QF contracts would have no influence on  
20 whether Company-owned wind resources need to be added in the future is

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<sup>4</sup> PacifiCorp has only recently added a 30 MW geothermal thermal resource to its IRP in 2029. The Company acknowledges in Data Response REC 4.1 (provided in Exhibit REC-CREA/201) that a biomass QF could displace geothermal resource in the IRP. However, this acknowledgement does not change the fact that the Company's "like for like" approach could preclude certain renewable QFs from being able to obtain avoided cost pricing based on deferring any renewable resources, depending on whether a resource type happens to be included in the IRP or not at any particular time.

1 unreasonable and objectionable. Such an approach, if put into practice, would be  
2 a recipe for making imprudent utility investments.

3 **Q What is PacifiCorp’s justification for the restrictiveness of its proposal?**

4 A PacifiCorp argues that its proposed restrictiveness is justified because  
5 “maintaining capacity equivalence between resources with widely disparate  
6 capacity contributions could introduce unintended consequences and  
7 unreasonable results.”<sup>5</sup> Mr. MacNeil goes on to state:

8 Based on the capacity contribution of solar and wind resources being  
9 prepared for the 2017 IRP, 10 megawatts of a west-side tracking solar  
10 resource would defer 55 megawatts of west-side wind capacity. Because  
11 wind and solar have different seasonal and hourly shapes, this could rapidly  
12 create an imbalance.<sup>6</sup>

13  
14 In its filed case, the Company does not offer any explanation as to what kind of  
15 unintended consequences and unreasonable results might occur, but elaborates in  
16 response to discovery. Specifically, in Response to REC 3.1, PacifiCorp  
17 calculates example capacity payments to a hypothetical 10 MW biomass QF and a  
18 hypothetical 10 MW fixed solar QF that are credited with partial capacity  
19 deferrals of a Company wind facility.<sup>7</sup>

20 According to the Company’s data response, a 10 MW biomass facility  
21 would provide the capacity equivalence of 63 MW of east-side wind and a 10  
22 MW west-side fixed solar facility would provide the capacity equivalence of 34  
23 MW of east-side wind. Using these ratios, the Company calculates that a biomass  
24 facility credited with displacing east-side wind would be paid \$138 per MWh for

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<sup>5</sup> Direct Testimony of Daniel MacNeil, p. 5.

<sup>6</sup> Id. at 6 (footnote omitted).

<sup>7</sup> PacifiCorp’s Response to REC 3.1 is provided in Exhibit REC-CREA/201.

1 capacity (\$2016) and a fixed solar resource credited with displacing east-side  
2 wind would be paid \$254 per MWh for capacity (\$2016). The data response  
3 points out that these capacity prices are significantly greater than the IRP capacity  
4 cost of comparable portfolio resources (geothermal and solar, respectively) and  
5 concludes that “it is unreasonable for the Company to pay more than the cost of a  
6 resource that was not selected.”

7 **Q What is your response to this reasoning?**

8 A First, the Company’s calculation in its data response does not use the most  
9 updated capital costs of \$1,637/kW (\$2016) for 2021 Wyoming Wind as  
10 published in the 2017 IRP, which represents a reduction of \$100/kW relative to  
11 the assumptions used in the Company’s data response.<sup>8</sup> Using the most current  
12 IRP cost assumptions for 2021 Wyoming Wind reduces the avoided capacity  
13 price for biomass displacing wind to \$132/MWH (\$2016) and for solar displacing  
14 wind to \$243/MWH (\$2016).

15 More importantly, we must bear in mind that in the Company’s analysis  
16 every megawatt of biomass capacity is displacing 6.3 MW of east-side wind  
17 capacity, and every megawatt of fixed solar capacity is displacing 3.4 MW of  
18 wind capacity. So it stands to reason that when an avoided wind capacity value is  
19 translated into a payment structured as “per-MW of biomass capacity” or “per-  
20 MW of solar capacity,” the avoided capacity price, in isolation, may appear high  
21 at first glance. But these results are not inconsistent with the Commission’s  
22 general policy for standard QFs in which those resources with greater capacity

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<sup>8</sup> See 2017 IRP Vol. I, p. 220. Apparently, PacifiCorp is still using capital costs of \$1,737/kW (\$2016) for Dave Johnston Wind scheduled for 2031 in the 2017 IRP.

1 values are compensated more than those with lower capacity values, all else being  
2 equal.

3 This observation leads to my third response to PacifiCorp on this point:  
4 the Company's explanation is faulty because it focuses on avoided capacity prices  
5 in isolation from avoided energy prices. Analyzing avoided capacity prices in  
6 isolation is misleading because, in accordance with the PDDRR the method,  
7 capacity and energy prices for any QF are inextricably linked. If both are  
8 considered in tandem, then the combined result is much more reasonable than the  
9 Company's analysis of capacity pricing in isolation suggests.

10 Capacity pricing and energy pricing must be considered in tandem because  
11 the GRID runs used to determine avoided energy costs also take into account the  
12 displacement of the output from the deferred resource. So, for example, if a 10  
13 MW biomass facility were to displace 63 MW of east-side wind in the  
14 determination of avoided capacity price, then the GRID run (starting in the  
15 deferral year) would remove 63 MW worth of wind resources in the "with QF"  
16 case. This means that the biomass resource – which would produce 74,400 MWh  
17 per year – would be responsible for displacing 238,194 MWh per year of nearly  
18 free energy (at the margin) from the deferred wind plant.<sup>9</sup> The net effect of such  
19 a displacement is a minimal, or even negative, avoided energy cost (in isolation)  
20 for a biomass QF when biomass displaces wind. Further, if the displaced wind  
21 plant is eligible for PTCs, the foregone benefit from the PTCs will be included in

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<sup>9</sup> The wind energy is not entirely free because wind integration costs must also be taken into account.

1 the avoided cost calculation.<sup>10</sup> Combining the very low or negative avoided  
2 energy cost with the seemingly “too-high” avoided capacity cost – and taking into  
3 consideration foregone PTCs when applicable – produces a *total* avoided cost that  
4 reasonably represents the true avoided cost of the displaced wind plant within the  
5 framework of the PDDRR method. So while, in isolation, both the avoided  
6 capacity cost *and* avoided energy cost may appear to be unreasonable (one too  
7 high, the other too low), taken together, within the framework of the PDDRR  
8 method accepted by the Commission, they produce an accurate avoided cost  
9 result.

10 Ultimately, it is PacifiCorp’s costs that are being avoided through the  
11 PDDRR calculation. If, for some reason, the resulting avoided costs appear too  
12 high to the Company, the cause is directly traceable to the assumed costs of the  
13 Company’s owned planned resources.

14 **Q How does the Company’s position on the non-interchangeability of different**  
15 **renewable resource types compare with the Company’s acknowledgment**  
16 **that a renewable QF can partially defer a thermal resource?**

17  
18 **A** As I noted above, the Company’s proposal allows a prospective QF the option of  
19 having its avoided cost pricing based on the next deferrable thermal resource. Mr.  
20 MacNeil explains this seeming inconsistency in the Company’s approach by  
21 stating that, “Deferring a smaller quantity of a thermal resource with little  
22 seasonality would create less of a potential mismatch.”<sup>11</sup> Based on this statement,

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<sup>10</sup> PacifiCorp apparently treats PTCs as a negative fixed cost, and thus an offset against capacity costs, even though PTCs are actually a function of energy output and arguably should be included in the calculation of avoided energy cost.

<sup>11</sup> Direct Testimony of Daniel MacNeil, p. 6.

1 it appears that the Company’s “mismatch” concerns are reduced when the  
2 capacity credit is small in relation to the resource being deferred and the deferred  
3 resource has little seasonal variation. While I agree with the Company’s  
4 willingness to recognize that a renewable QF can partially defer a planned thermal  
5 resource, I fail to see any reasonable justification for not recognizing that a high-  
6 capacity-factor renewable QF, such as a biomass generation plant, would  
7 reasonably be expected to defer a Company-planned wind plant. Similarly, I do  
8 not see any reasonable justification not to recognize that a solar QF plant would  
9 be able to defer Company-planned wind plant as well.

10 **Q Does PacifiCorp’s proposal to limit the deferral of a renewable resource to**  
11 **resources of the same type as the QF have real implications, or are your**  
12 **concerns primarily theoretical?**

13  
14 **A** There are real-world ramifications to PacifiCorp’s proposal to restrict the deferral  
15 of a renewable resource to resources of the same type as the QF. The preferred  
16 portfolio in the Company’s 2017 IRP calls for 1,100 MW of Company wind  
17 resources to be added in 2021. New utility solar is not added until 2028, and it is  
18 proposed to be only 11 MW in that year, followed by 97 MW in 2029. Moreover,  
19 in the Company’s PDDRR calculation, the 2028-29 solar resource in the 2017  
20 IRP is not even considered to be deferrable for a *new* Oregon solar QF, because  
21 the IRP solar resource is already deemed to be deferred by solar projects already  
22 in the QF queue.<sup>12</sup> According to the Company, the next solar deferrable resource  
23 for a new Oregon solar QF is not until 2033. Given the 2017 IRP preferred  
24 portfolio, the implication of PacifiCorp’s proposal in this case is that wind QFs

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<sup>12</sup> This is reflected in PacifiCorp’s Response to REC 6.2, Attachment 6.2-UM1802-1---Avoided Cost Study\_2017 04 26 Solar, Table 1, an excerpt from which is provided in Exhibit REC-CREA/201.



1 potentially could be credited with deferring a 2021 renewable resource, but a solar  
2 QF would not be given credit for deferring any renewable resources until 2028-29  
3 at best or as late as 2033. In this situation, the capacity value of a solar deferral  
4 would be delayed for an additional seven to twelve years relative to a wind  
5 deferral, significantly reducing the avoided cost pricing for a solar QF relative to  
6 wind.

7 In addition, as I discussed above, a biomass QF would not be credited with  
8 deferring any renewable resources at all, except for 30 MW of geothermal in  
9 2029, to the extent this is not already subsumed in the current queue.

10 The Company's "like for like" restrictions are arbitrarily restrictive and  
11 therefore are unreasonable.

12 **Q You stated that that wind QFs *potentially* could be credited with deferring a**  
13 **2021 renewable resource. Is PacifiCorp raising any doubts about this?**

14  
15 A Yes. In PacifiCorp's 1<sup>st</sup> Supplemental Response to REC 2.12,<sup>13</sup> the Company  
16 stated, in part:

17 [T]he 2021 Wyoming Wind resource is tied to Energy Gateway  
18 transmission capability and the production tax credit (PTC) expiration, so it  
19 cannot be partially displaced or deferred by resources outside of Wyoming  
20 Northeast.  
21

22 **Q What is your reaction this assertion?**

23 A The Company's statement fails to provide any reasoning in support of its  
24 contention. As a threshold matter, it is not at all clear why the linkage between  
25 the 2021 Wyoming Wind resource and Energy Gateway transmission precludes a

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<sup>13</sup> PacifiCorp's 1<sup>st</sup> Supplemental Response to REC 2.12 is provided in Exhibit REC-CREA/201.

1 resource from outside Wyoming Northeast, such as an Oregon QF, from partially  
2 displacing this resource. Indeed, if anything, the Company's statement raises the  
3 question as to whether an Oregon QF should be credited *additionally* with  
4 avoided transmission costs for displacing a resource that apparently requires  
5 incremental transmission investment from the Company in order to get built.  
6 Further, the Company's reference to the PTC expiration as somehow precluding  
7 deferability does not make sense on its face. As I discussed above, the  
8 displacement of a Company resource that is PTC-eligible is addressed in the  
9 calculation of avoided costs.

10 **Q What is your recommendation to the Commission regarding the treatment of**  
11 **the 2017 Wyoming Wind resource in the determination of avoided costs?**

12  
13 **A** I recommend that the Commission rule affirmatively that the 2017 Wyoming  
14 Wind resource should be considered as partially displaceable or deferrable for the  
15 purpose of determining avoided capacity and energy costs. The Company has not  
16 sufficiently explained its assertion that this resource cannot be partially displaced  
17 or deferred by resources outside of Wyoming Northeast. As such, the Company's  
18 claim should be considered unsupported. The burden of proof for demonstrating  
19 that its position is not unreasonable should rest with PacifiCorp.

20 In addition, the Commission should consider whether Oregon QFs should  
21 be credited with avoided transmission costs for partially displacing or deferring  
22 the 2021 Wyoming Wind resource. I recognize that in Order 16-174 the  
23 Commission established a rebuttable presumption that if the proxy resource used  
24 to calculate a utility's avoided cost is an on-system resource, there are no avoided

1 transmission costs.<sup>14</sup> However, PacifiCorp's assertions regarding the linkage  
2 between development of the 2021 Wyoming Wind resource and the Energy  
3 Gateway transmission capability suggest a set of facts that are contrary to this  
4 presumption.

5 **Q In recommending that the 2017 Wyoming resource should be considered**  
6 **partially displaceable or deferrable for the purpose of determining avoided**  
7 **capacity and energy costs, are you also attesting to the reasonableness of the**  
8 **Company's preferred portfolio in its 2017 IRP?**  
9

10 A No. My recommendation is based on the principle that the next deferrable  
11 renewable resource should be the basis of avoided cost pricing. I am not taking a  
12 position on whether the IRP itself is reasonable.

13 **Q Please summarize your recommendation to the Commission on the question**  
14 **of whether avoided cost calculations for renewable resources should be**  
15 **limited to deferring resources of the same type.**  
16

17 A For the purpose of avoided cost pricing using the PDDRR method, the deferral of  
18 a renewable resource in the IRP by a renewable QF should not be limited to  
19 resources of the same type. Rather, any renewable QF should be able to have its  
20 avoided cost pricing determined based on deferral of the next renewable resource  
21 irrespective of type, with appropriate adjustments for capacity equivalence. The  
22 total avoided capacity and energy cost that results will reasonably reflect the  
23 avoided cost of the deferred resource and is therefore a reasonable basis for  
24 pricing power produced by non-standard renewable QFs.

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<sup>14</sup> UM 1610, Order No. 16-174 at 8.

1           **2.       QFs Should Be Provided Both Renewable and Non-renewable**  
2           **Indicative Pricing at the Start of Contract Negotiations**  
3

4       **Q       Why should the Company’s proposal to allow a QF’s avoided cost pricing to**  
5       **be based on the next deferrable thermal resource be modified?**

6  
7       A       As I stated above, I support the fundamental thrust of PacifiCorp’s proposal to  
8           give a QF the option of having its avoided cost pricing be based on the next  
9           deferrable thermal resource. However, the Company’s proposal would not allow  
10          the QF to compare the pricing results from the available options prior to selecting  
11          its preferred pricing stream.<sup>15</sup> Instead, PacifiCorp proposes that the analysis be  
12          performed sequentially: the QF must first select a single pricing option; if the QF  
13          wishes to obtain pricing information for the alternative option, then the QF must  
14          then *withdraw* its pricing request for the first option (at the risk of falling further  
15          back in the pricing queue). In contrast, smaller QFs below the size threshold for  
16          standard contracts can easily review the published avoided cost prices prior even  
17          requesting a power purchase agreement.

18                 The Company’s approach makes little sense. The basic economics of  
19                 project development require the QF developer to be able to avail itself of critical  
20                 pricing information. This exercise should not be turned into a guessing game for  
21                 the QF. PacifiCorp is the gatekeeper of the pricing information produced by the  
22                 PDDRR and it is eminently reasonable for the Company to be required to provide  
23                 indicative avoided cost prices to a QF for each of the available pricing streams  
24                 (e.g., renewable versus thermal) at the same time.

25  

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<sup>15</sup>       See also PacifiCorp Response to REC 3.2, included as Exhibit REC-CREA/201.

1 **Q What is PacifiCorp’s rationale for limiting the pricing information provided**  
2 **to the QF to just one pricing stream?**

3  
4 A Mr. MacNeil’s rationale is tied to the queuing method PacifiCorp is proposing, in  
5 which all QFs with signed contracts and *potential* QF projects without contracts in  
6 place are included in the pricing queue. In light of the Company’s recommended  
7 queuing approach, Mr. MacNeil cites concerns about prospective QFs appearing  
8 in two queues simultaneously, e.g., the renewable queue and the thermal queue, if  
9 QFs were to be eligible for both pricing streams at the same time.<sup>16</sup>

10 **Q What is your response to this concern?**

11 A The concern is an artifact of the queuing method that PacifiCorp prefers. As I  
12 explain below, the Company’s proposed queuing method unreasonably suppresses  
13 avoided cost pricing. If the Company’s preferred queuing method is rejected in  
14 favor of the queuing method adopted in Wyoming, as I recommend below, then  
15 PacifiCorp’s Oregon avoided cost pricing will be more accurate *and* the  
16 Company’s concerns about QFs appearing in more than one queue at the same  
17 time will be rendered a non-issue.

18 **Q Please summarize your recommendation regarding the option to allow a**  
19 **renewable QF to select an avoided cost pricing stream based on deferring a**  
20 **thermal resource.**

21  
22 A I support the fundamental thrust of PacifiCorp’s proposal to give a QF the option  
23 of having its avoided cost pricing be based on the next deferrable thermal  
24 resource. However, the implementation of this option should be modified to  
25 allow the QF to have access to the avoided cost pricing information for each of  
26 the available pricing options (e.g., for any deferrable renewable options as well as

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<sup>16</sup> Direct Testimony of Daniel MacNeil, p. 9.

1 any deferrable thermal option) at the outset of the pricing process. If PacifiCorp's  
2 preferred queuing method is rejected in favor of the queuing method adopted in  
3 Wyoming, as I am recommending, then the Company's concerns about QFs  
4 appearing in more than one queue at the same time will be rendered a non-issue.

5

6 **3. Only QFs with Signed Contracts Should Be Included in the QF**  
7 **Pricing Queue**

8

9 **Q What are your concerns regarding PacifiCorp's proposed queuing method?**

10 A As I described above, according to the queuing method PacifiCorp is proposing,  
11 all QFs with signed contracts and various *potential* QF projects without contracts  
12 are included in the pricing queue. Specifically, all QFs that have begun the power  
13 purchase agreement process would be included as resources in the calculation of  
14 avoided costs under the PDDRR Method.

15 Because only a fraction of the projects that initiate the power purchase  
16 agreement process ever get developed, the practical consequence of adopting such  
17 an approach is to artificially drive down the calculation of avoided costs and thus  
18 drive down the price offered to Oregon QFs. This occurs because each successive  
19 QF added to the queue displaces lower cost resources in the GRID model and may  
20 also defer later-stage resources in the IRP, thereby delaying recognition of  
21 capacity payments. Adding more projects to the QF pricing queue as part of the  
22 pricing calculation thus drives down the calculated value of the energy and  
23 capacity that a new QF is credited with avoiding.

24 In a recent Wyoming docket, the Company estimated that this pricing  
25 approach would result in the inclusion in the avoided cost calculation of

1 approximately 4,100 MW of prospective projects that did not have signed  
2 contracts. According to the Company in that case, the inclusion of these projects  
3 in the QF pricing queue would reduce the calculation of avoided costs by \$3.91  
4 per MWh on a twenty-year levelized basis, amounting to an 11 percent price  
5 reduction, relative to what would occur if only QFs with signed contracts were  
6 included in the queue.<sup>17</sup>

7 **Q Among the QFs that have sought PDDRR pricing from the Company in**  
8 **recent years, how many have actually signed QF sales contracts?**

9  
10 A According to PacifiCorp's Response to REC 5.1,<sup>18</sup> the Company performed initial  
11 PDDRR studies for 178 QFs<sup>19</sup> between 2010 and 2014. Of these, only 48 QFs, or  
12 27% of the total, ultimately signed sales contracts.<sup>20</sup> This is a strong indicator  
13 that including in the queue all QFs that have initiated the pricing process will  
14 artificially suppress the avoided cost price.

15 **Q Is there a preferable alternative to the queuing method proposed by**  
16 **PacifiCorp?**

17 A Yes. The queuing method proposed by PacifiCorp is the same as the approach  
18 used in Utah. However, in Wyoming, the Company is required to use a different  
19 queuing method as part of the PDDRR calculation for determining avoided costs.  
20 Specifically, in Wyoming only QFs with signed contracts are included in the QF  
21 pricing queue. The Wyoming approach prevents the artificial suppression of

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<sup>17</sup> Wyoming Public Service Commission Docket No. 20000-481-EA-15, Direct Testimony of Brian S. Dickman, pp. 9-10.

<sup>18</sup> PacifiCorp's Response to REC 5.1 is provided in Exhibit REC-CREA/201.

<sup>19</sup> By limiting the count to initial PDDRR studies, multiple studies for the same QF are excluded.

<sup>20</sup> I excluded 2015 and 2016 from the count to avoid skewing the percentage even lower due to their recent vintage. In 2015, there were 70 initial PDDRR studies, resulting in 5 signed contracts and in 2016 there were 75 initial PDDRR studies, also resulting in 5 signed contracts.

1 avoided cost pricing that occurs when QF projects that are ultimately unsuccessful  
2 are included in the QF pricing queue.

3 The Wyoming treatment is reasonable because it provides the necessary  
4 balance to price QF power correctly. By only including QFs with signed  
5 contracts are in the QF pricing queue, only those projects with the most realistic  
6 chance of being developed are placed in the queue ahead of the QF seeking  
7 indicative pricing (although it is also the case that even some projects with signed  
8 contracts may ultimately not get built due to other project development obstacles).

9 **Q But doesn't the Wyoming approach run the risk of *overstating* avoided cost**  
10 **pricing if a new QF signs a contract after another QF has been provided**  
11 **indicative pricing?**

12  
13 A No. As additional QFs enter contracts, the Wyoming treatment requires the  
14 indicative pricing to be refreshed to reflect the updated queue. The requirement to  
15 refresh the price ensures that indicative pricing in Wyoming reflects the most  
16 current information regarding the QFs that are legitimately ahead of the  
17 prospective QF in the queue, by having reached the key development milestone of  
18 signing a power purchase agreement. This requirement protects against the  
19 indicative price being overstated.

20 In addition, the Wyoming treatment expressly identifies the circumstances  
21 under which re-pricing will and will not occur. That is, re-pricing will not occur  
22 after the Company and the QF have agreed to commercial terms. This provision  
23 allows the QF to lock in a price to effect a reasonable balancing of interests.

24  
25  
26



1 **Q Doesn't the Wyoming approach potentially subject a non-standard QF to**  
2 **multiple avoided cost pricing changes during its contract negotiations?**  
3

4 A Yes. That uncertainty is an unfortunate tradeoff that accompanies the exclusion  
5 projects without signed contracts from the queue.

6 **Q Are there any refinements that would provide the benefit of the greater**  
7 **precision in avoided cost pricing of the Wyoming queue (relative to the Utah**  
8 **queue) while also mitigating the potential uncertainty of last-minute pricing**  
9 **changes that might also occur under the Wyoming approach?**  
10

11 A Yes. The Commission could consider a modification to the Wyoming approach  
12 in which the indicative pricing provided to a QF was not subject to change for a  
13 specified time, such as 60-90 days. Such an approach could address some of the  
14 uncertainty regarding the drawback of potential last-minute pricing changes  
15 inherent in the Wyoming approach. Such a modification would be reasonable in  
16 light of the fact that not even all QFs with signed contracts actually come on line;  
17 that is, even limiting the queue to QFs with signed contracts, as Wyoming does,  
18 builds in a buffer on the side of conservative (i.e., lower) avoided cost pricing  
19 when considering that not all QFs with signed contracts ultimately sell power to  
20 PacifiCorp.

21 **Q What is your recommendation to the Commission regarding the appropriate**  
22 **queuing method?**  
23

24 A I recommend that the Commission reject the queuing method proposed by  
25 PacifiCorp, as it is nearly certain to understate avoided cost prices. Instead, I  
26 recommend that the Commission adopt the queuing method used in Wyoming, in  
27 which only QFs with signed contracts are included in the QF pricing queue. The  
28 Commission could consider a modification to the Wyoming approach in which

1 the indicative pricing provided to a QF was not subject to change for a specified  
2 time, such as 60-90 days.

3 **4. Market Price Floor**  
4

5 **Q What has Mr. MacNeil proposed with respect to the continued use of a**  
6 **market price floor in the calculation of avoided cost?**

7  
8 A Mr. MacNeil has proposed to eliminate the market price floor from the non-  
9 standard avoided cost calculation.

10 **Q What is your response to this proposal?**

11 A My understanding is that the adoption of a market floor accompanied the  
12 Commission's decision to adopt the PDDRR method in UM 1610. Specifically,  
13 the Commission stated:

14 Finally, we approve one change to be applied to all three utilities.  
15 We adopt ODOE's recommendation, supported by Staff, to set the  
16 floor for non-standard avoided cost prices at the wholesale power  
17 price forecast that is used to set sufficiency period avoided cost  
18 prices in standard QF contracts. We are persuaded that the benefit  
19 of QF developers understanding the price floor outweighs the  
20 minimal risk described by PacifiCorp that avoided cost prices  
21 produced by the PDDRR method would be lower than market.<sup>21</sup>  
22

23 While I am not an attorney, it appears that Mr. MacNeil's proposed change is  
24 directed to a previously resolved issue and is outside the scope of this proceeding.

25 **IV. CONCLUSION**

26 **Q Does this conclude your reply testimony?**

27 A Yes, it does.

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<sup>21</sup> UM 1610, Order No. 16-174 at 23.

**Docket No. UM 1802**

**EXHIBIT REC-CREA/201**

**Selected PacifiCorp Responses to Data Requests**

## REC Data Request 1.1

Please refer to PAC/100, MacNeil/2, lines/10-13. Does PacifiCorp agree that renewable avoided cost pricing should be available for non-standard renewable QFs if the Commission adopts a standard renewable resource sufficiency period date that is earlier than the IRP preferred portfolio date for acquiring a renewable resource and standard renewable resource sufficiency date exists during the term of the QF's PPA? For example, PacifiCorp's 2015 IRP did not identify the needs for a renewable resource; however, the Commission adopted a standard avoided cost renewable resource sufficiency date of 2028 in UM 1729 with a proxy wind resource (but no other technology type), which is within the possible contract term of an Oregon QF.

- (a) If not, please explain.
- (b) If so, please explain, identify any all differences regarding how the calculation of such rates would occur, and provide an illustrative example of the renewable rate for a 10 (solar only), 15, 30, 50 and 80 MW wind, solar, geothermal, biomass and hydro QF as compared to the non-standard non-renewable rate for the same resource. Please provide all supporting work papers.

## Response to REC Data Request 1.1

- (a) To the extent that it differs from the need for a "like" renewable resource (i.e. wind for wind, or solar for solar) identified in the Integrated Resource Plan (IRP), the Company does not agree that the standard renewable resource deficiency period date should determine the availability of renewable avoided cost pricing for non-standard qualifying facilities (QF). However, as described in the Opening Testimony of Company witness Daniel MacNeil; specifically PAC/100, MacNeil/9-10, to the extent the Public Utility Commission of Oregon (OPUC) chooses to adopt an alternative non-standard avoided cost pricing methodology which ascribes a higher value to renewables, the associated costs and benefits would be allocated to Oregon only.

Please refer to Attachment REC 1.1 -1 and Confidential Attachment REC 1.1 -2, which provide illustrative non-standard non-renewable prices for solar, wind, and base-load QFs. Because the highest cost resources in each interval are backed down first, a larger capacity QF will have slightly lower average avoided costs than an equivalent smaller QF starting at the same position in the pricing queue. While the effect of the queue is large when many requests are involved, the effect of QF size between 10 megawatts (MW) and 80 MW is generally not significant.

The Company has not prepared illustrative non-standard renewable avoided cost pricing as there is no identified need for renewable resources in the 2015 IRP Update. This is in accordance with Order 16-174 approving the Partial Displacement

Differential Revenue Requirement (PDDRR) methodology for calculating non-standard avoided cost prices, and Order 16-429 approving PacifiCorp's compliance filing for non-standard avoided cost prices.

(b) Please refer to the Company's response to subpart (a) above.

The confidential attachment is designated as Protected Information under Order 16-456 and may only be disclosed to qualified persons as defined in that order.

## **REC Data Request 1.2**

Please refer to PAC/100, MacNeil/2, lines/12-13 (emphasis added), specifically the requirements that the IRP “identifies the need for a renewable resource of **the same type**”. See also PAC/100, MacNeil/5. Does this mean that if the IRP only identifies a need for a renewable wind resource, that other renewable QFs (e.g., solar, hydro, geothermal, biomass, etc.) are not eligible for non-standard renewable avoided cost rates? If so, please explain why renewable resources of different types should not be eligible for renewable avoided cost rates.

## **Response to REC Data Request 1.2**

Yes. Please refer to the Opening Testimony of Company witness, Daniel MacNeil; specifically PAC/100, MacNeil/5-6. Renewable resources have significant differences in their operational characteristics, and widely varying impacts on the Company’s system. Maintaining capacity equivalence between resources with widely disparate capacity contributions could introduce unintended consequences and unreasonable results. The Partial Displacement Differential Revenue Requirement (PDDRR) methodology is built around maintaining capacity equivalence and accurately valuing a resource’s specific energy profile.

As described in PAC/100, MacNeil/9-10, to the extent the Public Utility Commission of Oregon chooses to adopt an alternative avoided cost pricing methodology which ascribes a higher value to renewables based on their renewable attributes rather than their capacity and energy, the associated costs and benefits would be allocated to Oregon only.

### **REC Data Request 1.3**

Please refer to Docket No. UM 1610, PAC/800, Dickman/19, Table 2. Please provide illustrative example of the non-standard renewable and non-renewable avoided cost rates for a 10 (solar only), 15, 30, 50 and 80 MW wind, solar, geothermal, biomass and hydro QF if the preferred portfolio identifies a need for a wind resource. Please provide all supporting work papers.

### **Response to REC Data Request 1.3**

Please refer to the Company's response to REC Data Request 1.1.

Avoided cost prices for non-wind resources would be unchanged from the non-renewable avoided cost rates provided in REC Data Request 1.1. Based on the capacity contribution study being prepared for the 2017 Integrated Resource Plan (IRP) – scheduled to be filed with the Public Utility Commission of Oregon on March 31, 2017 – each megawatt (MW) of west-side tracking solar resources is estimated to provide approximately 109 percent of the capacity provided by each MW of east-side tracking solar resources. As a result, a 10 MW Oregon tracking solar qualifying facility (QF) would defer 10 MW of a west-side tracking solar resource from an IRP preferred portfolio or 10.9 MW of an east-side tracking solar resource from an IRP preferred portfolio. Please refer to the Opening Testimony of Company witness, Daniel MacNeil; specifically PAC/100 MacNeil/4.

## **REC Data Request 1.4**

Please refer to Docket No. UM 1610, PAC/800, Dickman/19, Table 2. Please provide illustrative example of the non-standard renewable and non-renewable avoided cost rates for a 10 (solar only), 15, 30, 50 and 80 MW wind, solar, geothermal, biomass and hydro QF if the preferred portfolio identifies a need for a solar resource. Please provide all supporting work papers.

## **Response to REC Data Request 1.4**

Please refer to the Company's response to REC Data Request 1.1.

Avoided cost prices for non-solar resources would be unchanged from the non-renewable avoided cost rates provided in REC Data Request 1.1. Based on the capacity contribution study being prepared for the 2017 Integrated Resource Plan (IRP) – scheduled to be filed with the Public Utility Commission of Oregon on March 31, 2017 – each megawatt (MW) of west-side wind resources is estimated to provide approximately 75 percent of the capacity provided by each MW of east-side wind resources. As a result, a 10 MW Oregon wind qualifying facility (QF) would defer 10 MW of a west-side wind resource from an IRP preferred portfolio or 7.5 MW of an east-side wind resource from an IRP preferred portfolio. Please refer to the Opening Testimony of Company witness, Daniel MacNeil; specifically PAC/100 MacNeil/4.



## **REC Data Request 1.5**

Please refer to Docket No. UM 1610, PAC/800, Dickman/19, Table 2. Please provide illustrative example of the non-standard renewable and non-renewable avoided cost rates for a 10 (solar only), 15, 30, 50 and 80 MW wind, solar, geothermal, biomass and hydro QF if the preferred portfolio identifies a need for a geothermal resource. Please provide all supporting work papers.

## **Response to REC Data Request 1.5**

Please refer to the Company's response to REC Data Request 1.1.

Geothermal, biomass, and hydro resources are generally considered base-load resources, unless they are dispatchable or their output is expected to exhibit significant variation.

Avoided cost prices for non-base-load resources would be unchanged from the non-renewable avoided cost rates provided in REC Data Request 1.1. A 10 megawatt (MW) Oregon geothermal, biomass, or non-seasonal hydro qualifying facility (QF) would defer 10 MW of capacity contribution from a west-side base-load resource in an Integrated Resource Plan (IRP) preferred portfolio or 10 MW of capacity contribution from an east-side base-load resource in an IRP preferred portfolio. Resources with seasonal variations in output would have capacity contributions based on their output during the months of the Company's peak load requirements, as identified in a Loss of Load Probability (LOLP) Study in the IRP.

### **REC Data Request 1.6**

Please refer to Docket No. UM 1610, PAC/800, Dickman/19, Table 2. Please provide illustrative example of the non-standard renewable and non-renewable avoided cost rates for a 10 (solar only), 15, 30, 50 and 80 MW wind, solar, geothermal, biomass and hydro QF if the preferred portfolio identifies a need for a biomass resource. Please provide all supporting work papers.

### **Response to REC Data Request 1.6**

Please refer to the Company's response to REC Data Request 1.5.

### **REC Data Request 1.7**

Please refer to Docket No. UM 1610, PAC/800, Dickman/19, Table 2. Please provide illustrative example of the non-standard renewable and non-renewable avoided cost rates for a 10 (solar only), 15, 30, 50 and 80 MW wind, solar, geothermal, biomass and hydro QF if the preferred portfolio identifies a need for a hydro resource. Please provide all supporting work papers.

### **Response to REC Data Request 1.7**

Please refer to the Company's response to REC Data Request 1.5.

### **REC Data Request 1.13**

Please refer to PAC/100, MacNeil/8. Please confirm that PacifiCorp is proposing to use include the preferred portfolios from an unacknowledged IRP or IRP Update as an input to be updated. If so, does the change in the use of the preferred portfolio initiate immediately upon the filing of an IRP or IRP Update?

### **Response to REC Data Request 1.13**

Confirmed. The Company's Partial Displacement Differential Revenue Requirement (PDDRR) avoided cost methodology uses the preferred portfolio from the most recently filed Integrated Resource Plan (IRP) or IRP Update.

### **REC Data Request 1.14**

Please refer to PAC/100, MacNeil/10, in which PacifiCorp proposes to include “Signed and potential QFs (located anywhere on PacifiCorp’s system) are accounted for in the GRID model when calculating avoided costs for the next QF”.

- (a) Please define how PacifiCorp determines whether a QF is a “potential QF”?
- (b) For each of the last ten years, please identify the number and megawatts of “potential QFs” accounted for in the GRID model, and the number and megawatts of those potential QFs that achieved commercial operations. For each QF, please identify the size of the QF, resource type, and state of location.

### **Response to REC Data Request 1.14**

- (a) A potential qualifying facility (QF) is a project that has begun the process required to enter into a power purchase agreement (PPA) with the Company, but for which a signed PPA has not yet been fully executed. In order to remain in the QF queue, potential projects must continue to progress toward a PPA in accordance with the procedures applicable in its jurisdiction.
- (b) The Company objects to this request as unduly burdensome, overly broad, not reasonably calculated to lead to the discovery of admissible evidence. Notwithstanding the foregoing objection, the Company responds as follows:

Please refer to Attachment REC 1.14.

### **REC Data Request 1.17**

For the past ten years, please identify all Oregon QFs above the relevant standard rate size threshold that have requested power purchase agreements by resource type and size. Please also provide the initial contract prices offered to these QFs, including but not limited to renewable and non-renewable prices.

### **Response to REC Data Request 1.17**

Please refer to Attachment REC 1.17. Note: the first four projects listed in the provided attachment are executed power purchase agreement (PPA) prices; the remaining reflect indicative prices that did not result in PPAs.

## **REC Data Request 2.12**

Please assume that the 2017 IRP identifies a 100 MW west-side system wind resource in 2028. Please provide an illustrative calculation of how the wind proxy value would be determined for a 25 MW west side wind QF coming on line in 2019. Please explicitly show the capital costs, O&M costs, etc., and tie these numbers into the values being used in the draft 2017 IRP. Also, please explain how the avoided energy costs are determined once the proxy plant is assumed to be partially displaced. Specifically, is there any change to the GRID calculation to account for the displacement of the proxy resource starting in 2028?

## **Response to REC Data Request 2.12**

PacifiCorp objects to this data request because the content of draft iterations of PacifiCorp's 2017 Integrated Resource Plan (IRP) is outside the scope of this proceeding, has no relevance to any issue being litigated in this docket, and is unlikely to lead to the discovery of admissible evidence. PacifiCorp also objects to this data request to the extent that it seeks information protected by the attorney-client or attorney work product privileges. Subject to and without waiving the foregoing objection, the Company responds as follows:

PacifiCorp's 2017 IRP is scheduled to be published on April 4, 2017, and will be publically available on the Public Utility Commission of Oregon's (OPUC) and PacifiCorp's websites at that time. The Company has not prepared cost estimates based on the draft 2017 IRP. The Company will supplement this response with cost and timing estimates from the Preferred Portfolio identified in the published 2017 IRP once it is available.

Avoided energy costs reflect the difference in energy value between the proxy resource from the Preferred Portfolio and the proposed qualifying facility (QF) resource. Two Generation and Regulation Initiative Decision Tool (GRID) runs are prepared to identify this value. In the first GRID run, the proxy plant is included at its current size, accounting for any displacement by higher queued QF projects. In the second GRID run, the proposed QF is added and the capacity of the proxy plant is reduced by an amount equivalent to the QF on a capacity contribution basis. In the example in the request, the capacity change would be equal to the size of the proposed QF, since they are both west-side wind resources and have the same capacity contribution value.

UM 1802 / PacifiCorp  
April 25, 2017  
REC Data Request 2.12 – 1st Supplemental

### **REC Data Request 2.12**

Please assume that the 2017 IRP identifies a 100 MW west-side system wind resource in 2028. Please provide an illustrative calculation of how the wind proxy value would be determined for a 25 MW west side wind QF coming on line in 2019. Please explicitly show the capital costs, O&M costs, etc., and tie these numbers into the values being used in the draft 2017 IRP. Also, please explain how the avoided energy costs are determined once the proxy plant is assumed to be partially displaced. Specifically, is there any change to the GRID calculation to account for the displacement of the proxy resource starting in 2028?

### **1<sup>st</sup> Supplemental Response to REC Data Request 2.12**

Further to the Company's response to REC Data Request 2.12 dated April 3, 2017, the Company provides the following additional information relative to PacifiCorp's 2017 Integrated Resource Plan (IRP) published on April 4, 2017:

For capital costs, operations and maintenance (O&M) costs, etc. associated with wind and solar resources in the Company's 2017 IRP preferred portfolio, please refer to Attachment REC 2.12 1st Supplemental.

The following wind and solar resources were identified in the 2017 IRP preferred portfolio:

- 2021 Wyoming Wind,
- 2031 Wyoming Wind,
- 2036 Goshen Wind,
- 2028-2034 Yakima Solar, and
- 2031-2036 Utah South Solar.

Under the Company's proposed partial displacement methodology, resources in the IRP preferred portfolio are displaced from earliest to latest, on a capacity equivalent basis, without regard for east and west.

Under the Company's proposed partial displacement methodology a 25 megawatt (MW) west side wind qualifying facility (QF) coming online in 2019 could displace the 2031 Wyoming Wind resource, as shown in Attachment REC 2.12 1<sup>st</sup> Supplemental. Depending on the QF pricing queue and earlier requests, proposed wind QFs could also displace the 2036 Goshen Wind resource. Note: the 2021 Wyoming Wind resource is tied to Energy Gateway transmission capability and the production tax credit (PTC) expiration, so it cannot be partially displaced or deferred by resources outside of Wyoming Northeast.



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The energy value of the wind resource is calculated using two Generation and Regulation Initiative Decision Tool (GRID) runs, as explained in the Company's initial response to REC Data Request 2.12. In the example provided in Attachment REC 2.12 1<sup>st</sup> Supplemental, the first GRID run includes the IRP wind resource at its current size, accounting for any displacement by higher queued QF projects. In the second GRID run, the proposed QF is added at zero cost and the capacity of the proxy plant is reduced by 18.6 MW as this has the equivalent the capacity contribution of the QF. Through 2030, the GRID value reflects the incremental impact of the proposed QF. Starting in 2031, if the QF has more value in GRID than the displaced 2031 wind resource, the total avoided cost price will be higher than the capacity payments shown in the attachment. If the QF has less value than the proxy resource, the total avoided cost price will be lower than the capacity payments shown.

Under the Company's proposed partial displacement methodology, a 25MW west side solar QF coming online in 2019 could displace 2028 and 2029 Yakima solar resources, as shown in Attachment REC 2.12 1<sup>st</sup> Supplemental. Depending on the QF pricing queue and earlier requests, proposed solar QFs could also displace Utah South or Yakima solar resources in later years.

The energy value of the solar resource is calculated using two GRID runs, as explained in the Company's initial response to REC Data Request 2.13. In the example provided in Attachment REC 2.12 1<sup>st</sup> Supplemental, the first GRID run includes the IRP solar resource at its current size, accounting for any displacement by higher queued QF projects. In the second GRID run, the proposed QF is added at zero cost and the capacity of the proxy plant is reduced by 11.4 MW in 2028 (the entire 2028 IRP solar capacity) and 17.2 MW in 2029 (reflecting the QF capacity remaining in 2029) as this has the equivalent the capacity contribution of the QF. Through 2027, the GRID value reflects the incremental impact of the proposed QF. Starting in 2028, the 2028 solar resource is removed, and starting in 2029, part of the 2029 solar resource is displaced. If the QF has more value in GRID than the displaced resources, the total avoided cost price will be higher than the capacity payments shown in the attachment. If the QF has less value than the proxy resource, the total avoided cost price will be lower than the capacity payments

UM 1802 / PacifiCorp  
April 14, 2017  
REC Data Request 3.1

### **REC Data Request 3.1**

Please refer to Mr. MacNeil's opening testimony, pp. 5-6, in which he states: Maintaining capacity equivalence between resources with widely disparate capacity contributions could introduce unintended consequences and unreasonable results. With this in mind, the Company believes it appropriate to limit the deferral of renewable resource capacity to QFs of the same type.

- (a) Please provide examples of the unintended consequences and unreasonable results that Mr. MacNeil is referring to.
- (b) Assume a biomass QF with an 85% capacity factor was to have its avoided cost pricing based on deferring a wind plant in the Company's IRP using the PDDRR method. After adjusting for the differences in capacity factor and operating characteristics between the biomass QF and the wind plant, please explain in detail how deferring a wind plant in the IRP with a biomass QF causes unintended consequences or unreasonable results in the avoided cost pricing.
- (c) Assume a solar QF was to have its avoided cost pricing based on deferring a wind plant in the Company's IRP using the PDDRR method. After adjusting for the differences in capacity factor and operating characteristics between the solar QF and the wind plant, please explain in detail how deferring a wind plant in the IRP with a solar QF causes unintended consequences or unreasonable results in the avoided cost pricing.

### **Response to REC Data Request 3.1**

- (a) Please refer to Attachment REC 3.1. The preferred portfolio includes baseload and solar resource options with lower costs than those resulting from displacement of capacity equivalent wind resources by a base load or solar qualifying facility (QF). It is unreasonable for the Company to pay more than the cost of a resource that was not selected. Details on resource costs are contained in Table 6.1 and Table 6.2 of PacifiCorp's 2017 Integrated Resource Plan (IRP).
- (b) Please refer to the Company's response to subpart (a) above.
- (c) Please refer to the Company's response to subpart (a) above.

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	Type	Capacity Factor	Capacity contribution	Capacity	Proxy Resource Cost (2016 \$/kW-yr)	QF Capacity Payment (\$/kW-yr)	Capacity Payment (\$/MWh)	Delta vs Portfolio Options
<b>REC 3.1b</b>	Biomass QF	85%	100%	10		1,030.34	138	179%
	Displaced East Wind 2031	43%	15.8%	63	163		43	
<b>REC 3.1c</b>	OR Solar QF	25%	53.9%	10		554.96	254	374%
	Displaced East Wind 2031	43%	15.8%	34	163		43	
IRP Preferred Portfolio Resources								
	2029 Geothermal	90%	100%	10	611		77	
	2028 Yakima Solar	25%	53.9%	10	148		68	

Type	East	West
Wind	15.8%	11.8%
Fixed	37.9%	53.9%
Tracking	59.7%	64.8%
Gas	100.0%	100.0%
Hydro	100.0%	100.0%

	DJ Wind	Yakima S	Geothermal 2029		
2016 \$	\$1,737	\$1,762	\$0	Plant capacity cost	\$/kW
2016 \$	\$37.57	\$18.74	\$0.00	Fixed O&M, plus on-going capital cost	\$/kW-yr
2016 \$	\$0.65	\$0.00	\$77.34	Variable O&M	\$/MWh
2016 \$		(2.95)		Tax Credit \$/MWh	\$/MWh
2016 \$	162.79	148.24	611.44	Total Resource Costs \$/kW-yr	\$/kW-yr
	7.067%	7.716%	6.311%	Payment Factor	
	43%	24.9%	90.3%	Capacity Factor	

UM 1802 / PacifiCorp  
April 14, 2017  
REC Data Request 3.2

### **REC Data Request 3.2**

Please refer to Mr. MacNeil's opening testimony, pp. 8-9, in which he states:  
...the Company is willing to provide a non-renewable avoided cost price stream if requested. However, for consistency with the queue methodology for potential QFs adopted by the Commission in Order No. 16-174 and used in the Company's PDDRR,

QFs will need to specify either renewable or non-renewable prices at the time of their request.

- (a) Please clarify what Mr. MacNeil means by the phrase "at the time of their request." Specifically, must the QF specify whether it wants a non-renewable or renewable pricing stream prior to receiving any indicative pricing from the Company, or is the QF allowed to request pricing streams under each option but then must select one or the other to remain in the queue?
- (b) Admit that the PDDRR methodology uses different queue methods in Utah and Wyoming.
- (c) Please identify where in Order No. 16-174 the Commission addresses the queue methodology.

### **Response to REC Data Request 3.2**

- (a) In order to provide consistent pricing to later queued requests, the pricing option must be identified at the time the request is submitted.
- (b) Agreed. Note: each of the methods accounts for qualifying facilities (QF) in all jurisdictions.
- (c) Please refer to Public Utility Commission of Oregon (OPUC) Order No. 16-174 at 22 "*We approve PacifiCorp's request to use its PDDRR method going forward*". PacifiCorp's Partial Displacement Differential Revenue Requirement (PDDRR) method, including the queue methodology for potential QFs, was presented in the Opening Testimony of Company witness, Brian S. Dickman (docket UM-1610, PAC/800 Dickman/18).

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UM 1802 / PacifiCorp  
April 18, 2017  
REC Data Request 4.1

### **REC Data Request 4.1**

Please refer to Mr. MacNeil's opening testimony, pp. 5-6, in which he states: Maintaining capacity equivalence between resources with widely disparate capacity contributions could introduce unintended consequences and unreasonable results. With this in mind, the Company believes it appropriate to limit the deferral of renewable resource capacity to QFs of the same type.

The preferred portfolio in the 2017 IRP calls for 30 MW of west-side geothermal resources to be added in 2029. Does PacifiCorp consider this resource to be deferrable by:

- (a) A renewable biomass QF? If no, please explain the basis for the Company's position.
- (b) A tracking solar QF? If no, please explain the basis for the Company's position.

### **Response to REC Data Request 4.1**

- (a) Yes. To the extent they both operate at a high capacity factor and have limited diurnal or seasonal variation, biomass and geothermal qualifying facilities (QF) can reasonably be considered the same type.
- (b) No. Tracking solar QFs have a very different generation profile from geothermal QFs, so they cannot be considered the same type. Tracking solar QFs should first be used to displace solar resources from the preferred portfolio as that is a closer fit with the needs assessed in the Company's Integrated Resource Plan (IRP) portfolio selection process. To the extent a QF desires a non-renewable pricing stream or all of the solar resources in the preferred portfolio have been displaced through the proposed term of the QF, tracking solar QFs should displace non-renewable resources.

UM 1802 / PacifiCorp  
April 26, 2017  
REC Data Request 5.1

**REC Data Request 5.1**

Follow up to PacifiCorp Response to ICNU 010. Please refer to the Table provided in the response. For each year shown:

- (a) Please identify the number of individual QFs for which an initial PDDRR study was performed (i.e., remove from the total any PDDRR studies that were performed for QFs that had previously been provided with PDDRR study results).
- (b) Please identify the number of QFs for which an initial PDDRR study was performed that ultimately signed a QF sales contract with the Company (listed by year in which the initial PDDRR study was performed, e.g., if a QF receiving an initial PDDRR result in 2011 signed a contract in 2012, it would be listed under 2011).

**Response to REC Data Request 5.1**

The Company objects to this request as overly broad, unduly burdensome, and not likely to lead to the discovery of admissible evidence relevant to this proceeding. Without waiving these objections, the Company responds as follows:

Please refer to the table below. The Company has not made an exhaustive review of the referenced qualifying facility (QF) studies and the additional review associated with this response produced slightly different totals than that identified in the Company’s response to ICNU Data Request 010:

Year	Estimated Number of PDDRR Studies	Revised PDDRR Estimate	# of individual QFs for which an initial PDDRR study was performed	# of QFs for which an initial PDDRR study was performed that ultimately signed a QF sales contract with the Company
2010	12	12	12	6
2011	25	26	22	9
2012	43	42	37	12
2013	56	53	41	11
2014	74	74	66	10
2015	86	83	70	5
2016	72	78	75	5

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UM 1802 / PacifiCorp  
April 28, 2017  
REC Data Request 6.2

## **REC Data Request 6.2**

Please provide a GRID instance in which a 20 MW west side solar tracking QF defers the next deferrable solar resource using the QF queue recommended by PacifiCorp in this case.

### **Response to REC Data Request 6.2**

On April 28, 2017, the Company provided Don Hendrickson of Energy Strategies, Inc., (consultant to the Renewable Energy Coalition (REC)) access to the Generation and Regulation Initiative Decision Tool (GRID) via the internet and access to the GRID projects / scenarios explained below. Note: Access to GRID and its inputs are provided subject to the terms and conditions of the protective order in this proceeding and may only be disclosed to qualified persons as defined in that order.

On the GRID instance (accessible by Don Hendrickson), please refer to the GRID project entitled “UM 1802 DR REC 6.2 and 6.4” which contains the following listed GRID scenarios created to evaluate a 20 megawatt (MW) west side solar tracking qualifying facility (QF), deferring the next deferrable resource using the QF queue:

- “REC 6.2 - UM1802 - 1a - Base Case\_2017 04 26”: Base Case scenario using QF queue for study period of 2018 through 2027.
- “REC 6.2 - UM1802 – 1b - Base Case\_2017 04 26”: Base Case scenario using QF queue for study period of 2028 through 2037.
- “REC 6.2 - UM1802 - 2a - AC Case\_2017 04 26 Solar”: Avoided Cost Case with 20 MW west side solar included in GRID scenario partially deferring Integrated Resource Plan (IRP) resource -200 MW simple cycle combustion turbine (SCCT) available in 2033 since the QF queue deferred prior to addition of 20 MW QF already deferred all of the IRP solar resources.
- “REC 6.2 - UM1802 – 2b - AC Case\_2017 04 26 Solar”: Avoided Cost Case with 20 MW West side solar included in GRID scenario partially deferring IRP resource - 200 MW SCCT available in 2033 since the QF queue deferred prior to addition of 20 MW QF already deferred all of the IRP solar resources.

Please refer to Confidential Attachment REC 6.2, which provides the avoided cost study files, demand and partial displacement differential revenue requirement (PDDRR) data input files as follows:

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UM 1802 / PacifiCorp  
April 28, 2017  
REC Data Request 6.2

- “REC 6.2 - Demand CONF \_2017 04 20 (wQueue)”: GRID input file with the following tabs added with data specific to 2017 IRP and QF potential queue:
  - West Side Solar T QF tab: contains hourly profile of a 20 MW West Side Solar QF (hourly profile based on 2017 IRP Supply Side Resource Options),
  - 0 GRID IRP Solar 4B tab: contains hourly profile of 2017 IRP Resources reflecting potential QF queue and addition of West Side Solar,
  - 0-GRID IRP Displaced tab: contains 2017 IRP information for front office transactions (FOT), demand-side management (DSM) and wind resources (row 98 through row 339) and summarizes partial displacement calculations from PDDRR data file (row 98 through row 121), and
  - 0-GRID Potential, WyoWind1, WyoWind3, WyoWind4, WyoWind5 tabs: contains hourly profile of QF potential Queue.
- “REC 6.2 - PDDRR - CONF \_2017 04 20 (wQueue)”: Microsoft Excel file containing partial displacement of IRP resources:
  - Queue tab: summarizes data related Potential QF Queue,
  - Profile: Hourly profile of Potential QF queue,
  - Signed QFs tab: partial displacement values adjusted for degradation for signed QFs and the 20 MW West Side solar QF,
  - Displacement Base tab: Partial displacement calculations reflecting Base Case Potential Queue with OR QFs deferring like-for-like,
  - Displacement AC tab: Partial displacement calculations reflecting AC Case Potential Queue and the 20 MW West Side Solar QF added with OR QFs deferring like-for-like, and
  - Displacement tab: summarizes the calculations in “Displacement Base” and “Displacement AC” tabs.
- “REC 6.2 Verify AC Study \_2017 04 20 (wQueue)”: Summarizes Attributes of the 2017 IRP Thermal Resources. Specifically, the avoided cost study provided for evaluation of 20 MW West Side Solar, next deferrable resource is the -200 MW SCCT in 2033, and the “2033 200 MW DJ” tab shows the thermal attributes of Base

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UM 1802 / PacifiCorp  
April 28, 2017  
REC Data Request 6.2

case and AC case versions of this thermal resource.

- “REC 6.2 - UM1802 - 1a - GRID AC Study CONF\_2017 04 26 Solar”: net power costs (NPC) template file used to process GRID output files (study period 2018 through 2027) to calculate avoided energy costs.
- “REC 6.2 - UM1802 - 1b - GRID AC Study CONF\_2017 04 26 Solar”: NPC template file used to process GRID output files (study period 2028 through 2037) to calculate avoided energy costs.
- “REC 6.2 - UM1802 - 1 --- Avoided Cost Study\_2017 04 26 Solar”: Avoid cost study file used to calculate monthly heavy load hour (HLH) / light load hour (LLH) avoided cost prices, combining both avoided capacity costs (based on resource costs of partially deferred IRP resource) and GRID based avoided energy costs, and also reflecting application of market price floor.
- “REC 6.2 - UM1802 - 1 --- Avoided Cost Study\_2017 04 26 Solar (without Market Floor)”: Avoid cost study file used to calculate monthly HLH / LLH avoided cost prices which combines both avoided capacity costs (based on resource costs of partially deferred IRP resource) and GRID based avoided energy costs, and without market price floor.

The confidential attachment is designated as Protected Information under Order No. 16-456 and may only be disclosed to qualified persons as defined in that order.

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**Table 1**  
**Avoided Cost Prices**  
**West Solar QF 20.0 MW and 28.8% CF**

Year	Capacity Price \$/kW-yr	Energy Only Price \$/MWh <sup>(2)</sup>	Total Price @ 28.8% Capacity Factor \$/MWh
2018	\$0.00	\$26.58	\$26.58
2019	\$0.00	\$27.87	\$27.87
2020	\$0.00	\$29.34	\$29.34
2021	\$0.00	\$31.52	\$31.52
2022	\$0.00	\$34.50	\$34.50
2023	\$0.00	\$38.54	\$38.54
2024	\$0.00	\$42.31	\$42.31
2025	\$0.00	\$44.59	\$44.59
2026	\$0.00	\$46.40	\$46.40
2027	\$0.00	\$48.26	\$48.26
2028	\$0.00	\$49.40	\$49.40
2029	\$0.00	\$50.52	\$50.52
2030	\$0.00	\$52.19	\$52.19
2031	\$0.00	\$53.39	\$53.39
2032	\$0.00	\$54.44	\$54.44
2033	\$120.84	\$16.83	\$68.55
2034	\$123.77	\$19.70	\$72.93
2035	\$126.75	\$25.13	\$79.92
2036	\$129.84	\$26.56	\$82.87
2037	\$132.99	\$37.93	\$96.00

Capacity Contribution		
Type	East	West
Wind	15.8%	11.8%
Fixed	37.9%	53.9%
Tracking	59.7%	64.8%
Gas	100.0%	100.0%
Hydro	100.0%	100.0%

15 Year Strating 2018	Levelized Prices (Nominal) @ 6.57% Discount Rate (1)	Discount Rate - 2017 IRP
15 Year Strating 2018	\$/kW \$4.63	6.57%
	\$/MWh \$38.40	<---- Calculated Monthly
20 Year Strating 2018	\$/kW \$19.11	
20 Year Strating 2018	\$/MWh \$37.16	<---- Calculated Monthly

Footnotes:  
 (1) Discount Rate - 2017 IRP  
 (2) 'Energy Only' is the GRID calculated costs and includes some capacity costs.

## **OPUC Data Request 2**

In general, does the Company find the per kWh prices paid to QFs under the nonstandard methodology to be greater or less than standard rates? If the general conclusion varies by state, please explain.

### **Response to OPUC Data Request 2**

Generally, per kilowatt-hour (kWh) prices paid to qualifying facilities (QF) under the non-standard avoided cost pricing methodology are less than standard avoided cost pricing rates.

### **OPUC Data Request 3**

Staff believes that QF contracts executed using nonstandard avoided cost prices as a share of all of PacifiCorp's QF contracts is an indicator of the robustness and fairness of the nonstandard contract methodology. Please provide the following information by state for QF contracts executed on or after January 1, 2005 using standard avoid cost prices:

- (a) Project name,
- (b) State,
- (c) Technology (wind, solar, hydro, etc.),
- (d) Capacity in MW,
- (e) Whether renewable attributes are transferred to PacifiCorp, and if so, during what years,
- (f) Month and year contract executed,
- (g) Contract term in years,
- (h) Contracted commercial operation month and year,
- (i) Month and year of actual operational status, if applicable, and
- (j) Current status, e.g., operating, under development, delayed, expired, terminated; if terminated, the reason for termination

### **Response to OPUC Data Request 3**

Please refer to Attachment OPUC 3.

Standard (Schedule 37) - Qualifying Facility (QF) Power Purchase Agreements (PPA)

OPUC 3 subpart (a)	OPUC 3 subpart (b)	OPUC 3 subpart (c)	OPUC 3 subpart (d)	OPUC 3 subpart (e)		OPUC 3 subpart (f)	OPUC 3 subpart (g)	OPUC 3 subpart (h)	OPUC 3 subpart (i)	OPUC 3 subpart (j)
Project Name	State	Technology	Capacity (megawatts (MW))	Renewable Energy Credit (REC) Entitlement	REC Years	PPA Execution / Renewal	PPA Term (Years)	PPA Commercial Operation Date (COD)	Actual Operation Date	Current Status
Loyd Ferry	OR	Hydro	0.07	NO	-	Jul-16	1	Jan-85	Jan-85	Operating
Roush Hydro, Inc	OR	Hydro	0.08	NO	-	Jul-16	1	Jan-85	Jan-85	Operating
Mountain Energy, Inc	OR	Hydro	0.05	NO	-	Nov-07	15	Jan-86	Jan-86	Operating
Thayn Ranch Hydro (Green River Hydro)	UT	Hydro	0.58	NO	-	Sep-16	20	Apr-92	Apr-92	Operating
City of Buffalo	WY	Hydro	0.20	NO	-	Dec-15	1	Aug-97	Aug-97	Operating
Ballard Hog Farms Inc	UT	Methane	0.05	NO	-	Sep-12	7	Oct-03	Oct-03	Operating
Draper Irrigation Company	UT	Hydro	0.51	NO	-	Feb-12	20	Sep-04	Sep-04	Operating
Hill Air Force Base	UT	Methane	2.46	YES	Term	Jan-05	20	Jan-05	Jan-05	Operating
Douglas County Forest Products (Douglas County Inc)	OR	Biomass	6.25	NO	-	Jul-15	5	Aug-06	Aug-06	Operating
Middle Fork Irrigation District	OR	Hydro	3.70	NO	-	Jan-07	15	Jan-07	Jan-07	Operating
Oregon Environmental Industries, LLC (Dry Creek, Medford)	OR	Methane	3.20	NO	-	Aug-06	15	Jan-07	Jan-07	Operating
Evergreen BioPower, LLC (Frieses Lumber)	OR	Biomass	10.00	NO	-	Jan-07	10	Nov-07	Nov-07	Operating
Finley Bioenergy, LLC (Finley Buttes)	OR	Methane	4.80	NO	-	Oct-07	15	Dec-07	Dec-07	Operating
City of Albany, Department of Public Works	OR	Hydro	0.50	NO	-	Apr-08	15	Jan-09	Jan-09	Operating
Cottonwood Hydro Lower (Alta Energy)	UT	Hydro	0.85	NO	-	Sep-15	10	Mar-09	Mar-09	Operating
Stahlbush Island Farms, Inc	OR	Methane	1.60	ETO %	ETO Contract	Sep-14	3	Jun-09	Jun-09	Operating
Big Top LLC (Oregon Windfarms LLC)	OR	Wind	1.65	NO	-	Dec-08	20	Aug-09	Aug-09	Operating
Butter Creek Power LLC (Oregon Windfarms LLC)	OR	Wind	4.95	NO	-	Dec-08	20	Aug-09	Aug-09	Operating
Oregon Trail Windfarm LLC (Oregon Windfarms LLC)	OR	Wind	9.90	NO	-	Dec-08	20	Aug-09	Aug-09	Operating
Pacific Canyon Windfarm LLC (Oregon Windfarms LLC)	OR	Wind	8.25	NO	-	Jan-12	15	Aug-09	Aug-09	Operating
Sand Ranch Windfarm LLC (Oregon Windfarms LLC)	OR	Wind	9.90	NO	-	Dec-08	15	Aug-09	Aug-09	Operating
Thremmie Canyon Wind 1 LLC	OR	Wind	9.90	NO	-	Jun-09	20	Sep-09	Sep-09	Operating
Wagon Trail LLC (Oregon Windfarms LLC)	OR	Wind	3.30	NO	-	Dec-08	20	Sep-09	Sep-09	Operating
Ward Butte Windfarm LLC (Oregon Windfarms LLC)	OR	Wind	6.60	NO	-	Dec-08	20	Sep-09	Sep-09	Operating
Four Corners Windfarm LLC (Oregon Windfarms LLC)	OR	Wind	10.00	NO	-	Jun-09	20	Sep-09	Sep-09	Operating
Four Mile Canyon Windfarm LLC (Oregon Windfarms LLC)	OR	Wind	10.00	NO	-	Jun-09	20	Sep-09	Sep-09	Operating
Bell Mountain Hydro LLC (Ted Sorenson)	ID	Hydro	0.28	NO	-	Nov-09	20	Dec-09	Dec-09	Operating
Lower Valley Energy (combination of Strawberry Creek and/or Swift Creek)	WY	Hydro	1.70	NO	-	Jul-14	3	Feb-10	Feb-10	Operating
Oregon Institute of Technology (OIT)	OR	Geothermal	0.28	NO	-	Apr-10	20	Apr-10	Apr-10	Operating
Swalley Irrigation District	OR	Hydro	0.75	Energy Trust of Oregon (ETO) %	ETO Contract	Nov-09	20	Apr-10	Apr-10	Operating
Central Oregon Irrigation District (COID) (Juniper Ridge)	OR	Hydro	5.00	NO	-	Aug-09	20	Oct-10	Oct-10	Operating
Oregon State University (OSU) (Oregon State Board of Higher Education (OSBHE))	OR	Natural Gas	6.50	NO	-	Nov-10	10	Nov-10	Nov-10	Operating
Farmers Irrigation District (Copper Dam Plant)	OR	Hydro	4.80	ETO %	ETO Contract	Dec-10	15	Jan-11	Jan-11	Operating
Cargill, Q3 (Kettle Butte Dairy)	ID	Methane	1.70	NO	-	Jun-11	10	Jun-11	Jun-11	Operating
J Bar 9 Ranch	WY	Wind	0.10	YES	Term	Aug-14	4	Aug-11	Aug-11	Operating
Roseburg Landfill Gas Energy, LLC (Roseburg LFG Energy) (Roseburg South Gate)	OR	Methane	1.60	NO	-	Jun-11	20	Dec-11	Dec-11	Operating
Power County Wind Park North	ID	Wind	22.50	NO	-	Aug-10	20	Dec-11	Dec-11	Operating
Power County Wind Park South	ID	Wind	22.50	NO	-	Aug-10	20	Dec-11	Dec-11	Operating
Curtiss Livestock (Cameron A. Curtiss)	OR	Hydro	0.08	NO	-	Nov-11	5	Jan-12	Jan-12	Operating
C Drop Hydro, LLC	OR	Hydro	1.10	NO	-	Oct-11	15	May-12	May-12	Operating
Cottonwood Hydro Upper (Alta Energy)	UT	Hydro	0.26	NO	-	Sep-15	10	May-12	May-12	Operating
RES Ag - Oak Lea, LLC	OR	Methane	0.17	NO	-	Dec-11	15	May-12	May-12	Operating
City of Portland, Portland Water Bureau	OR	Hydro	0.03	NO	-	Dec-11	15	Nov-12	Nov-12	Operating
TMF Biofuels (Three Mile Digester)	OR	Methane	4.80	NO	-	Feb-12	10	Dec-12	Dec-12	Operating
Wasatch Integrated Waste Management District (Davis County Waste Management)	UT	Methane	1.60	NO	-	Jan-13	20	Jan-13	Jan-13	Operating
Bureau of Land Management - Rawlins Office	WY	Wind	0.10	YES	Term	Aug-12	10	Mar-13	Mar-13	Operating
Farm Power Misty Meadow, LLC	OR	Methane	0.75	NO	-	Mar-12	15	May-13	May-13	Operating
Luckey, Paul	CA	Hydro	0.05	YES	Term	Dec-13	5	Jan-14	Jan-14	Operating
eBay - Solar	UT	Solar	0.52	NO	-	Sep-12	10	Jan-14	Jan-14	Operating
Three Sisters Irrigation District	OR	Hydro	0.70	ETO %	ETO Contract	Feb-14	15	Aug-14	Aug-14	Operating
St. Anthony	ID	Hydro	0.50	SHARE	2024-2033	Dec-12	20	Oct-14	Oct-14	Operating
Dorena Hydro, LLC	OR	Hydro	6.10	NO	-	Apr-11	20	Dec-14	Dec-14	Operating
Yakima Tieton (Cowiche)	WA	Hydro	1.47	NO	-	Mar-15	4	Mar-15	Mar-15	Operating
SunEdison DB 18 LLC - South Milford Solar	UT	Solar	2.33	NO	-	May-13	20	Apr-15	Apr-15	Operating
City of Astoria	OR	Hydro	0.03	ETO %	ETO Contract	Jan-15	15	Apr-15	Apr-15	Operating
Yakima Tieton (Orchards)	WA	Hydro	1.40	NO	-	Apr-15	4	Apr-15	Apr-15	Operating
EBD Hydro, LLC (45 Mile Hydro) (Apple, Inc.)	OR	Hydro	2.99	NO	-	Apr-12	15	Jun-15	Jun-15	Operating
Laho Solar, LLC	UT	Solar	3.00	NO	-	Oct-13	20	Jul-15	Jul-15	Operating
Milford Flat Solar, LLC	UT	Solar	3.00	NO	-	Oct-13	20	Jul-15	Jul-15	Operating
Granite Peak Solar, LLC	UT	Solar	3.00	NO	-	Oct-13	20	Aug-15	Aug-15	Operating
Beryl Solar, LLC	UT	Solar	3.00	NO	-	Jun-13	20	Aug-15	Aug-15	Operating
Consolidated Irrigation Company / District	ID	Hydro	0.48	NO	-	Sep-15	20	Sep-15	Sep-15	Operating
SunEdison Solar XVII Project 1 LLC (REUT Origination - Fiddler's Canyon Solar 1)	UT	Solar	3.00	NO	-	May-13	20	Sep-15	Sep-15	Operating
SunEdison Solar XVII Project 2 LLC (REUT Origination - Fiddler's Canyon Solar 2)	UT	Solar	3.00	NO	-	May-13	20	Sep-15	Sep-15	Operating
Brigham Young University Idaho (BYU Idaho)	ID	Natural Gas	5.60	NO	-	Apr-15	2	Sep-15	Sep-15	Operating
Greenville Solar, LLC	UT	Solar	2.19	NO	-	Jun-13	20	Oct-15	Oct-15	Operating
Mariah Wind, LLC	OR	Wind	10.00	NO	-	Apr-14	15	Dec-15	Delayed	Delayed
Orem Family Wind, LLC	OR	Wind	10.00	NO	-	Apr-14	15	Dec-15	Delayed	Delayed
Cedar Valley Solar, LLC	UT	Solar	3.00	NO	-	Jun-13	20	Dec-15	Dec-15	Operating
SunEdison DB24 LLC (REUT Origination - Milford Solar 2)	UT	Solar	2.97	NO	-	Apr-15	20	Dec-15	Dec-15	Operating
SunEdison Solar XVII Project 3 LLC (REUT Origination - Fiddler's Canyon Solar 3)	UT	Solar	3.00	NO	-	Oct-13	20	Dec-15	Dec-15	Operating
Buckhorn Solar, LLC	UT	Solar	3.00	NO	-	Jun-13	20	Dec-15	Dec-15	Operating
Chopin Wind, LLC	OR	Wind	10.00	NO	-	May-14	20	Jun-16	Oct-16	Operating
Monroe Hydro, LLC (Apple, Inc.)	OR	Hydro	0.30	NO	-	Apr-12	15	Jun-16	Jun-16	Operating
Klamath Falls Solar 1, LLC (Ewauna Solar LLC)	OR	Solar	0.83	NO	-	Mar-15	20	Jul-16	Jul-16	Operating
Surprise Valley Electrification Corporation	OR	Geothermal	3.65	YES	Term	Aug-16	5	Sep-16	Sep-16	Operating
Tooele Army Depot (Wind 1)	UT	Wind	1.50	NO	-	May-16	10	Nov-16	Nov-16	Operating
Tooele Army Depot (Wind 2)	UT	Wind	1.70	NO	-	May-16	10	Nov-16	Nov-16	Operating
Oregon Solar Land Holdings (OSLH, LLC) - Collier Solar	OR	Solar	9.90	SHARE	2024-2031	Jun-15	15	Nov-16	Delayed	Delayed
Quichappa Solar 1	UT	Solar	3.00	NO	-	Oct-13	20	Nov-16	Construction	Construction
Chloquin Solar, LLC (Saturn Power Corporation)	OR	Solar	9.90	SHARE	2024-2036	Oct-15	20	Dec-16	Construction	Construction
Tumbleweed Solar, LLC (Saturn Power Corporation)	OR	Solar	9.90	SHARE	2024-2036	Oct-15	20	Dec-16	Construction	Construction
Quichappa Solar 2	UT	Solar	3.00	NO	-	Oct-13	20	Dec-16	Construction	Construction
Cypress Creek Renewables - Merrill Solar LLC	OR	Solar	10.00	SHARE	2024-2031	Jun-15	15	Dec-16	Delayed	Delayed
Norwest Energy 2 LLC (Neff)	OR	Solar	9.90	NO	-	May-15	15	Dec-16	Construction	Construction
Norwest Energy 7 LLC (Eagle Point)	OR	Solar	9.90	NO	-	May-15	15	Dec-16	Construction	Construction
Norwest Energy 9 LLC (Pendleton)	OR	Solar	6.60	SHARE	2024-2031	Jun-15	15	Dec-16	Delayed	Delayed
Obsidian Renewables LLC - Beauty Solar	OR	Solar	5.00	NO	-	Aug-14	20	Dec-16	Construction	Construction

Obsidian Renewables LLC - Black Cap II (BC Solar, LLC)	OR	Solar	8.00	NO	-	Jul-14	20	Dec-16	Construction	Construction
Obsidian Renewables LLC - Ivory Pine Solar	OR	Solar	10.00	NO	-	Jul-14	20	Dec-16	Delayed	Delayed
Obsidian Renewables LLC - Sprague River Solar	OR	Solar	7.00	NO	-	Jul-14	20	Dec-16	Delayed	Delayed
OR Solar 2, LLC (Agate Bay Solar)	OR	Solar	10.00	SHARE	2024-2036	Jun-15	20	Dec-16	Delayed	Delayed
OR Solar 3, LLC (Turkey Hill Solar)	OR	Solar	10.00	SHARE	2024-2036	Jun-15	20	Dec-16	Delayed	Delayed
OR Solar 5, LLC (Merrill Solar)	OR	Solar	8.00	SHARE	2024-2036	Jun-15	20	Dec-16	Delayed	Delayed
OR Solar 6, LLC (Lakeview Solar)	OR	Solar	10.00	SHARE	2024-2036	Jun-15	20	Dec-16	Delayed	Delayed
OR Solar 7, LLC (Jacksonville Solar)	OR	Solar	10.00	SHARE	2024-2036	Jun-15	20	Dec-16	Delayed	Delayed
OR Solar 8, LLC (Dairy Solar)	OR	Solar	10.00	SHARE	2024-2036	Jun-15	20	Dec-16	Delayed	Delayed
Woodline Solar LLC	OR	Solar	8.00	SHARE	2024-2037	Jun-15	20	Dec-16	Delayed	Delayed
Quichapa Solar 3	UT	Solar	3.00	NO	-	Oct-13	20	Jan-17	Construction	Construction
Adams Solar Center, LLC	OR	Solar	10.00	Yes	Term (2016 RFP)	Aug-14	20	Apr-17	Under Development	Under Development
Bly Solar Center, LLC	OR	Solar	8.50	Yes	Term (2016 Request for Proposals (RFP))	Jul-14	20	Apr-17	Under Development	Under Development
Elbe Solar Center, LLC	OR	Solar	10.00	Yes	Term (2016 RFP)	Aug-14	20	Apr-17	Under Development	Under Development
Bear Creek Solar Center, LLC	OR	Solar	10.00	Yes	Term (2016 RFP)	Aug-14	20	Oct-17	Under Development	Under Development
Klamath Falls Solar 2, LLC (Ewanua Solar 2 LLC)	OR	Solar	2.90	SHARE	2024-2037	Jun-15	20	Nov-17	Oct-16	Operating
Norwest Energy 4 LLC (Bonanza)	OR	Solar	4.80	NO	-	May-15	15	Jul-18	Delayed	Delayed
Orchard Wind Farm 1, LLC	OR	Wind	10.00	SHARE	2024-2039	Jun-16	20	Oct-20	Under Development	Under Development
Orchard Wind Farm 2, LLC	OR	Wind	10.00	SHARE	2024-2039	Jun-16	20	Oct-20	Under Development	Under Development
Orchard Wind Farm 3, LLC	OR	Wind	10.00	SHARE	2024-2039	Jun-16	20	Oct-20	Under Development	Under Development
Orchard Wind Farm 4, LLC	OR	Wind	10.00	SHARE	2024-2039	Jun-16	20	Oct-20	Under Development	Under Development