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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of the Application of Rocky Mountain Power to Establish Export Credits for Customer Generated Electricity	Docket No. 17-035-61 Phase 2
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SURREBUTTAL TESTIMONY OF SPENCER S. YANG, PH.D.

ON BEHALF OF

VOTE SOLAR

September 15, 2020

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1 **I. INTRODUCTION**

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

3 A. My name is Spencer S. Yang. I am a Principal with Bates White, LLC. My business address
4 is 2001 K Street NW, North Building, Suite 500, Washington, DC 20006.

5 **Q. Have you submitted testimony previously in this docket?**

6 A. Yes. I filed affirmative testimony in Phase 2 of this docket on behalf of Vote Solar.¹ This
7 surrebuttal testimony is also sponsored by Vote Solar.

8 **Q. Please summarize your educational and professional background.**

9 A. I received a Ph.D. in high energy physics from Columbia University in 1996. From 1996 to
10 2003, I was employed by the California Institute of Technology as a postdoctoral scholar,
11 senior postdoctoral scholar, and then staff scientist in nuclear and high energy physics, and was
12 a visiting scholar at Stanford University. Since 2003, I have served as a Principal with Bates
13 White, LLC. During this time period, I have performed engineering, transmission, reliability,
14 interconnection, renewable energy, value of solar, qualifying facility (“QF”), Public Utility
15 Regulatory Policies Act, power purchase agreement, power flow, production cost, and market
16 power analyses, and I have submitted expert testimony before the Federal Energy Regulatory
17 Commission (“FERC”); state regulatory proceedings in Maryland, Oregon, Texas, and Virginia
18 in connection with, *inter alia*, the Exelon–Constellation merger, solar QF interconnection,
19 Houston Import Project, and certificates of public convenience and necessity to construct a
20 500-kV transmission line; and civil courts in Mississippi and Texas. A copy of my curriculum
21 vitae that includes a complete list of my testimony was attached to my affirmative testimony.²

¹ Vote Solar, *Revised Affirmative Testimony of Spencer S. Yang*, May 8, 2020 (“*Yang Revised Affirmative*”).

² *Yang Revised Affirmative*, Exhibit 1-SSY.

22 **II. PURPOSE OF TESTIMONY**

23 **Q. What is the purpose of your surrebuttal testimony?**

24 A. I was asked to provide my expert opinion of the Rebuttal Testimony of Philip Hayet (the “Hayet
25 Rebuttal”) submitted on behalf of the Office of Consumer Services (“OCS”). Specifically, my
26 testimony focuses on Mr. Hayet’s claim that it was not appropriate for me to use PacifiCorp’s
27 Open Access Transmission Tariff (“OATT”) price for the avoided transmission capacity cost
28 associated with Customer Generated (“CG”) solar. I am also submitting this testimony to
29 correct a clerical error in my Revised Affirmative Testimony.

30 My lack of comments on any components of other parties’ affirmative, direct, or rebuttal
31 testimony should not be interpreted as acquiescence or agreement. I reserve the right to express
32 additional opinions, to amend or supplement the opinions in this testimony, or to provide
33 additional rationale for these opinions as additional documents are produced and new facts are
34 introduced during discovery and trial. I also reserve the right to express additional opinions in
35 response to any opinions or testimony offered by other parties in this proceeding.

36 **III. SUMMARY OF CONCLUSION**

37 **Q. Please provide a summary of your opinions regarding the Hayet Rebuttal.**

38 A. Mr. Hayet incorrectly asserts that it is not appropriate to use PacifiCorp’s OATT transmission
39 price for the avoided transmission capacity cost associated with CG because PacifiCorp’s
40 OATT transmission price includes costs that cannot be avoided by CG exports such as certain
41 general plant and administrative costs and general expenses.³ However, I did not include costs
42 that cannot be avoided by CG in my valuation of the avoided transmission capacity costs of
43 CG solar. Instead, I discounted PacifiCorp’s firm OATT transmission rate to the proportion
44 that could be reasonably offset by CG exports using Dr. Michael Milligan’s effective load

³ *Hayet Rebuttal*, lines 638-45.

45 carrying capacity (“ELCC”) or effective CG capacity.⁴ Moreover, it is important to recognize
46 that PacifiCorp’s firm OATT transmission rates are based on average costs, not marginal costs,
47 and thus this approach may undervalue the transmission costs avoided by CG exports, to the
48 extent that a utility’s marginal transmission cost is higher than its average cost.

49 Marginal cost is the incremental cost of the last unit produced while average cost is the total
50 cost divided by the total units produced. As such, average cost would steadily increase to the
51 extent that the marginal cost is higher than the average cost.⁵ Indeed, Figures 3 and 4 in my
52 affirmative testimony show that PacifiCorp’s FERC-approved average firm transmission rate
53 and cost went up steadily over time – *i.e.*, from \$24.30/kW-year (or \$4.3 billion) in 2010 to
54 \$32.02/kW-year (or \$6.4 billion) in 2018, indicating that PacifiCorp’s marginal transmission
55 rate/cost is higher than its average transmission rate/cost.⁶ Moreover, this average firm
56 transmission rate is expected to rise further after PacifiCorp is able to include major
57 transmission projects like the “deferrable” Gateway South project into the rate base. CG
58 exports can avoid and defer PacifiCorp’s need for transmission investments in proportion to
59 the likelihood that CG exports will occur at times of peak demand on the transmission system.⁷

60 **Q. What is the clerical error from your May 8, 2020 testimony that you wish to correct?**

61 A. As I explain in my affirmative testimony, I conclude that the value of avoided Transmission
62 and Distribution (“T&D”) capacity costs due to CG exports in RMP’s service area is at least
63 1.86 cents/kWh, as shown in Table 1 below.

⁴ *Yang Revised Affirmative*, lines 102-07, 245-52.

⁵ This relationship between average and marginal cost can be explained via an exam score analogy. Suppose that Bob’s average grade in a course was 80. If he were to get a score of 90 on his next exam, this would pull his average grade up and his new average score would be higher than 80. Stated differently, Bob’s average score would increase to the extent that his marginal score on a next exam is higher than his average grade.

⁶ *Yang Revised Affirmative*, lines 229-30.

⁷ *Id.* at lines 216-30.

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Table 1: Value of Avoided T&D Capacity Costs (2021 cents/kWh)⁸

Value Category	Value in 2021 cents/kWh
Avoided T Value	1.34
Avoided D Value	0.52
Avoided T&D Value	1.86

65 However, Line 43 of my affirmative testimony incorrectly uses the figure “2.02 cents/kWh”
 66 rather than 1.86 cents/kWh. The use of the “2.02 cents/kWh” was a clerical error and should
 67 be revised to reflect the 1.86 cents/kWh Avoided T&D Value cited throughout my affirmative
 68 testimony.⁹

69 **IV. REBUTTAL OF HAYET TESTIMONY**

70 **Q. What are avoided transmission capacity costs?**

71 A. Avoided transmission capacity costs represent the costs that utilities and ratepayers can save
 72 from avoided or postponed transmission infrastructure upgrades. CG exports in RMP’s service
 73 territory are consumed by customers on the distribution system, reducing present and future
 74 electricity transmission needs. CG exports relieve RMP’s requirement to supply power at a
 75 particular location using its transmission network and therefore effectively reduce transmission
 76 congestion/constraints, transmission losses, and the need for additional transmission
 77 capacity.¹⁰

78 **Q. Did you rely on RMP’S OATT transmission rate to calculate the avoided transmission
 79 costs associated with CG solar?**

80 A. Yes, I used PacifiCorp’s current FERC-approved firm transmission rate of about \$32.74/kW-
 81 year as a reasonable proxy for RMP’s avoided transmission capacity costs.¹¹

⁸ *Id.* at line 46.

⁹ *Id.* at lines 46, 341, 342, 346.

¹⁰ *Id.* at lines 180-87.

¹¹ *Id.* at lines 188-92.

82 **Q. Why did you use PacifiCorp’s OATT transmission rate?**

83 A. I reasoned that a utility’s existing firm transmission rate is the utility’s opportunity cost to avoid
84 additional firm transmission made available to the extent that CG exports reduce peak loads
85 and reduced peak loads on the transmission system would make incremental firm transmission
86 capacity available to serve other transmission customers. Moreover, it is important to
87 recognize that PacifiCorp does not have to actually post incremental additional capacity for
88 sale to other transmission customers to monetize benefits from reduced peak loads. Rather,
89 the benefits accrue automatically because CG exports help PacifiCorp to reduce current peak
90 load and future load growth, thus avoiding and deferring the need for load-related T&D
91 investments.¹² Notably, PacifiCorp has publicly stated that this formula rate provides the “best
92 mechanism” to estimate a rate that reflects an “accurate representation of the Company’s
93 transmission cost[.]”¹³ Thus, the OATT firm transmission rate can be used as a reasonable
94 proxy to measure RMP’s avoided transmission costs.

95 **Q. PacifiCorp’s firm transmission rate includes costs not related to CG exports. Did you**
96 **assume that all transmission costs are avoidable as the Hayet Testimony claims?**

97 A. No. I did not assume that all transmission costs included in PacifiCorp’s firm OATT
98 transmission rate are avoidable. I only allocated a fraction of transmission costs that
99 PacifiCorp would otherwise have to incur but for CG exports.¹⁴

100 **Q. How did you allocate the transmission costs that PacifiCorp would otherwise incur but**
101 **for CG exports?**

102 A. I discounted PacifiCorp’s firm OATT transmission rate to the proportion that could be
103 reasonably offset by CG exports using Dr. Milligan’s effective load carrying capacity or ELCC.

¹² *Id.* at lines 234-40.

¹³ PacifiCorp, *Testimony of Kenneth T. Houston on behalf of PacifiCorp*, FERC Docket No. ER11-3643, 9:5-10, May 24, 2011, http://www.oasis.oati.com/woa/docs/PPW/PPWdocs/20110526_FERCRC_AttachD_Houston.pdf.

¹⁴ *Yang Revised Affirmative*, lines 246-52.

104 My calculation of the avoided transmission costs is the product of Dr. Milligan's CG export's
105 ELCC (about 28%)¹⁵ times PacifiCorp's OATT firm transmission rate.

106 **Q. Is your use of PacifiCorp's OATT firm transmission rate unique?**

107 A. No. As I explain in my affirmative testimony, Oregon and Maine also used a firm transmission
108 rate as a reasonable proxy in valuing avoided transmission capacity benefits attributable to CG
109 solar. Specifically, in Maine's value of solar study, Clean Power Research used historical
110 transmission tariffs as a proxy for the cost of future transmission that is avoidable or deferrable
111 through the use of distributed generation. In Oregon's value of solar study, Portland General
112 Electric used Bonneville Power Administration's firm transmission rate of \$21.52 per kW-year
113 for avoided transmission.¹⁶

114 **Q. What was your final calculation for avoided transmission capacity costs associated with
115 CG solar?**

116 A. I calculated a levelized annual avoided transmission cost of 1.23 cents/kWh in 2021 dollars, or
117 1.34 cents/kWh inclusive of line losses.¹⁷

118 **V. CONCLUSION**

119 **Q. Does this conclude your testimony?**

120 A. Yes.

¹⁵ Vote Solar, *Revised Affirmative Testimony of Michael Milligan*, lines 528-31.

¹⁶ *Yang Revised Affirmative*, lines 166-74.

¹⁷ *Yang Revised Affirmative*, lines 272-74.

CERTIFICATE OF SERVICE

I hereby certify that on this 15th day of September, 2020 a true and correct copy of the foregoing was served by email upon the following:

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