Selendy & Gay PLLC
Jennifer M. Selendy
Philippe Z. Selendy
Joshua S. Margolin
Shelby P. Rokito
1290 Avenue of the Americas
New York, NY 10104
212-390-9000
jselendy@selendygay.com
pselendy@selendygay.com
jmargolin@selendygay.com
srokito@selendygay.com

Attorneys for Vote Solar

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**

SUR-SURREBUTTAL TESTIMONY OF SPENCER S. YANG , PH.D.

ON BEHALF OF

VOTE SOLAR

February 22, 2021

Table of Contents

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Spencer S. Yang. My business address is 2001 K Street NW, North Building, Suite 500, Washington, DC 20006.

Q. On whose behalf are you submitting this sur-surrebuttal testimony?

A. I am submitting this sur-surrebuttal testimony on behalf of Vote Solar.

Q. By whom are you employed and in what capacity?

A. I am a Principal with Bates White, LLC., an independent economic consulting firm.

Q. Please summarize your education and professional experience.

A. I received a Ph.D. in high energy physics from Columbia University in 1996. From 1996 to 2003, I was employed by the California Institute of Technology as a postdoctoral scholar, senior postdoctoral scholar, and then staff scientist in nuclear and high energy physics, and was a visiting scholar at Stanford University. Since 2003, I have served as a Principal with Bates White, LLC. During this time period, I have performed engineering, transmission, reliability, interconnection, renewable energy, value of solar, qualifying facility ("QF"), Public Utility Regulatory Policies Act ("PURPA"), power purchase agreement, power flow, production cost, and market power analyses, and I have submitted expert testimony before the Federal Energy Regulatory Commission ("FERC"); state regulatory proceedings in Maryland, Oregon, Texas, and Virginia in connection with, inter alia, the Exelon–Constellation merger, solar QF interconnection, Houston Import Project, and certificates of public

convenience and necessity to construct a 500-kV transmission line; and civil courts in Mississippi and Texas. Exhibit 1-SSY to my Revised Affirmative Testimony, filed May 8, 2020, provides a statement of my qualifications and experience.

Q. Have you previously testified before the Utah Public Service Commission ("PSC" or "Commission")?

A. Yes. I submitted Affirmative Testimony and Surrebuttal Testimony in Phase 2 of this Docket.[1] I also testified at the hearing before the Commission on October 2, 2020.

II. PURPOSE OF TESTIMONY

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

A. My testimony addresses the proper annual carrying charge rate that should be applied to calculate avoided capacity costs.

III. SUMMARY OF CONCLUSIONS

Q. Please provide a brief summary of your principal conclusions.

A. First, I find that it is appropriate to use the annual carrying charge rate Rocky Mountain Power ("RMP") used in its current marginal cost of service study in Utah. That rate is 7.82% for avoided generation capacity cost and 7.91% for avoided distribution capacity cost. In the Commission's October 30, 2020 Order, the Commission erroneously reduced Vote Solar's proposed avoided generation capacity

[1] Vote Solar, *Revised Affirmative Testimony of Spencer S. Yang*, May 8, 2020 ("*Yang Revised Affirmative*"); Vote Solar, *Surrebuttal Testimony of Spencer S. Yang*, Sept. 15, 2020 ("*Yang Surrebuttal*").

cost by 17% from 2.771 cents/kWh to 2.31 cents/kWh on the assumption that Vote Solar had used a carrying charge of 9.39%. Because Vote Solar's proposed avoided generation capacity cost was based on a carrying charge of 6.959%, the Commission should not have reduced the value at all, and instead should have increased the avoided generation capacity cost from 2.771 cents/kWh to 2.966 cents/kWh. Vote Solar's witness Dr. Michael Milligan addresses this issue in his Sur-surrebuttal Testimony.[2]

Second, I find that the Commission erred in adjusting the avoided transmission capacity cost that I proposed in my Revised Affirmative Testimony to account for the 7.82% annual carrying charge rate: the 1.34 cents/kWh value I proposed (levelized over 20 years) had already been annualized based on PacifiCorp's annual transmission rate. Without levelization, this value would translate to 1.15 cents/kWh in 2021.

My lack of comments on any component of other parties' testimony or any order issued by the Commission should not be interpreted as acquiescence or agreement. I reserve the right to express additional opinions, to amend or supplement the opinions in this testimony, or to provide additional rationale for these opinions as additional documents are produced and new facts are introduced. I also reserve the right to express additional opinions in response to any opinions, testimony, or orders in this proceeding.

[2] Vote Solar, *Sur-surrebuttal Testmony of Michael Milligan*, Feb. 22, 2021 ("*Milligan Sur-surrebuttal*"), lines 59-70.

IV. THE PROPER CARRYING CHARGE RATE FOR AVOIDED GENERATION AND DISTRIBUTION CAPACITY COSTS

Q. What is an economic carrying charge?

A. An economic carrying charge (hereinafter, "carrying charge") is a measure to annualize the full capital cost of an asset into an annual cost for use in rate design and other cost analysis. The carrying charge measures the value of deferring the construction of an asset from one year to the next, and, unlike levelized costs, it rises at the rate of inflation every year.[3] The carrying charge uses a formula that calculates the cost of deferring investment by one year. The carrying charge for subsequent years is simply the first-year charge adjusted for annual inflation. The carrying charge has been used in many states, including Utah, in the calculation of avoided capacity costs.[4]

Q. What is a proper way to calculate the carrying charge for use in this proceeding?

A. I conclude that RMP's current marginal cost of service study in Utah is the appropriate tool for determining the carrying charge in this proceeding. RMP's marginal cost of service study measures the change in total cost of service with respect to a small change in the demand of a resource or service at any given time. Since CG

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[3] H. Parmesano, W. Bridgman, *The Role and Nature of Marginal and Avoided Costs in Ratemaking: A Survey*, National Economic Research Associates, Inc., (Jan. 1992), https://www.nera.com/content/dam/nera/publications/archive1/3968.pdf at 6 ("Economic carrying charges rise with the rate of inflation (net of technological progress) and are equivalent to the cost of not deferring an investment, i.e., bringing plant on a year early to meet an increment of load.").

[4] *See, e.g.,* M. Bolinger and R. Wiser, *An Examination of Avoided Costs in Utah*, U.S. Gov't Documents (Utah Regional Depository), (Jan. 7, 2005), https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1022&context=govdocs at 5, Table 1.

exports reduce RMP's electricity demand, the results of the marginal cost of service study, which show RMP's marginal cost of resources required to produce one additional unit of electricity, inform the value that CG exports provide in the form of avoided marginal generation, transmission and distribution capacity costs. RMP's marginal cost of service study in Utah filed on May 8, 2020 estimated annualized marginal cost for each component of service by multiplying the marginal investments for each service by the corresponding annual carrying charge, expressed as a percentage.[5] For example, RMP's annual carrying charge for generation is 7.82% and for distribution is 7.91%.[6]

Q. Why are RMP's annual carrying charge rates under its current marginal cost of service study different for generation and distribution resources?

A. RMP's carrying charge rates differ for generation and distribution resources because the formula used to calculate carrying charge uses values that are different for generation and distribution resources. For example, assumed expected life for RMP's generation and distribution resources under its marginal cost of service study is 20 years and 49 years, respectively.[7]

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[5] PSC Docket No. 20-035-04, RMP, *Direct Testimony of Robert M. Meredith*, May 8, 2020, line 1372, Exhibit RMM-15.

[6] PSC Docket No. 20-035-04, RMP Workpapers RMM 1 – COS (May 8, 2020). The file entitled "MCOS UT GRC 2020.xlsm," Sheet: Charge1, cell: C46 shows 7.82%; cell G46 shows 7.91%. Note that the 7.91% value for distribution includes an Administration & General ("A&G") Expense Loading Factor of 0.61%. The inclusion of this A&G Expense Loading Factor is reasonable because it is designed to account for overhead expenses that increase with investment. *See Yang Refised Affirmative*, line 206 n. 47.

[7] *Id*., cell C18 and G18.

Q. RMP witness Daniel MacNeil asserts that carrying charges from the marginal cost of service study are inappropriate for determining avoided capacity costs. Do you agree?

A. Mr. MacNeil asserted in his Rebuttal Testimony filed on July 15, 2020 that it is not appropriate to use the carrying charges from marginal cost of service studies because: (i) the service study "is intended to produce a reasonable revenue requirement allocation amongst customer classes"; (ii) "[i]t does not represent the cost [RMP] would use to justify acquiring an asset"; and (iii) "it does not represent the cost [RMP] would recover from customers for providing service from that asset."[8] I disagree with Mr. MacNeil's conclusions.

Q. Please explain.

A. Mr. MacNeil's conclusions fail to recognize one of the key applications of the marginal cost of service study: the results of RMP's marginal cost of service study represent the value of RMP's resources at issue in their next best alternative use, known as the "opportunity cost," such as the need to expand generation and distribution infrastructure to meet system load *but for* CG exports. Therefore, it is appropriate to use the carrying charges from a marginal cost study recently conducted in RMP's service territory to perform the avoided capacity cost calculations in this proceeding.

[8] RMP, *Rebuttal Testimony of Daniel J. MacNeil*, July 15, 2020 ("*MacNeil Rebuttal*"), lines 839-43.

Q. Why didn't you use the carrying charge from RMP's current marginal cost of service study in your affirmative testimony?

A. The study was not available at that time. PacifiCorp's marginal cost of service study in California filed April 12, 2018 was the most relevant and current study that I was able to identify as of the writing of my affirmative testimony.[9] If RMP's current marginal cost of service study in Utah had been available, I would have used the carrying charge from that study to determine avoided capacity costs.

Q. What annual carrying charge did the Commission use in its October 30, 2020 Order?

A. In its October 30, 2020 Order, the Commission adopted the annual carrying charge rate of 7.82% based on RMP's current marginal cost of service study in Utah and applied it to *all* of the Vote Solar's proposed capacity costs.[10]

Q. Did the Commission properly apply the annual carrying charge to the avoided capacity costs approved in its October 30, 2020 Order?

A. No. The Commission erroneously assumed that Vote Solar had used a 9.39% in calculating the avoided generation capacity cost and thus erronesouly reduced the value by 17%.[11] Vote Solar's witness Dr. Michael Milligan addresses this issue in his Sur-surrebuttal Testimony.[12] With respect to avoided distribution capacity cost, the

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[9] *Yang Revised Affirmative*, n. 47.

[10] Oct. 30, 2020 Order at 16.

[11] *Id*.

[12] *Milligan Sur-surrebuttal*, lines 59-70.

Commission erroneously assumed that the carrying charge applicable to distribution is the same as the 7.82% carrying charge applicable to generation. However, RMP's carrying charge for distributon is 7.91% under its current marginal cost of service study in Utah.[13] Therefore, I conclude that 7.91% is the proper carrying charge for the calculation of avoided distribution cost.

V. AVOIDED TRANSMISSION CAPACITY COST DOES NOT USE A CARRYING CHARGE

Q. Did the Commission err in reducing Vote Solar's proposed avoided transmission capacity cost in its October 30, 2020 Order?

A. Yes. With respect to avoided transmission capacity cost, the Commission erroneously assumed that the cost proposed in my affirmative testimony was based on a higher carrying charge, and thus improperly reduced the value by 17%. As explained above, a carrying charge is used to convert the full cost of an asset into an annual cost. Since the value I proposed in my affirmative testimony was already annualized based upon PacifiCorp's annual transmission rate, it should not be adjusted to account for the carrying charge rate.[14]

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[13] *Supra* note 6.

[14] *See Yang Revised Affirmative,* lines 190-92 ("I adopted the Current Tariff Approach for this testimony. Specifically, I used PacifiCorp's current FERC-approved firm transmission rate of about $32.74/kW-year as a reasonable proxy for RMP's avoided transmission capacity costs"). Since the value of avoided transmission capacity costs is already annualized on a $/kW-year basis, no carrying charge was applied. In contrast, to calculate avoided distribution costs I used the "Deferable Project Approach" for avoided distribution. *See id.* at lines 206-08. This approach does require the use of a carrying charge rate to annualize the investments on a $/kW-year basis. Had I used the Deferrable Project Approach to calculate avoided transmission cost as I did for avoided distribution costs, then a carrying charge would have been used. However, because I did not use that approach, no carrying charge was applied in my calculation of annual avoided transmission capacity cost.

Q. What value should the Commission have arrived at?

A. Had the Commission not improperly reduced the value of avoided transmission capacity cost to account for a carrying charge, the approved value would have been my one-year avoided transmission capacity cost of 1.15 cents/kWh.

VI. SUMMARY OF RECOMMENDATIONS

Q. Please summarize your recommendations.

A. For reasons set forth above, I conclude the following:

- The Commission should adopt the annual carrying charge that RMP identifies in its current marginal cost of service study in Utah. The rate is 7.82% for avoided generation capacity cost and 7.91% for avoided distribution capacity cost.
- Applying the proper carrying charge results in a value of 2.966 cents/kWh for avoided generation capacity cost,[15] and 0.33 cents/kWh for avoided distribution capacity cost.[16] I recommend that the Commission revise its October 30, 2020 Order to reflect an increase in avoided generation capacity cost from 2.31 cents/kWh to 2.966 cents/kWh and an increase in avoided distribution capacity cost from 0.31 cents/kWh to 0.33 cents/kWh.
- Finally, I recommend that the Commission revise its October 30, 2020 Order to address the fact that I did not use a carrying charge in calculating avoided

[15] *Milligan Sur-surrebuttal*, lines 43, 81, 252.

[16] Vote Solar Workpaper 1 – SY (Feb. 22, 2021).

transmission capacity, but rather based this value on PacifiCorp's annual transmission rate. The Commission should revise its Order accordingly to reflect an increase in avoided transmission capacity cost from 0.91 cents/kWh to 1.15 cents/kWh.[17]

Q. **Does this conclude your sur-surrebuttal testimony?**

A. Yes.

[17] *See* Vote Solar Workpaper 1 – SY (Feb. 22, 2021).

CERTIFICATE OF SERVICE

I hereby certify that on this 22nd day of February, 2021 a true and correct copy of the foregoing was served by email upon the following:

DIVISION OF PUBLIC UTILITIES:

Chris Parker	chrisparker@utah.gov
William Powell	wpowell@utah.gov
Patricia Schmid	pschmid@agutah.gov
Justin Jetter	jjetter@agutah.gov
Erika Tedder	etedder@utah.gov
	dpudatarequest@utah.gov

OFFICE OF CONSUMER SERVICES:

Michele Beck	mbeck@utah.gov
Cheryl Murray	cmurray@utah.gov
Robert Moore	rmoore@agutah.gov
Steve Snarr	stevensnarr@agutah.gov
Bela Vastag	bvastag@utah.gov

SALT LAKE CITY CORPORATION:

Tyler Poulson	tyler.poulson@slcgov.com
Megan DePaulis	megan.depaulis@slcgov.com

UTAH SOLAR ENERGY ASSOCIATION:

Amanda Smith	asmith@hollandhart.com
Ryan Evans	revans@utsolar.org
Engels J. Tejada	ejtejada@hollandhart.com
Chelsea J. Davis	cjdavis@hollandhart.com

WESTERN RESOURCE ADVOCATES:

Nancy Kelly	nkelly@westernresources.org
Steven S. Michel	smichel@westernresources.org
Sophie Hayes	sophie.hayes@westernresources.org

UTAH CLEAN ENERGY:

Sarah Wright	sarah@utahcleanenergy.org
Kate Bowman	kate@utahcleanenergy.org
Hunter Holman	hunter@utahcleanenergy.org

VOTE SOLAR:

Sachu Constantine	sachu@votesolar.org
Claudine Custodio	claudine@votesolar.org
Ronny Sandoval	ronny@votesolar.org
Jennifer M. Selendy	jselendy@selendygay.com
Philippe Z. Selendy	pselendy@selendygay.com
Joshua Margolin	jmargolin@selendygay.com

AURIC SOLAR:

Elias Bishop	elias.bishop@auricsolar.com

ROCKY MOUNTAIN POWER:

Yvonne Hogle	yvonne.hogle@pacificorp.com
Jana Saba	jana.saba@pacificorp.com
Joelle Steward	joelle.steward@pacificorp.com
	datarequest@pacificorp.com
	utahdockets@pacificorp.com

VIVINT SOLAR, INC:

Stephan F. Mecham	sfmecham@gmail.com

/s/ *Joshua S. Margolin*