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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	<b>Docket No. 17-035-61 Phase 2</b>
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**REVISED AFFIRMATIVE TESTIMONY OF SACHU CONSTANTINE**

**ON BEHALF OF**

**VOTE SOLAR**

May 8, 2020

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1 **I. INTRODUCTION**

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

3 A. My name is Sachu Constantine. My business address is 360 22<sup>nd</sup> St., Suite 730,  
4 Oakland, CA 94612.

5 **Q. On whose behalf are you submitting this revised direct testimony?**

6 A. I am submitting this revised testimony on behalf of Vote Solar.

7 **Q. What is Vote Solar?**

8 A. Vote Solar is an independent 501(c)(3) non-profit working to repower the U.S. with  
9 clean energy by making solar power more accessible and affordable through effective  
10 policy advocacy. Vote Solar seeks to promote the development of solar at every scale,  
11 from distributed rooftop solar to large utility-scale plants. Vote Solar has over 100,000  
12 members nationally, including roughly 360 members in Utah. Vote Solar is not a trade  
13 group, nor does it have corporate members.

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

15 A. I serve as Managing Director, Regulatory for Vote Solar. I manage the full regulatory  
16 team for Vote Solar and analyze the development and implementation of policy  
17 initiatives related to distributed solar generation. I also review regulatory filings,  
18 perform technical analyses, and participate in commission proceedings relating to  
19 distributed energy resources and renewable generation.

20 **Q. Please describe your education and experience.**

21 A. I have a Master of Public Policy degree from the Goldman School of Public Policy at  
22 the University of California, Berkeley, and I have been employed in the energy industry  
23 since 1998. Prior to joining Vote Solar in November of 2017, I was employed by the  
24 Center for Sustainable Energy, a non-profit energy program administration and  
25 advisory services organization, for five years. Prior to that, I was employed at  
26 Sunpower Corporation, the California Public Utilities Commission, the Alliance to  
27 Save Energy, and Lawrence Berkeley National Laboratory over the course of my  
28 career. Throughout, I focused on energy policy and markets, ratemaking, utility  
29 regulation, and program implementation, particularly with regards to solar  
30 photovoltaics and clean energy. As a regulator at the California Public Utilities  
31 Commission, I oversaw program evaluation and the cost-benefit analysis of the  
32 California Solar Initiative, the State's rooftop solar incentive program. At Vote Solar,  
33 I oversee a team of experts evaluating utility cost-of-service studies, revenue allocation  
34 and ratemaking, resource planning and grid modernization proceedings as well as Load  
35 Research Studies and other quantitative analyses. A summary of my background and  
36 qualifications is attached hereto as Exhibit 1-SCO.

37 **Q. Have you previously testified before the Utah Public Service Commission**  
38 **(“Commission”)?**

39 A. No.

40 **Q. Have you previously testified before other regulatory commissions?**

41 A. No.

42 **II. PURPOSE OF TESTIMONY**

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

44 A. My testimony covers four subjects. *First*, I describe the history and scope of this docket.  
45 *Second*, I introduce the witnesses who are testifying on behalf of Vote Solar and  
46 provide a summary of the topics addressed in each testimony. *Third*, I provide  
47 background on the Vote Solar Load Research Study (“Vote Solar LRS”). *Fourth*, I  
48 describe Vote Solar’s proposed compensation for customer generation (“CG”) exports  
49 as informed by the analyses conducted by the Vote Solar witnesses.

50 My lack of comments on Rocky Mountain Power’s (“RMP”) affirmative testimony  
51 should not be interpreted as acquiescence or agreement with RMP. I reserve the right  
52 to express additional opinions, to amend or supplement the opinions in this testimony,  
53 or to provide additional rationale for these opinions as additional documents are  
54 produced, and new facts are introduced during discovery and hearing. I also reserve the  
55 right to express additional opinions in response to any opinions or testimony offered  
56 by other parties to this proceeding.

57 **Q. What revisions to your initial testimony did you make?**

58 I am submitting this revised testimony to reflect changed inputs to the analysis  
59 underlying the arguments and conclusions presented here. After the initial Affirmative  
60 Testimony was submitted, RMP indicated that they had provided incorrect input data

61 in response to a Vote Solar Data Request. Upon receipt of new and updated data from  
62 RMP, we ran the underlying and related analyses using that data again, resulting in  
63 minor changes to certain calculations. The original analysis and, in particular, the  
64 conclusions drawn in this testimony from that analysis remain robust and consistent.  
65 Thus, this revised testimony reflects only minor adjustments to certain tables and  
66 figures and makes no substantive changes to previous versions.

### 67 **III. SUMMARY OF RECOMMENDATIONS**

68 **Q. Please summarize your recommendations.**

69 A. As described in detail below, I recommend the following:

70 1) The Commission should make a determination that the benefits of the net metering  
71 (“NEM”) Program exceed its costs and should re-open the NEM Program to new  
72 customers as of the effective date of its order in this proceeding.

73 2) In the alternative, if the Commission elects to maintain the general structure of the  
74 Transition Program, as defined below, the Commission should adopt an Export Credit  
75 Rate (“ECR”) of 22.22 c/kWh with the following Program details:

76 a) Exports should be netted on an hourly basis, rather than the current, 15-minute  
77 netting period;

78 b) The ECR should be fixed for a period of 20 years for individual customers;

- 79 c) Eligibility for each ECR vintage should be consistent with the terms of  
80 eligibility adopted for legacy access to the NEM Program under the terms of  
81 the Stipulation;<sup>1</sup>
- 82 d) The Commission should eliminate the annual expiration of excess export  
83 credits; and
- 84 e) NEM<sup>2</sup> and Transition<sup>3</sup> Customers should have the option to take service under  
85 the new ECR Program at their sole discretion.

#### 86 **IV. HISTORY AND SCOPE OF THE PRESENT DOCKET**

##### 87 **Q. Please describe the history of this proceeding.**

88 A. In 2002, the Utah State Legislature approved House Bill 7, authorizing a statewide  
89 NEM Program. NEM, as defined under House Bill 7, required “the electrical  
90 corporation to give the customer a credit for electricity generated by the customer that  
91 exceeds the amount supplied by the electrical corporation.”<sup>4</sup> Passage of House Bill 7  
92 and the resulting NEM Program led to consistent growth in CG resources, particularly  
93 solar distributed generation (“DG”).

94 In 2014, RMP proposed a charge on NEM Customers at the Commission, and new  
95 legislation focusing on net metering. This proposal, reflected in Utah Senate Bill 208

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<sup>1</sup> Rocky Mountain Power, *Settlement Stipulation*, Public Service Commission of Utah, Docket No. 14-035-114, Aug. 28, 2017, <https://pscdocs.utah.gov/electric/14docs/14035114/296270RMPSettleStip8-28-2017.pdf>.

<sup>2</sup> Net Metering Customers, as described more fully below, are those that will remain on the NEM Program through December 31, 2035.

<sup>3</sup> Transition Customers, as described more fully below, are those that submit an interconnection application during the Transition Program period.

<sup>4</sup> NET METERING OF ELECTRICITY, 2002 Utah Laws Ch. 6 (H.B. 7).

96 (“SB 208”), was passed and signed into law. SB 208 recommended that “the governing  
97 authority shall . . . [i] determine, after appropriate notice and opportunity for public  
98 comment, whether costs that the electrical corporation or other customers will incur  
99 from a net metering program will exceed the benefits of the net metering program, or  
100 whether the benefits of the net metering program will exceed the costs; and . . . [ii]  
101 determine a just and reasonable charge, credit, or ratemaking structure . . . in light of  
102 the costs and benefits.”<sup>5</sup>

103 Pursuant to SB 208, on November 10, 2015, the Commission established a structure to  
104 analyze costs and benefits of the NEM Program, ordering RMP to conduct two cost of  
105 service studies, one using RMP’s actual costs and the other using a hypothetical  
106 situation where “net metering customers produced no electricity.”<sup>6</sup> On November 9,  
107 2016, RMP filed these cost of service studies with the Commission, and based on the  
108 results, advocated for the end of the NEM Program and a new rate structure that  
109 substantially reduced the compensation to customer generators.

110 The Commission never held a hearing on the merits of RMP’s proposal because RMP  
111 and other parties, not including Vote Solar, reached a settlement stipulation  
112 (“Stipulation”) that was submitted to the Commission on August 28, 2017.<sup>7</sup> The  
113 Stipulation included the establishment of a NEM “cap date,” under which existing  
114 NEM Customers and those that applied to the Program prior to the cap date would

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<sup>5</sup> UT LEGIS 53 (2014), 2014 Utah Laws Ch. 53 (S.B. 208); *see also* Utah Code Ann. § 54-15-105.1.

<sup>6</sup> Utah Public Service Commission, *Order*, Docket No. 14-035-114, p. 16, Nov. 10, 2015, <https://psc.utah.gov/2016/06/20/docket-no-14-035-114-2/>.

<sup>7</sup> Public Service Commission of Utah, *Order Approving Settlement Stipulation*, Docket No. 14-035-114, p. 3–4, Sept. 29, 2017, <https://pscdocs.utah.gov/electric/14docs/14035114/29703614035114oass9-29-2017.pdf>.

115 remain on the NEM Program through 2035. The Stipulation also established a  
116 Transition Program, establishing an interim ECR for new customer generators after the  
117 NEM cap date and until a final method for compensating exports from CG was  
118 determined.

119 Without making a determination per SB 208 on whether costs of the NEM Program  
120 exceed the benefits, or whether the benefits of the NEM Program exceed the costs, the  
121 Commission approved the Stipulation on September 29, 2017.<sup>8</sup> In its Order, the  
122 Commission stated: “[T]he Settlement does not operate to annul our obligations under  
123 Subsection One [to make a finding on NEM benefits and costs], rather it prolongs them.  
124 Given the additional load studies and other data that will be collected in the meantime,  
125 we anticipate being even better equipped to make the required findings at that future  
126 date.”<sup>9</sup> Moreover, the Commission acknowledged that “[a]s a practical matter, we  
127 acknowledge the findings we would make in a docket devoted to fulfilling Subsection  
128 One [whether the benefits of the NEM Program exceed the costs] will be largely  
129 subsumed in the Export Credit Proceeding and the general rate cases we are likely to  
130 consider between now and the conclusion of the Grandfathering Period.”<sup>10</sup>

131 On December 1, 2017, RMP filed a request for an Export Credit Proceeding to the  
132 Commission, which began the present docket.<sup>11</sup>

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<sup>8</sup> *Id.* at 1.

<sup>9</sup> *Id.* at 9.

<sup>10</sup> *Id.* at 9 n.9.

<sup>11</sup> Rocky Mountain Power, *Application*, Public Service Commission of Utah, Docket No. 17-035-61, p. 3, Dec. 1, 2017, <https://pscdocs.utah.gov/electric/17docs/1703561/298212RMPApp12-1-2017.pdf>.

133 **Q. Please describe the scope of the present docket.**

134 A. As indicated in RMP’s application to open this docket, the purpose of the present  
135 proceeding is to “determine the compensation rate for exported power from customer  
136 generation systems for all customers, including after the expiration of the  
137 Grandfathering Period and Transition Period.”<sup>12</sup> Phase 1 of this docket addressed the  
138 design of RMP’s load research study (“RMP LRS”) and the information to be collected  
139 in the RMP LRS to inform Phase 2 of this docket where just and reasonable  
140 compensation for CG exports is to be determined.<sup>13</sup> The Commission issued an Order  
141 in Phase 1 on May 21, 2018.<sup>14</sup> Additional background on Phase 1 is provided in Section  
142 VI, below.

143 In the Stipulation, signing parties agreed to the following regarding Phase 2 of the  
144 present docket:

145 Parties may present evidence addressing reasonably quantifiable  
146 costs or benefits or other considerations they deem relevant, but the  
147 Party asserting any position will bear the burden of proving its  
148 assertions (for example, parties may present evidence addressing the  
149 following costs or benefits: energy value, appropriate measurement  
150 intervals, generation capacity, line losses, transmission and  
151 distribution capacity and investments, integration and  
152 administrative costs, grid and ancillary services, fuel hedging,  
153 environmental compliance, and other considerations). The  
154 Commission will also determine the appropriate study period over  
155 which to quantify and model export credit components.”<sup>15</sup>

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<sup>12</sup> *Id.* at 2.

<sup>13</sup> Public Service Commission of Utah, *Phase 1 Order*, Docket No. 17-035-61, p. 2, May 21, 2018, <https://pscdocs.utah.gov/electric/17docs/1703561/3022941703561pIo5-21-2018.pdf>.

<sup>14</sup> *Id.*

<sup>15</sup> Rocky Mountain Power, *Settlement Stipulation*, Public Service Commission of Utah, Docket No. 14-035-114, p. 10, Aug. 28, 2017, <https://pscdocs.utah.gov/electric/14docs/14035114/296270RMPSettleStip8-28-2017.pdf>.

156 In addition, the Stipulation specified: “[T]he Parties agree that nothing from the  
157 November 2015 Order or other aspects of this Docket No. 14-035-114 will: (a) limit or  
158 preclude a Party from presenting evidence in the Export Credit Proceeding identified  
159 in this Paragraph 30, or (b) be precedential in the Export Credit Proceeding or any  
160 future case.”<sup>16</sup>

161 **Q. Please describe how Vote Solar’s testimony complies with the scope of this docket.**

162 A. Vote Solar acknowledges that the scope of this docket is limited to the appropriate  
163 compensation method for CG exports. While additional costs and benefits result from  
164 CG that is produced and consumed behind the meter, these costs and benefits are not  
165 relevant to the design of just and reasonable compensation for CG exports. Similarly,  
166 rate design for services that customers with DG receive from RMP above and beyond  
167 what their own generation provides is outside the scope of the present docket. With this  
168 scope in mind, Vote Solar has conducted an analysis of the value of CG exports and  
169 has used the results of that analysis to inform its proposal for just and reasonable  
170 compensation for CG exports.

171 For purposes of its analysis to support just and reasonable compensation for CG exports  
172 in this case, Vote Solar has focused on the costs and benefits of DG solar in RMP’s  
173 Utah service territory. This is a reasonable approach because the vast majority of CG  
174 in RMP’s Utah service territory is solar, and the majority of future CG installations are  
175 expected to be solar.<sup>17</sup> Specifically, according to RMP’s most recent NEM report, filed

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<sup>16</sup> *Id.* at 10.

<sup>17</sup> See Exhibit 2-SCO, Navigant\_PG LT RA\_20180815.pdf, p. 31–32, RMP’s Responses to Vote Solar 6th Set Data Requests – Attach 6.16-2 (Aug. 16, 2019).

176 on July 1, 2019, 99.7% of NEM Customers had DG solar, and 100% of Transition  
177 Customers had DG solar.<sup>18</sup>

178 **V. INTRODUCTION TO VOTE SOLAR WITNESSES**

179 **Q. Please provide an introduction to all witnesses testifying on behalf of Vote Solar.**

180 A. As a part of its affirmative case, Vote Solar is providing testimony from a total of six  
181 witnesses, including myself. I have provided a summary of the purpose of my testimony  
182 in Section II above. A brief summary of the purpose of each of the remaining Vote  
183 Solar witnesses is provided below:

184 1. Dr. Albert Lee, Founding Partner and Economist at Summit Consulting, LLC, is filing  
185 testimony describing the Vote Solar LRS method and the data from the Vote Solar LRS  
186 that was provided to other Vote Solar witnesses. Additional background on the Vote  
187 Solar LRS is provided in Section VI below.

188 2. Dr. Michael Milligan, Principal at Milligan Grid Solutions, is filing testimony  
189 describing the avoided energy cost, avoided generation capacity cost, and avoided  
190 carbon emissions associated with CG in RMP's Utah service territory. Dr. Milligan's  
191 analysis incorporates results from the Vote Solar LRS conducted by Dr. Lee and  
192 provides inputs to Dr. Carolyn Berry's valuation of CG.

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<sup>18</sup> Rocky Mountain Power, *Rocky Mountain Power's 2019 Net Metering Report*,  
Docket No. 19-035-29, Reference Docket No. 08-035-T04, p. 1, July 1, 2019,  
<https://pscdocs.utah.gov/electric/19docs/1903529/308974RMPCustmrOwndGeneandNetMeterReptforthePerdApril12018thrMarch3120197-1-2019.pdf>.

- 193 3. Mr. Curt Volkmann, President and founder of New Energy Advisors, LLC, is filing  
194 testimony describing the avoided line losses, avoided distribution capital expenditures,  
195 and integration costs associated with CG in RMP's service territory. Mr. Volkmann's  
196 analysis incorporates results from the Vote Solar LRS conducted by Dr. Lee and  
197 provides inputs to Dr. Berry's valuation of CG.
- 198 4. Dr. Spencer Yang, Principal at Bates White Economic Consulting, is filing testimony  
199 describing avoided transmission capacity costs and avoided distribution capacity costs  
200 associated with CG in RMP's service territory. Dr. Yang's analysis incorporates results  
201 from the Vote Solar LRS conducted by Dr. Lee and conclusions reached by Mr.  
202 Volkmann regarding distribution costs and line losses. Dr. Yang provides inputs to Dr.  
203 Berry's valuation of CG.
- 204 5. Dr. Carolyn Berry, Principal at Bates White Economic Consulting, is filing testimony  
205 developing Vote Solar's valuation of CG in RMP's service territory. Dr. Berry  
206 incorporates results from Dr. Lee, Dr. Milligan, Mr. Volkmann, and Dr. Yang and  
207 conducts additional analysis to develop Vote Solar's value of CG. In my testimony, I  
208 rely on Dr. Berry's assessment of the value of CG to inform Vote Solar's proposal for  
209 just and reasonable compensation for CG exports.

210 **VI. BACKGROUND ON THE VOTE SOLAR LRS**

211 **Q. What is the Vote Solar LRS?**

212 A. The Vote Solar LRS is an analysis of customer-owned generation in RMP’s Utah  
213 service territory that examines meter data and solar inverter data to develop an  
214 assessment of how and when customer generators interact with the electrical grid. In  
215 particular, the Vote Solar LRS has been used to develop an hourly assessment of total  
216 solar production, as well as exported solar production, for customers with DG. The  
217 Vote Solar LRS has also been used to develop yield factors (kWh/kW) associated with  
218 solar production and export. This information, provided by Dr. Lee to the other Vote  
219 Solar witnesses in this proceeding, provides the foundation for the analysis conducted  
220 to derive the value of CG presented by Vote Solar as summarized in the testimony of  
221 Dr. Berry. Dr. Berry’s value of CG analysis is in turn used to inform my proposal for  
222 compensation for CG exports, as described in this testimony in Sections VII and VIII.

223 **Q. Why did Vote Solar pursue its own LRS?**

224 A. On May 21, 2018, the Commission issued an Order on Phase 1 of this proceeding to  
225 address the design of the RMP LRS that would inform the current phase of this docket  
226 – Phase 2 – which addresses the determination of just and reasonable compensation  
227 for electricity exported by CG.<sup>19</sup> In its affirmative testimony in Phase 1 of this  
228 proceeding, Vote Solar expressed several concerns with the RMP LRS that were not  
229 addressed by the Commission’s decision. Vote Solar’s concerns are described in more

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<sup>19</sup> *Supra* n.13 at 2.

230 detail in Dr. Lee’s Phase 1 testimony on behalf of Vote Solar, his testimony during the  
231 April 17, 2018 Phase 1 hearing before the Commission, and his Phase 2 revised  
232 affirmative testimony filed concurrently with this testimony.<sup>20</sup> Under the terms of the  
233 Commission’s Phase 1 Order, the Commission expressed that parties may construct  
234 their own LRS samples.<sup>21</sup> In addition, per the Stipulation in Docket No. 14-035-114  
235 setting forth the scope of this docket, it was agreed that any party to the present docket  
236 would bear the burden of proving its assertions regarding just and reasonable  
237 compensation for CG exports.<sup>22</sup> The LRS provides a foundational element of any  
238 proposal for just and reasonable compensation for CG exports. As a result, because  
239 Vote Solar’s concerns with the RMP LRS design were not fully addressed by the  
240 modifications placed on the study in the Commission’s Phase 1 Order, Vote Solar  
241 decided to pursue its own LRS.

242 **Q. How did Vote Solar obtain the data that was used in the Vote Solar LRS?**

243 A. In order to allow Vote Solar to conduct its own LRS, the Commission issued an Order  
244 on a Motion for Formal Discovery, outlining a process by which Vote Solar and RMP  
245 were to confer and agree on a mailer to all CG customers of RMP that would describe

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<sup>20</sup> Vote Solar, *Direct Testimony of Albert J. Lee, Ph.D. on Behalf of Vote Solar*, Public Service Commission of Utah, Docket No. 17-035-61, Apr. 10, 2018, <https://pscdocs.utah.gov/electric/17docs/1703561/301235DirTestLeeVoteSolar4-11-2018.pdf>; Public Service Commission of Utah, *Hearing*, Docket No. 17-035-61, p. 210–24, 229–33, Apr. 17, 2019, <https://pscdocs.utah.gov/electric/17docs/1703561/301740RepTransApr1720185-1-2018.pdf>; Vote Solar, *Revised Affirmative Testimony of Albert J. Lee*.

<sup>21</sup> *Supra* n.13 at 19 (“To the extent a party or parties desire to construct their own load-research student sample, using inverter data and some data from PacifiCorp and CG customers, parties may coordinate with PacifiCorp to develop a process to obtain the needed information while maintaining customer privacy.”).

<sup>22</sup> *See supra* n.15 at 10.

246 the Vote Solar LRS and provide a means for customers to opt in to the Vote Solar  
247 LRS.<sup>23</sup>

248 **Q. Was a mailer sent to all RMP customers with CG in Utah?**

249 A. Yes. A letter was sent to all RMP customers with CG in the state of Utah on December  
250 2, 2019. A copy of the letter is attached to my testimony as Exhibit 3-SCO.

251 **Q. What information did the letter provide to RMP customers with CG?**

252 A. The letter provided information on the present docket, Vote Solar's interests in the  
253 proceeding, and a means for customers to opt-in to the Vote Solar LRS by visiting a  
254 website hosted by RMP and providing identifying information as well as permissions  
255 for the study. The content of the website was agreed to by RMP and Vote Solar. A  
256 printout is provided as Exhibit 4-SCO.

257 As shown in Exhibit 4-SCO, customers choosing to opt-in to the Vote Solar LRS were  
258 asked to provide two specific permissions. The *first* authorized RMP to release the  
259 customer's identifying information to Vote Solar (specifically, address) so that Vote  
260 Solar could link the customer's meter data on imported and exported electricity flows  
261 with his/her location. The *second* authorized Vote Solar to obtain inverter data from  
262 the customer's solar installer. The solar inverter data provided information on solar  
263 production and system attributes such as installed capacity. In his testimony, Dr. Lee

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<sup>23</sup> Public Service Commission of Utah, *Order on Motion for Formal Discovery*, Docket No. 17-035-61 Phase 2, p. 4, <https://pscdocs.utah.gov/electric/17docs/1703561/3081351703561oomffd5-8-2019.pdf>.

264 describes how this data was used to generate the Vote Solar LRS results relied on by  
265 the other Vote Solar witnesses in this case.

266 **Q. How was the information received through the study website processed?**

267 A. RMP received all information from the study website and provided it to Vote Solar in  
268 two forms. *First*, for those customers that released their identifying information, RMP  
269 provided weekly updates to Vote Solar in the form of supplemental responses to Vote  
270 Solar’s Data Request 4.1 that identified Vote Solar LRS opt-in customers’ addresses to  
271 allow Vote Solar to analyze opt-in customer meter data. This information was marked  
272 confidential and is subject to the confidentiality agreement in this proceeding. *Second*,  
273 for those customers that released their inverter data, RMP provided Vote Solar with  
274 individual .pdf files for each customer that contained the information they provided in  
275 the web form including name, address, contact information, and solar installer. A blank  
276 example is provided as Exhibit 5-SCO.

277 **Q. What steps were undertaken to obtain customer inverter data?**

278 A. Vote Solar processed the .pdf files provided by RMP into a database and sorted them  
279 by identified solar installer. Vote Solar then conducted individual outreach to solar  
280 installers identified to develop a process for Vote Solar to gain access to individual  
281 customer inverter data through the inverter companies’ application programming  
282 interface (“API”). Based on conversations with the installer community, Vote Solar  
283 ascertained that the vast majority of CG customers in RMP’s Utah service territory  
284 have either SolarEdge or Enphase branded inverters. The one other major inverter  
285 company, SMA, did not have a functioning API, preventing us from accessing

286 customer data. Therefore, the Vote Solar LRS focuses on customers with SolarEdge  
287 and EnPhase Inverters. Vote Solar developed code to ping Enphase and SolarEdge  
288 APIs for information on individual solar system characteristics and production for  
289 calendar year 2019. This code was used to obtain the inverter data to support Vote  
290 Solar's LRS in most instances. However, one solar installer opted to provide the needed  
291 inverter data directly to Vote Solar.

292 **VII. NET METERING PROVIDES JUST AND REASONABLE**  
293 **COMPENSATION FOR CG EXPORTS**

294 **Q. Please describe the results of Vote Solar's Value of CG analysis.**

295 A. As described in the revised affirmative testimony of Dr. Carolyn Berry, Vote Solar has  
296 quantified a 20-year levelized value of CG in RMP's service territory of 22.22 c/kWh.  
297 This value is expressed in 2021 dollars and is based on a study period of 2021-2040.  
298 This approach was chosen because the compensation mechanism adopted by the  
299 Commission in this docket will be effective beginning in 2021. By quantifying a 20-  
300 year levelized value, Dr. Berry's analysis provides an assessment of the value of CG  
301 over the typical minimum expected lifetime of a rooftop solar system. A summary of  
302 the elements in Dr. Berry's value of CG calculation is provided in Table 1 below.

**Table 1: Value of CG Exports in Utah**

Category	Value ¢/kWh 2021USD (levelized)
<b>Utility-Based Benefits</b>	
<b>Energy</b>	
Avoided Energy	3.55
Avoided line losses	0.31
<b>Capacity</b>	
Avoided generation capacity	1.48
Avoided transmission capacity	1.34
Avoided distribution capacity	0.52
<b>Grid Support Services</b>	
Ancillary services	<i>nq*</i>
<b>Financial Risk</b>	
Fuel price hedge	0.19
Market price effect	<i>nq</i>
<b>Security Risk</b>	
Reliability and resilience	<i>nq</i>
<b>Environmental</b>	
Carbon (CO <sub>2</sub> ) compliance costs	2.80
<b>Utility Costs</b>	
Integration costs	0.00
<b>Subtotal</b>	<b>10.19</b>
<b>Community Benefits</b>	
<b>Environmental</b>	
Health benefits from reduced air pollution	2.09
Benefits of reduced carbon emissions (CO <sub>2</sub> )	6.57
Avoided fossil fuel lifecycle costs	<i>nq</i>
<b>Societal</b>	
Local economic benefits	3.37
<b>Subtotal</b>	<b>12.03</b>
<b>Total Value of CG Exports</b>	<b>22.22</b>

*\*not quantified*

304 **Q. In your opinion, is this an accurate assessment of the Value of CG in RMP's Utah**  
305 **service territory?**

306 A. Yes, though it is likely an underestimate of the full value. I have reviewed the testimony  
307 and methods employed by Dr. Berry, Dr. Milligan, Mr. Volkmann, Dr. Yang, and Dr.  
308 Lee that support the valuation of CG at 22.22 c/kWh. I find that the value of CG at  
309 22.22 c/kWh is likely conservative as several categories of benefits have not been able  
310 to be quantified. Namely, avoided ancillary services cost, market price impacts,  
311 reliability and resiliency value, and avoided fossil fuel lifecycle costs. I also note that  
312 the valuation of CG at 22.22 c/kWh is based on the Vote Solar LRS, which examined  
313 attributes of exported CG from currently installed systems. At the current moment, CG  
314 installations in RMP's Utah service territory are largely standalone rooftop solar.<sup>24</sup> As  
315 the market for distributed energy storage matures, there is immense opportunity for  
316 Utahns to reap additional benefits by dispatching storage at the times when it is most  
317 valuable to grid operation, increasing efficiency in the system and facilitating cost  
318 effective reduction in fossil fuel resources on the grid.

319 **Q. How does the value of CG compare to the average retail energy rate paid by**  
320 **RMP's customers?**

321 A. Average retail energy rates vary by rate schedule as shown in Table 2 below.

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<sup>24</sup> There are approximately 129 customers with behind-the-meter energy storage interconnected to RMP's system. Exhibit 6-SCO, Attach Vote Solar 6.3-10.XLSX, RMP's Responses to Vote Solar 6th Set of Data Requests – Attach 6.3-10 (Aug. 23, 2019). In comparison, there are roughly 33,588 NEM and Transition Customers with behind-the-meter solar PV. *Supra* n.18 at 1.

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**Table 2: Average Energy Charges Compared to Value of CG (c/kWh)<sup>25</sup>**

Rate Schedule	Retail Energy Rate	Value of CG Exports	Percentage
Residential - Schedule 1,2 & 3	10.2	22.2	217%
General Service - Schedule 6	3.7	22.2	605%
General Service Energy TOD - Schedule 6a	7.1	22.2	312%
General Service Demand TOD - Schedule 6b	3.7	22.2	605%
Large General Service - Schedule 8	3.8	22.2	588%
Irrigation - Schedule 10	6.1	22.2	367%
Outdoor Lighting - Schedule 15.1	5.3	22.2	420%
Traffic Signals - Schedule 15.2	8.4	22.2	264%
Small General Service - Schedule 23	8.9	22.2	251%

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324

As shown in Table 2, average retail energy rates are significantly lower than the full value of CG. This is an important finding, as an evaluation of the benefits and costs of the NEM program rests on this comparison. Under a NEM Program, where exported energy is provided a kWh-based credit to offset a customer’s bill at the full retail rate, the benefits of CG greatly exceed its costs on all of RMP’s tariffs. Table 3 below provides an estimate of the net benefits of the NEM Program on each of RMP’s rate schedules.

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<sup>25</sup> Average energy rates are approximate and are calculated from Schedule 136 Transition Program rates for Schedules 1, 2, and 3 by dividing by 90% and for all other schedules by dividing by 92.5%. See Rocky Mountain Power, *Settlement Stipulation*, Public Service Commission of Utah, Docket No. 14-035-114, p. 6, Aug. 28, 2017, <https://pscdocs.utah.gov/electric/14docs/14035114/296270RMPSettleStip8-28-2017.pdf>.

331

**Table 3: Net Benefits of NEM Program**

Rate Schedule	Net Benefits
Residential - Schedule 1,2 & 3	12.0
General Service - Schedule 6	18.6
General Service Energy TOD - Schedule 6a	15.1
General Service Demand TOD - Schedule 6b	18.6
Large General Service - Schedule 8	18.4
Irrigation - Schedule 10	16.2
Outdoor Lighting - Schedule 15.1	16.9
Traffic Signals - Schedule 15.2	13.8
Small General Service - Schedule 23	13.4

332 **Q. What do you recommend based on these findings?**

333 A. I recommend that the Commission fulfill its obligation to make a determination on the  
334 relative costs and benefits of the NEM program under Section 54-15-105.1 of the Utah  
335 Code which reads as follows:

336 The governing authority shall:

- 337
- 338 (1) determine, after appropriate notice and opportunity for public
- 339 comment, whether costs that the electrical corporation or other
- 340 customers will incur from a net metering program will exceed the
- 341 benefits of the net metering program, or whether the benefits of the
- 342 net metering program will exceed the costs; and
- 343 (2) determine a just and reasonable charge, credit, or ratemaking
- 344 structure, including new or existing tariffs, in light of the costs and
- 345 benefits.<sup>26</sup>

346 Notably, while the Commission adopted a compensation mechanism for exported CG  
347 alternative to the NEM Program in Docket No. 14-035-114, it never made the  
348 determination as to whether the NEM Program resulted in net benefits or net costs.

<sup>26</sup> Utah Code Ann. § 54-15-105.1.

349 Indeed, the Commission indicated that it anticipated that evidence in this proceeding  
350 may provide the basis for such a determination.<sup>27</sup>

351 NEM is a mechanism by which exported energy from CG is compensated at the full  
352 retail energy rate through a one-to-one kWh credit. As shown in Table 3 above, benefits  
353 from CG far exceed the costs of compensating CG customers at the retail rate. Vote  
354 Solar recommends that the Commission find that the NEM Program constitutes a just  
355 and reasonable ratemaking structure in light of these costs and benefits and re-open  
356 enrollment in the dormant program upon finalization of its order in this proceeding. Per  
357 the terms of the Stipulation, Transition Customers should be allowed to voluntarily  
358 enroll in the re-opened NEM Program at their discretion.<sup>28</sup>

359 **VIII. IN THE ALTERNATIVE, THE COMMISSION SHOULD ADOPT A**  
360 **FAIR ECR PROGRAM**

361 **Q. If the Commission elects to maintain the general structure of the Transition**  
362 **Program rather than returning to the NEM Program, what would you**  
363 **recommend?**

364 A. If the Commission elects to maintain the general structure of the Transition Program,  
365 the evidence supports setting an ECR at 22.22 c/kWh based on the value of CG as

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<sup>27</sup> See *supra* n.7 at 9; *id.* at 9 n.9.

<sup>28</sup> See *supra* n.15 at 11.

366 demonstrated in Table 1. Vote Solar recommends that the ECR be fixed for individual  
367 customers for a period of 20 years as described in more detail below.

368 The Commission should revisit its evaluation of a just and reasonable ECR in RMP's  
369 future general rate cases with the first re-evaluation occurring no earlier than 2024. If  
370 an updated valuation of CG results in the determination that the ECR should be  
371 updated, I recommend that a new vintage ECR be adopted for new customers  
372 submitting interconnection applications after the effective date of the next vintage  
373 ECR.

374 If an ECR structure is implemented, I recommend the following (addressed in turn  
375 below):

- 376 1) Exports should be netted on an hourly basis, rather than the current, 15-minute  
377 netting period;
- 378 2) The ECR should be fixed for a period of 20 years for individual customers;
- 379 3) Eligibility for each ECR vintage should be consistent with the terms of  
380 eligibility adopted for legacy access to the NEM Program under the terms of  
381 the Stipulation;
- 382 4) The Commission should eliminate the annual expiration of excess export  
383 credits; and
- 384 5) NEM and Transition Customers should have the option to take service under  
385 the new ECR Program at their sole discretion.

386 **Q. Please explain your proposal to net exports on an hourly basis.**

387 A. Well-designed rates provide price signals that are understandable and actionable for  
388 customers. In comparison to retail rate net metering, it is far more complex for  
389 customers to examine the billing implications of adoption of DG under an ECR,  
390 resulting in a price signal that is inherently less understandable and less actionable.  
391 Under retail rate net metering, a customer’s bill can be easily estimated based on total  
392 expected monthly load and total expected monthly solar generation. This data is readily  
393 available. Total monthly load is reported to customers on their monthly bill from RMP,  
394 and solar installers are well prepared to provide customers with expected monthly solar  
395 production based on the design of their specific system.

396 In contrast, under an ECR, the customer must understand how production would relate  
397 to in-home consumption throughout each day within each month. While it is less  
398 difficult for solar installers to provide customers with estimates of solar production  
399 throughout each day and month, information about in-home consumption is far more  
400 difficult to access. At the current time, RMP customers do not have access to their own  
401 usage data at an interval more granular than monthly. However, it is my understanding  
402 that the Commission has approved funding for RMP to make hourly usage information  
403 available to all customers with Automated Meter Reading (“AMR”) capable meters.<sup>29</sup>

404 Under the Transition Program, exports are measured or “netted” every fifteen minutes.  
405 In order to evaluate an investment in DG solar, a customer must estimate their in-home

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<sup>29</sup> Utah Public Service Commission, *Report and Order*, Docket No. 16-035-36, p. 4, June 28, 2019, <https://pscdocs.utah.gov/electric/16docs/1603536/3089131603536rao6-28-2019.pdf>.

406 consumption at 2,920 15-minute intervals in each month and compare that estimate to  
407 assumptions about solar production at the same granularity.<sup>30</sup> Residential customers in  
408 particular will have little understanding or control over their intra-hour electric  
409 consumption habits as many drivers of residential consumption like air conditioners,  
410 refrigerators, and other major appliances cycle on and off automatically. For those load  
411 drivers that are controlled by the customer such as dishwashers, washing machines,  
412 hair dryers, and other appliances, many residential customers will find it difficult to  
413 adjust consumption within the hour, as family schedules and work schedules drive meal  
414 times and appliance use, rather than the desire to match load with solar consumption.  
415 On the production side of the equation, intra-hour variability in solar production due to  
416 passing clouds, adds uncertainty to the equation. It is impracticable for a family to  
417 attempt to adjust behavior in response to such a price signal, making the ECR under  
418 the Transition Program neither understandable nor actionable. Burdensome netting  
419 periods lead to less efficient behavior, in turn, forgoing the potential benefits of  
420 improved price signals.

421 In contrast to fifteen-minute netting, netting exports every hour would reduce the  
422 burden on customers and provide a price signal that is more understandable and more  
423 actionable for customers.

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<sup>30</sup> This amounts to a total of over 70,000 data points needing evaluation each year (2,920 times 12 for both consumption and production), in contrast to 24 data points needing evaluation under a retail rate NEM Program. Notably, netting on a 15-minute basis is also burdensome on RMP, which must capture and process the larger volume of data.

424 **Q. Please explain your proposal that the ECR should be fixed for a period of 20 years**  
425 **for individual customers.**

426 A. The ECR should be fixed for twenty years to provide a fair and actionable price signal  
427 to customers with DG. Vote Solar is recommending an ECR that is based on a complex  
428 analysis that models avoided costs associated with CG on RMP's system. The results  
429 of this analysis are impacted by the fundamentals of the electric system and how that  
430 system may change over time. Individual families and businesses lack the tools to  
431 understand and forecast potential changes to CG value over time and, as a result, will  
432 be unable to reliably evaluate the impacts that an investment in CG would have on their  
433 personal financial situation were the ECR allowed to fluctuate.

434 By investing private capital in their own energy source, individual families and  
435 businesses fix a portion of their energy costs and are able to reduce their monthly  
436 expenses once their system is paid off, similar to a mortgage. Most behind-the-meter  
437 technology has a long operating life of twenty years or more. Customers may  
438 accordingly invest in their systems as part of a long-term financial plan, with  
439 anticipated savings tied to other financial needs such as retirement or college tuition.  
440 Unforeseen changes to the ECR may materially impact customers' financial plans. As  
441 a result, it is reasonable to adopt an ECR that is fixed for an individual customer for a  
442 period of twenty years from their date of interconnection.

443 **Q. By fixing the ECR for a period of twenty years, will the Commission be placing**  
444 **undue burden of uncertainty on the non-participating ratepayer?**

445 A. No. RMP provides similar certainty to its other customers as well as solar developers.  
446 On the customer side, RMP's own Subscriber Solar program allows customers to fix  
447 the price they pay for solar energy that offsets their retail electric usage for a period of  
448 20 years, a benefit of the program that is specifically highlighted in RMP's program  
449 FAQ.<sup>31</sup> For developers of renewable energy, it is extremely common for utilities to  
450 sign fixed-price contracts for a period of 20 years or more. This pricing certainty allows  
451 the developer to secure financing and is common despite the fact that it puts ratepayers  
452 at risk of "over-paying" for that energy if the contract does not look as cost-effective  
453 with perfect hindsight. In a recent example, PacifiCorp, RMP's parent company, signed  
454 a 25-year fixed price contract for solar energy from the 128 MW Milford Solar Project,  
455 a term the project's investors highlighted as follows: "The 25-year [power purchase  
456 agreement] with PacifiCorp will provide stable long-term infrastructure cashflows to  
457 our investors, something that is particularly pleasing in this low interest rate  
458 environment."<sup>32</sup>

459 In the case of a 20-year fixed ECR, the "actual" value of CG is just as likely to fall  
460 above the ECR as it is likely to fall below the ECR. While it is technically correct that  
461 non-participating ratepayers may bear the risk of uncertainty, that risk is common to all

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<sup>31</sup> Rocky Mountain Power, *Utah Subscriber Solar Program*, Rocky Mountain Power, <https://www.rockymountainpower.net/savings-energy-choices/blue-sky-renewable-energy/subscriber-solar.html> (last visited Mar. 3, 2020).

<sup>32</sup> Conor Ryan, *USF Completes Acquisition, Financing of 12MW PV Project in Utah*, PVTECH (Sept. 2, 2019, 10:09 PM BST), <https://www.pv-tech.org/news/usf-completes-acquisition-financing-of-128mw-pv-project-in-utah>.

462 utility resource acquisitions, both through fixed-price power purchase agreements  
463 (“PPAs”) as mentioned above, and indeed any utility-owned asset for which cost  
464 recovery is anticipated. In addition, because CG makes up only a very small proportion  
465 of RMP’s resource mix, the risk is immaterial to the average ratepayer. In contrast,  
466 shifting pricing risk to the customer-generator, whose personal financial outlook may  
467 be drastically impacted by unforeseen changes to the ECR, is very likely to chill  
468 development in CG, foreclosing the benefits CG can provide to all ratepayers.

469 **Q. What ECR would an individual customer be provided at the end of their 20-year**  
470 **lock-in period?**

471 A. At the end of the 20-year lock-in period customers would be compensated for exported  
472 energy at the then-prevailing ECR.

473 **Q. Please explain your proposal for ECR vintage eligibility.**

474 A. Eligibility for enrollment in each vintage ECR should be modeled on the eligibility  
475 criteria set forth in the Stipulation in Docket No. 14-035-114 for the legacy NEM  
476 Program. Specifically, customers who submit complete interconnection applications,  
477 including payment of applicable fees by the deadline date, would be eligible for a  
478 locked-in ECR under that vintage. These customers would then have twelve months  
479 from the date their interconnection application is approved to complete  
480 interconnection. As with the legacy NEM Program, ECR vintage eligibility would be  
481 maintained for subsequent customers served at the point of delivery approved for  
482 interconnection. A customer’s ECR vintage eligibility will cease if: (1) the equipment  
483 approved for interconnection is affirmatively removed from service for any reason

484 other than on a short-term basis for replacement of equipment or repair of the  
485 equipment or underlying structure; (2) the customer makes a material modification to  
486 increase the size of the customer's generation system after interconnection; or (3) the  
487 customer chooses to voluntarily change to another available CG program. If a customer  
488 transfers ownership of the applicable property, the transferee will receive the same  
489 vintage ECR rate throughout the remainder of the lock-in period.

490 **Q. Please explain your proposal for elimination of the annual expiration of excess**  
491 **export credits.**

492 A. Under the Transition Program, any export credits remaining on the March billing cycle  
493 expire and are unable to be carried forward to offset charges for consumption in future  
494 months.<sup>33</sup> With this docket, the Commission may set an ECR Program based on a full  
495 consideration of the value of CG, rather than a settled-on value derived via Stipulation.  
496 As a result, it is not reasonable to wipe credits clean for customers without any  
497 compensation. To do so can create perverse price signals that incentivize customers to  
498 waste energy on uneconomic end uses to avoid large balances of energy being forfeited  
499 to the utility.

500 Under the ECR Program, all credits should be monetized. At the end of each annualized  
501 billing period the customer should have the choice of: (1) carrying over credits to the  
502 next annualized billing period or (2) requesting a check from RMP for their remaining

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<sup>33</sup> For Schedule 10 customers, excess credits expire on the October billing cycle. See Rocky Mountain Power, *Electric Service Schedule No. 136*, p. 1, 8, Nov. 15, 2017, [https://www.rockymountainpower.net/content/dam/pcorp/documents/en/rockymountainpower/rates-regulation/utah/rates/136\\_Transition\\_Program\\_for\\_Customer\\_Generators.pdf](https://www.rockymountainpower.net/content/dam/pcorp/documents/en/rockymountainpower/rates-regulation/utah/rates/136_Transition_Program_for_Customer_Generators.pdf).

503 balance.<sup>34</sup> This is similar to the terms in place for the export credit program of Arizona  
504 Public Service Company (“APS”). Under the APS program, all credits are monetized  
505 every month. At the end of the year, customer balances in excess of \$25 are  
506 automatically refunded to customers via a check from the utility.<sup>35</sup> Because the current  
507 CG program contains caps on installed capacity of 25 kW for residential and 2 MW for  
508 non-residential, any concerns about customers “over-sizing” CG is unfounded.

509 **Q. Please explain your proposal that Net Metering and Transition Customers should**  
510 **have the option to take service under the new ECR Program at their sole**  
511 **discretion.**

512 A. Continued enrollment on the NEM Program and Transition Program should be  
513 optional. NEM Customers and Transition Customers should be allowed, at their sole  
514 discretion, to opt into the ECR Program. However, once a customer transitions to the  
515 ECR Program, that customer should not be eligible to re-qualify for legacy NEM  
516 Program or Transition Program access. This is consistent with the terms of the  
517 Stipulation.<sup>36</sup>

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<sup>34</sup> Section 54-15-104 of the Utah Code requires the expiration of excess credits at the end of the annualized billing period under net metering. *See* Utah Code Ann. § 54-15-104. The same restrictions do not apply to an ECR Program.

<sup>35</sup> Arizona Public Service, *Renewable Energy Riders*, APS, <https://www.aps.com/en/Residential/Service-Plans/Compare-Service-Plans/Renewable-Energy-Riders> (last visited Mar. 3, 2020).

<sup>36</sup> *See supra* n.15 at 11.

518 **IX. SUMMARY OF RECOMMENDATIONS**

519 **Q. Please summarize your recommendations.**

520 A. Taking into account the analyses and evidence reviewed in this case, I recommend the  
521 following:

522 1) The Commission should make a determination that the benefits of the net metering  
523 (“NEM”) Program exceed its costs and should re-open the NEM Program to new  
524 customers as of the effective date of its order in this proceeding.

525 2) In the alternative, if the Commission elects to maintain the general structure of the  
526 Transition Program, the Commission should adopt an ECR of 22.22 c/kWh with the  
527 following program details:

528 a) Exports should be netted on an hourly basis, rather than the current, 15-minute  
529 netting period;

530 b) The ECR should be fixed for a period of 20 years for individual customers;

531 c) Eligibility for each ECR vintage should be consistent with the terms of  
532 eligibility adopted for legacy access to the NEM Program under the terms of  
533 the Stipulation;

534 d) The Commission should eliminate the annual expiration of excess export  
535 credits; and

536 e) NEM and Transition Customers should have the option to take service under  
537 the new ECR Program at their sole discretion.

538 Q. Does this conclude your revised testimony?

539 A. Yes.

## CERTIFICATE OF SERVICE

I hereby certify that on this 8th day of May, 2020 a true and correct copy of the foregoing was served by email upon the following:

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