

Rocky Mountain Power  
Docket No. 16-035-36  
Witness: Robert M. Meredith

BEFORE THE PUBLIC SERVICE COMMISSION  
OF THE STATE OF UTAH

ROCKY MOUNTAIN POWER

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Rebuttal Testimony of Robert M. Meredith

April 2017

1 **Q. Are you the same Robert M. Meredith that presented direct testimony in phase**  
2 **III of this proceeding?**

3 A. Yes.

4 **PURPOSE OF REBUTTAL TESTIMONY**

5 **Q. What is the purpose of your rebuttal testimony?**

6 A. The purpose of my rebuttal testimony is to further support the rate structure and design  
7 of the Company's proposed EV TOU Pilot and respond to the testimony of Division of  
8 Public Utilities "(DPU)" witness Mr. Robert A. Davis, Office of Consumer Services  
9 "(OCS)" witnesses Mr. James W. Daniel, Mr. Jacob Thomas and Ms. Cheryl Murray,  
10 Utah Clean Energy "(UCE)" witness Ms. Sarah Wright, Western Resource Advocates  
11 "(WRA)" witness Mr. Kenneth L. Wilson, and ChargePoint, Inc. "(ChargePoint)"  
12 witness Mr. James Ellis.

13 **GENERAL DISCUSSION OF EV TOU PILOT**

14 **Q. What is your general reaction to the phase III direct testimony of other parties?**

15 A. I think that the workshops to discuss the legislative requirement for "time of use pricing  
16 for electric vehicle charging" were useful in building consensus around many of the  
17 elements surrounding the Company's proposed EV TOU Pilot, except rate design.  
18 During the workshops, the topic of the actual rate designs that should be included in a  
19 pilot prompted the most discussion. Achieving consensus on which rates to include in  
20 the pilot seems to be as elusive now as it was during the workshops.

21 During the workshops, many different rate designs were explored, with pros  
22 and cons to each. The range of different options discussed reflected the diversity and  
23 unique perspectives of the stakeholders. Designing rates is a balancing act which must

24 take into consideration many different and often conflicting goals. What the Company  
25 ultimately filed does not necessarily reflect what the Company's most preferred rate  
26 options would have been absent the discussions at the workshops. I think that the  
27 Company's proposed Option 1 and Option 2 rates, which include both a moderate on-  
28 to off-peak energy price differential and a more elevated on- to off-peak energy price  
29 differential, best balance different parties' perspectives, while testing rate options that  
30 are sufficiently different enough from each other and from the Company's existing  
31 residential time-of-use tariff, Schedule 2, that useful information will be learned.  
32 Ultimately, the purpose of a pilot is to test a program's feasibility, effectiveness, and  
33 acceptance in order to develop an offering that can be more broadly rolled-out to  
34 provide longer-term benefits. In this case, the pilot is intended to test customer  
35 responsiveness to time-of-use rates to encourage electric vehicle owners to charge their  
36 vehicles to off-peak hours.

37 **REBUTTAL OF MR. ROBERT A. DAVIS**

38 **Q. To what aspects of DPU witness Mr. Davis' direct phase III testimony are you**  
39 **responding?**

40 A. I address the following in Mr. Davis' phase III direct testimony:

- 41 1. Mr. Davis' recommendation to reject the Company's proposed Schedule 2E,  
42 because of his misgivings with the Company's proposed rate design.
- 43 2. The DPU's concern that the Annual Guarantee Payment may undermine the  
44 integrity of the load research study.
- 45 3. His request for clarity on the accounting treatment of the cost of meters for the  
46 proposed EV TOU Pilot.

47 4. A discrepancy in my Exhibit RMP \_\_\_(RMM-5), which Mr. Davis identified.

48 **Q. Why does Mr. Davis recommend rejection of proposed Schedule 2E?**

49 A. While Mr. Davis seems to generally agree with the other features of the Company's  
50 proposed EV TOU Pilot's general design, he expresses concerns with the actual design  
51 for the two rate options which the Company proposed for the pilot.<sup>1</sup>

52 **Q. What are Mr. Davis' chief concerns with the Company's proposed rate design  
53 options?**

54 A. While it is somewhat unclear to me what his exact reservations with the Company's  
55 proposed rates are, his concerns appear to be that: 1) Option 1 and 2 may not be  
56 different enough for lessons to be learned about customer behavior;<sup>2</sup> 2) The on-/off-  
57 peak price ratio of about 3:1 on Option 1 is too small and may not induce behavioral  
58 changes<sup>3</sup> and; 3) The on-/off-peak price ratio of about 10:1 on Option 2 is too large and  
59 may be punitive to customers who may not be able to shift their household usage.<sup>4</sup>

60 **Q. Does Mr. Davis offer a specific alternative to the Company's proposed rates?**

61 A. No. Mr. Davis suggests that maybe a rate with a 4:1 or 5:1 on-/off-peak price ratio  
62 could be used along with maybe using some other unspecified party's rate design that  
63 the DPU would evaluate for rebuttal or surrebuttal testimony.<sup>5</sup>

64 **Q. What reasons does Mr. Davis present for rejecting the Company's proposed rates?**

65 A. Mr. Davis' three reasons for rejecting the Company's two proposed rate options seem  
66 somewhat inconsistent. Mr. Davis suspects, but expresses uncertainty about whether

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<sup>1</sup> See lines 67 through 72 of DPU witness Mr. Robert A. Davis' Direct Testimony.

<sup>2</sup> See lines 94 through 100 of DPU witness Mr. Robert A. Davis' Direct Testimony.

<sup>3</sup> See lines 101 through 110 of DPU witness Mr. Robert A. Davis' Direct Testimony.

<sup>4</sup> See lines 111 through 113 of DPU witness Mr. Robert A. Davis' Direct Testimony.

<sup>5</sup> See lines 115 through 121 of DPU witness Mr. Robert A. Davis' Direct Testimony.

67 the on-/off-peak price ratio of Option 1 may be too small of a differential for customers  
68 to respond. Mr. Davis also suspects, but expresses uncertainty about whether the  
69 on-/off-peak price ratio of Option 2 may be so large that customers will be overly  
70 penalized. Although he describes price responsiveness and potential impacts to  
71 customers as important considerations which he feels are not well understood with the  
72 two proposed rate options, he is concerned that not enough useful information would  
73 be learned from them.

74 To me, it is also unclear how Option 1 or Option 2 may induce changes in  
75 customer behavior or what the customer acceptance of the two options may be. It is  
76 this uncertainty that makes me believe that testing these particular rate designs in the  
77 EV TOU Pilot would be keenly insightful. Perhaps, the on-/off-peak price ratio is too  
78 small on Option 1 and perhaps too large on Option 2. The Company proposed these  
79 two options, whose differences in price for energy consumed during the on- and off-  
80 peak periods represent two different extremes, precisely because they would be  
81 instructive and lead to a better understanding of the impact of price differential.

82 **Q. While generally agreeing that the Company's proposed Annual Guarantee**  
83 **Payment should be included in the pilot's design, Mr. Davis expresses concern that**  
84 **it may prevent customers from changing the timing of their consumption habits.<sup>6</sup>**  
85 **Please respond to this concern.**

86 A. As I mentioned in my direct testimony, I think that the Company's proposed Annual  
87 Guarantee Payment is needed to persuade customers to enroll in the pilot. While in  
88 theory the Annual Guarantee Payment could keep some customers from responding to

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<sup>6</sup> See lines 67 through 72 of DPU witness Mr. Robert A. Davis' Direct Testimony.

89 the time-based price signals, I do not think that this would have a significant impact to  
90 participants' behavior during their first year after enrollment. Customers would still  
91 face an annual consequence of up to an increase of ten percent in their energy charges,  
92 if they did not adequately manage the timing of their energy consumption. They would  
93 also have the upside potential of saving on their bills if they were successful in shifting  
94 enough usage to the off-peak period. Furthermore, it is important to note that the  
95 Annual Guarantee Payment is a lump sum *annual* payment made after the first 12  
96 months on proposed Schedule 2E. Customers would still see and need to pay their bills  
97 on a monthly basis. I believe that experiencing a large monthly bill, or the potential to  
98 experience a large monthly bill, will still encourage customers to respond to the price  
99 signals of the tariff, even if there may be some relief after the end of the first year of  
100 participation.

101 **Q. Mr. Davis expresses uncertainty regarding the accounting treatment of the costs**  
102 **of meters for the proposed EV TOU Pilot.<sup>7</sup> Please describe the accounting for the**  
103 **cost of meters.**

104 A. The cost to install meters necessary for the EV TOU Pilot will be recovered from STEP  
105 funds and will be a part of the cost and budget for electric vehicle incentives. Mr. Davis  
106 states that the cost of meters may need to be included in the budget for Conservation,  
107 Efficiency and Other New Technology Programs. I do not think that this is necessary,  
108 because the meters are needed for the Time of Use Pilot Program incentive described  
109 in Mr. Comeau's direct testimony and are therefore a necessary element of the budget  
110 for electric vehicle incentives.

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<sup>7</sup> See lines 201 through 212 of DPU witness Mr. Robert A. Davis' Direct Testimony.

111                   Concerning the accounting of the meter costs, the capital spend for the meters  
112 will be offset by contributions in aid of construction “(CIAC)” from STEP funds. While  
113 the labor and materials cost of installing a meter is capitalized, the Company will not  
114 earn a return on or depreciate the meters, since the costs will be eliminated by the STEP  
115 funds’ CIAC.

116 **Q. Mr. Davis notes that for the incremental cost to charge a plug-in electric vehicle**  
117 **“(PEV)” shown on Exhibit RMP\_\_\_(RMM-5), Schedule 2 and proposed Schedule**  
118 **2E do not include various surcharges. Please respond.**

119 A. When preparing Exhibit RMP\_\_\_(RMM-5), the Company inadvertently left off  
120 Schedule 94 and Schedule 98 adjustments to the energy charges for proposed Schedule  
121 2E. Please refer to Revised Exhibit RMP\_\_\_(RMM-5) which corrects this issue.  
122 Exhibit RMP\_\_\_(RMM-5) presents estimates of the incremental cost to charge a PEV  
123 and therefore Schedule 91, which is a fixed monthly surcharge, is not relevant to this  
124 calculation. Also, Schedule 2’s surcharge for on-peak energy and credit for off-peak  
125 energy are adders to Schedule 1 and are not subject to Schedule 94 and 98. The “fuel”  
126 comparison presented in Exhibit RMP\_\_\_(RMM-5) is therefore accurate for Schedule  
127 2.

128 **Q. What is the change in the estimated “fuel” savings for proposed Schedule 2E**  
129 **presented in Revised Exhibit RMP\_\_\_(RMM-5) relative to what you presented in**  
130 **direct testimony?**

131 A. The change is relatively minor. The estimated monthly “fuel” savings shown on  
132 Revised Exhibit RMP\_\_\_(RMM-5) for TOU Option 1 is \$46.62, or \$0.27 per month  
133 less than presented in my direct testimony. For TOU Option 2, the estimated monthly

134 “fuel” savings was corrected to be \$59.05, or \$0.14 per month less than presented in  
135 my direct testimony.

136 **Q. Does this correction impact the prices calculated for proposed Schedule 2E?**

137 A. No. The Company’s estimates for the incremental cost to “fuel” PEV’s and internal  
138 combustion vehicles “(ICE)” were provided in my direct testimony for informational  
139 purposes and do not influence the calculation of the actual prices.

140 **REBUTTAL OF MR. JAMES W. DANIEL**

141 **Q. Please summarize OCS witness Mr. Daniel’s concerns with the Company’s**  
142 **proposed rates for the EV TOU Pilot.**

143 A. Mr. Daniel feels that the on-peak energy charge for Option 2 is too large and the time  
144 periods for the on-peak period contain too many hours.<sup>8</sup> Mr. Daniel argues that Option  
145 2 is problematic, because a customer who shifts a significant level of energy  
146 consumption to the off-peak period could avoid paying distribution-related costs which  
147 could shift those costs to other customers.<sup>9</sup>

148 **Q. Would the Company’s Option 2 cause distribution costs to be shifted to non-**  
149 **participating customers?**

150 A. It is unclear to me whether either of the Company’s rate options for the pilot would  
151 shift costs to non-participants. The issue of potential cost shifting and the degree to  
152 which customers participating in the different rate designs for the EV TOU Pilot are  
153 fully covering their costs may be perhaps the most important aspect to examine in this  
154 pilot. I do not think that the Company’s proposed rate options would necessarily create

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<sup>8</sup> See lines 65 through 70 of OCS witness Mr. James W. Daniel’s Direct Testimony.

<sup>9</sup> See lines 146 through 156 of OCS witness Mr. James W. Daniel’s Direct Testimony.



155 a cost shifting situation, since both options are guided by the Company's cost of service  
156 study from the last general rate case.

157 The margin by which the on-peak energy charge exceeds the off-peak energy  
158 charge for Option 2 was designed to recover all costs that are not energy-related and  
159 are not recovered by the customer charge.<sup>10</sup> In other words, the on-peak energy charge  
160 for Option 2 was primarily designed to recover those costs that are demand related.  
161 Costs that are allocated on the basis of demand in the last general rate case made up  
162 approximately 60 percent of the residential class' cost of service. In comparison, the  
163 premium for the on-peak energy charge over the off-peak energy charge for Option 2  
164 recovers about 61 percent of residential revenue requirement. Since the on-peak energy  
165 charge premium from Option 2 was designed to recover demand-related costs, which  
166 make up most of the residential class' cost of service, the on-peak period was set to  
167 include the vast majority of both system coincident peaks and distribution coincident  
168 peaks.<sup>11</sup>

169 While both the rates and the time-of-use periods are strongly aligned with the  
170 Company's cost of service study, it is not entirely clear that a customer's time-based  
171 volumetric usage in response to time-of-use prices will correspond with that customer's  
172 demand at the times of the Company's peaks. If the Commission approves the  
173 Company's proposed rates and load research study plan, I think that this important  
174 question could be answered.

175 I think that it is quite possible that analysis at the pilot's conclusion could show  
176 that customers on the Company's proposed rates could pay quite close to their cost of

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<sup>10</sup> See lines 295 through 301 of Company witness Mr. Robert M. Meredith's Direct Testimony.

<sup>11</sup> See lines 227 through 239 of Company witness Mr. Robert M. Meredith's Direct Testimony.

177 service, since those rates were guided by the cost of service study. I also think that it is  
178 possible that analysis could show that they do not fully cover their costs creating  
179 potential cost shifting. In consideration of this uncertainty surrounding the potential for  
180 cost shifting, the Company's proposal for time-of-use pricing for PEV drivers is for a  
181 limited five year pilot which will at most include about 1,200 customers. The  
182 Company's expectation is that the proposed EV TOU Pilot, if approved by the  
183 Commission, would shed some light on this issue before any TOU option would be  
184 more broadly implemented.

185 **Q. Mr. Daniel indicates that the Company "arbitrarily" set Option 1's off-peak**  
186 **energy charge halfway between the average energy charge for residential**  
187 **customers and the off-peak charge for Option 2.<sup>12</sup> Were the rates for Option 1 set**  
188 **arbitrarily?**

189 A. No. Given the uncertainty I just described regarding the effectiveness of volumetric  
190 time-based rates to adequately capture cost, it was important for another rate option to  
191 be developed from which all variables, except one, were kept constant. Option 1 was  
192 therefore designed to be identical to Option 2 in all ways, except for having a smaller  
193 on- to off-peak energy charge price differential. The rates resulting from using halfway  
194 between average energy charges and Option 2's rates produces prices that are  
195 sufficiently different from both Option 2 and present Schedule 2, such that meaningful  
196 information could be obtained from testing and studying them.

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<sup>12</sup> See lines 141 through 143 of OCS witness Mr. James W. Daniel's Direct Testimony.

197 **Q. Does Mr. Daniel present alternative rates for the two options for the EV TOU**  
198 **Pilot?**

199 A. Yes. Mr. Daniel recommends a rate option 1 with an approximately 2:1 on-/off-peak  
200 price differential “(OCS Option 1)” as well as another rate option 2 with an  
201 approximately 4:1 on-/off-peak price differential “(OCS Option 2).”<sup>13</sup>

202 **Q. What is your opinion of Mr. Daniel’s proposed rates?**

203 A. Relative to the Company’s proposed prices, the on- to off-peak energy price  
204 differentials of the rate options presented by Mr. Daniel are significantly closer  
205 together. I also note that the on- to off-peak energy price differential for OCS Option 1  
206 is about 2:1, which is fairly close to the differential of the Company’s existing Schedule  
207 2 tariff. Given the similarities between OCS Option 1 and OCS Option 2 as well as  
208 OCS Option 1 and Schedule 2, I think the information that could be learned from the  
209 pilot would be less useful, if the Commission were to approve Mr. Daniel’s proposed  
210 prices instead of those proposed by the Company.

211 **Q. Does Mr. Daniel present alternative on-peak time periods for the EV TOU Pilot?**

212 A. Yes. Mr. Daniel also recommends a slight modification to the hours of the on-peak  
213 period for OCS Option 1 such that the winter morning non-holiday weekday on-peak  
214 hours include only 8am to 9am instead of the Company’s proposed 8am to 10am period,  
215 and the non-holiday weekday late afternoon/early evening on-peak hours are shortened  
216 to three hours and staggered one hour apart (5pm to 8pm in the winter and 4 to 7pm in  
217 the summer as compared to the Company’s proposed 3pm to 8pm).<sup>14</sup>

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<sup>13</sup> See lines 164 through 177 of OCS witness Mr. James W. Daniel’s Direct Testimony.

<sup>14</sup> See lines 204 through 232 of OCS witness Mr. James W. Daniel’s Direct Testimony.

218 **Q. What is your opinion of Mr. Daniel's proposed on-peak period for OCS Option 1?**

219 A. The on-peak period which Mr. Daniel selected for OCS Option 1, while shorter and  
220 less restrictive from a customer perspective, captures a smaller percentage of the system  
221 coincident and distribution system coincident peaks. While the Company's on-peak  
222 period includes 94 percent of the peaks that occurred in the past five filed cost of service  
223 studies, the on-peak period that Mr. Daniel proposes for OCS Option 1 would only  
224 include 80 percent of those same peaks in the summer period and 83 percent in the  
225 winter period. The Company selected the hours which it did so that the on-peak period  
226 would include the timing for almost all of the Company's potential peaks with the hope  
227 that energy shifted away from on-peak hours would result in demand reductions at the  
228 time of the Company's peaks.

229 Also, varying the time-of-use periods as well as the on- and off-peak energy  
230 price differentials would make it more challenging for useful information to be learned  
231 from the pilot. As I indicated earlier in my testimony, I think that whichever two rate  
232 options are included in the pilot should be the same in all respects except for one useful  
233 variable which could be studied. If OCS Option 1 and OCS Option 2 were to be used  
234 for the pilot, it may be impossible to accurately parse out the impacts from price  
235 differential versus time-of-use period. Furthermore, I believe that price differential is a  
236 more important variable to test, since the Company's proposed time of use periods  
237 accurately reflect the times of the Company's peak periods and price may be more  
238 impactful than a subtle change in the hours.

239 **Q. Mr. Daniel recommends that the Company’s final report for the EV TOU Pilot**  
240 **include several particular analyses.<sup>15</sup> Does the Company agree to include these**  
241 **analyses in its final report?**

242 A. Yes. The analyses that Mr. Daniel references would be useful and the Company agrees  
243 to include them in its final report.

244 **Q. Mr. Daniel recommends that the Company’s proposed Annual Guarantee**  
245 **Payment be limited to a period less than 12 months. Does he provide any support**  
246 **for this recommendation?**

247 A. No. Mr. Daniel simply recommends that the proposed Annual Guarantee Payment  
248 should be limited to some unspecified period that would be less than the proposed 12  
249 months without providing any reasoning for his suggestion.<sup>16</sup>

250 **Q. Why is an annual period for a guarantee payment a good length of time?**

251 A. For many customers, their usage patterns fluctuate over the different months of a year.  
252 They may use electricity to either cool or heat their home and consequently the timing  
253 of their electric consumption may be quite different in July than it is in March. For PEV  
254 drivers, who this pilot is specifically targeted towards, the number of miles driven on  
255 their PEV’s may also vary significantly during the different months of a year. If the  
256 guarantee payment did not cover a full annual period, it would be challenging for  
257 customers to know if participating in the EV TOU Pilot would be a good choice for  
258 them. Any period less than a year may not include the full range of end-uses for which  
259 a customer uses electricity. Furthermore, the seasonality of a customer’s hourly energy  
260 consumption may make it more or less challenging to effectively shift usage to the off-

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<sup>15</sup> See lines 261 through 269 of OCS witness Mr. James W. Daniel’s Direct Testimony.

<sup>16</sup> See lines 278 through 279 of OCS witness Mr. James W. Daniel’s Direct Testimony.

261 peak period during different months. I believe that providing participants with a  
262 guarantee that covers a full year will be an important tool for signing up participants  
263 who might otherwise be on the fence about time-of-use rates. Accordingly, the  
264 Company recommends that the Commission adopt the Company's proposal for the  
265 guarantee payment to cover one year.

266 **REBUTTAL OF MR. JACOB THOMAS**

267 **Q. How does OCS witness Mr. Thomas recommend the Company modify the design**  
268 **of its proposed load research study?**

269 A. Along with the Company's proposed approach of stratifying customers with PEVs on  
270 the basis of energy usage, Mr. Thomas recommends another dimension of stratification  
271 be included which would consider the type of PEV charging that a sample customer  
272 uses. Mr. Thomas recommends including the variable of whether a customer uses a  
273 Level 1 or a Level 2<sup>17</sup> PEV charger in the design of the load research study.

274 **Q. Why does Mr. Thomas recommend this change to the Company's proposed load**  
275 **research study?**

276 A. Mr. Thomas reasons that the underlying electric characteristics of different chargers  
277 would likely have different usage patterns.<sup>18</sup> He further describes how stratifying upon  
278 energy usage alone may not fully correct for the differences in load profile for  
279 customers with different PEV charger types, since residential customers have a variety  
280 of different end-uses for their household consumption. For example, a customer with  
281 central air conditioning and a Level 1 charger that uses less overall energy on PEV

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<sup>17</sup> A Level 1 PEV charger is connected to a standard 120 volt household outlet and supplies a slower charge that draws less power. A Level 2 PEV charger is connected to a 240 volt circuit, which are commonly used to supply power to an oven or a clothes dryer, and charges faster with a greater draw of power.

<sup>18</sup> See lines 152 through 170 of OCS witness Mr. Jacob Thomas' Direct Testimony.

282 charging and a customer with a swamp cooler and a Level 2 charger that uses more  
283 energy on PEV charging may have similar overall energy consumption but very  
284 different hourly profiles.<sup>19</sup>

285 **Q. Do you agree with Mr. Thomas' recommended changes?**

286 A. No. I respectfully think that his recommended changes are unnecessary to achieve the  
287 goal of a load research study that is robust and accurate, and could overly complicate  
288 the process of recruiting participants for the load research study.

289 **Q. Please describe why you believe that stratifying based upon charger type is**  
290 **unnecessary.**

291 A. The Company has several load research studies in place for different rate classes such  
292 as residential, irrigation, and small general service. Within each of these rate classes,  
293 there can be a wide range of end-uses that are present within each sample customer's  
294 electric consumption. Like Mr. Thomas referenced, some residential customers have  
295 central air conditioning and some do not. It has never been the practice of the Company  
296 to try and determine which customers within a particular rate class have different end  
297 use energy applications and then stratify the study based upon those end uses. As a  
298 practical matter, the Company does not know exactly which customers within the  
299 population have central air conditioning, heat their home with electricity, or have a pool  
300 pump. Even if the Company knew all end use energy applications for all its customers,  
301 basing load research design for a particular rate class upon the end uses within that  
302 class could be a never-ending process of segmentation. Should the residential load  
303 research study be stratified for those who heat with gas versus electricity? Should it

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<sup>19</sup> See lines 171 through 182 of OCS witness Mr. Jacob Thomas' Direct Testimony.

304 also be stratified on cooling type? What about square footage of the home? Unless there  
305 was an ultimate expectation to develop mandatory rates for a specific end use, such as  
306 a customer with a Level 2 charger, this further stratification is unnecessary.

307 The logic behind Mr. Thomas' recommendation to stratify on charger type could  
308 also be applied to the Company's present residential load research study which is  
309 stratified on energy usage alone. In the same way that someone with a Level 2 charger  
310 and a swamp cooler could have similar energy use to a customer with a Level 1 charger  
311 and central air, a customer who lives in a small house but heats with electricity could  
312 use about the same amount of kilowatt hours as someone else who lives in a larger  
313 home and heats with gas. Ultimately, the Company's residential load research study is  
314 not designed upon end use, but on energy usage, because it is known and because  
315 different end uses are naturally inherent within a properly designed random sample of  
316 customers. In the same way, the Company's proposed load research study for the EV  
317 TOU Pilot will examine those customers who have a PEV and its random selections of  
318 customers from that population will naturally reflect the penetrations of different  
319 charger types within the study.

320 **Q. Please describe why stratifying based upon charger type could make the load**  
321 **research recruitment process overly complicated.**

322 A. The Company's proposed load research study will include 3 groups of customers (TOU  
323 Option 1, TOU Option 2, and the Control Group), which may be in three different strata  
324 for a total of nine separate tranches from which the Company must successfully recruit  
325 a certain number of customers. Adding the dimension of charger type would double the  
326 number of tranches from which the Company would need to recruit its target numbers



327 to 18, which could make full recruitment by the Company's deadlines more challenging  
328 to achieve. Furthermore, the Company would need to survey existing customers who  
329 have PEVs regarding whether each customer used Level 1 or Level 2 charging before  
330 it could begin the process of stratification, random sampling, and recruitment. If the  
331 response rate from this initial survey, which would ask about charger type, were to be  
332 low, recruitment targets could be further challenged. I do not think that the additional  
333 complexity and challenges of adding this dimension are worth any incremental  
334 precision that could be achieved.

335 **Q. Are there any other reasons why stratifying based upon charger type (Level 1 or**  
336 **Level 2) could be problematic?**

337 A. Yes. Like other end uses, charger type could evolve over time with a customer. A  
338 customer who used to charge her PEV on a Level 1 charger could install a Level 2  
339 charger in the middle of the load research study. Charger type also may not necessarily  
340 be a binary choice between Level 1 and Level 2. For example, a household could have  
341 two PEVs with one which is charged on a Level 1 charger and another which is charged  
342 on a Level 2 charger.

343 **Q. Is the charger type an irrelevant data point which should be ignored?**

344 A. No. In my direct testimony, I include charger type as one of the items for which the  
345 Company plans to ask customers about in its surveys.<sup>20</sup> Certainly, the charger type can  
346 have a significant impact on a customer's hourly load profile. The Company intends to  
347 analyze the types of chargers which pilot participants indicate they use on the surveys  
348 and compare this back to the load research study results along with other data. From

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<sup>20</sup> See line 157 of Company witness Mr. Robert M. Meredith's Direct Testimony.

349 this analysis, the Company hopes to draw useful inferences on the significance of  
350 charger type. While I do not think the load research study should be stratified on charger  
351 type, I do think that collecting this information through surveys will likely prove  
352 insightful.

353 **Q. Is there another way that the Company could ensure that the Control Group as**  
354 **well as the groups on TOU Option 1 and TOU Option 2 include penetrations of**  
355 **Level 1 versus Level 2 charging that are representative of the existing population**  
356 **of customers with PEVs?**

357 A. Yes. While I continue to believe that the Company's load research study as proposed is  
358 statistically defensible for the reasons previously described, another approach could be  
359 pursued which would more intentionally account for Level 1 and Level 2 penetration.  
360 Although I believe this alternative process is unnecessary, I think that it would be more  
361 manageable than Mr. Thomas' recommended approach.

362 **Q. Please describe this alternative approach.**

363 A. The load research study period could be extended for two years. At the time that  
364 randomly selected customers agree to participate in the study, they could indicate  
365 whether their charging was Level 1 or Level 2. Simultaneous with the first year of the  
366 study, the Company would analyze the occurrence of Level 1 and Level 2 charger type  
367 in the different groups. From all of the responses received from load research study  
368 participants, the Company could estimate Level 1 versus Level 2 penetration for the  
369 population of customers with PEVs. This estimate could then be used to determine  
370 whether each group (Control Group, TOU Option 1, and TOU Option 2) had a  
371 statistically defensible representation of charger penetration. If some of the groups did

372 not adequately represent the population's charger penetration levels, the Company  
373 would recruit more participants during the first year of the study until it did. By the  
374 second year of the study, any potential disparities related to charger type penetration  
375 would be eliminated.

376 **REBUTTAL OF MS. CHERYL MURRAY**

377 **Q. To which of OCS witness Ms. Murray's recommendations will you respond?**

378 A. I will respond to three of Ms. Murray's recommendations presented in her direct  
379 testimony. First, I will respond to two minor changes which she recommends for  
380 proposed Schedule 2E. Second, I will respond to her recommendation for a tariff which  
381 would explain the details for the load research study. Finally, I will address her  
382 recommendation to exclude customers in the ASG from the Annual Guarantee  
383 Payment.

384 **Q. Do you agree to make the two minor changes which Ms. Murray recommends for**  
385 **Schedule 2E?<sup>21</sup>**

386 A. Yes. Please refer to Revised Exhibit RMP\_\_\_\_(RMM-7) for revised tariff sheets for  
387 proposed Schedule 2E.

388 **Q. What is your opinion of Ms. Murray's recommendation to include a tariff for load**  
389 **research study participants?<sup>22</sup>**

390 A. I think that having a tariff that explains eligibility for participation in the proposed load  
391 research study and the payment that customers would receive for their participation is  
392 a good idea. Having this tariff will make it clear who can participate in the proposed  
393 study. While Schedule 2E makes this clear for customers who are on either Company

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<sup>21</sup> See lines 199 through 206 of OCS witness Ms. Cheryl Murray's Direct Testimony.

<sup>22</sup> See lines 212 through 231 of OCS witness Ms. Cheryl Murray's Direct Testimony.

394 proposed Option 1 or Option 2, having a tariff would make it clear that the control  
395 group participants must be subject to many of the same requirements. For example,  
396 control group participants should not be able to participate in the net metering program,  
397 so that study participants who are on one of the time-of-use options can be cleanly  
398 compared to the control group. Please refer to Exhibit RMP\_\_\_(RMM-1R) for tariff  
399 sheets for proposed Schedule 121 - Plug-in Electric Vehicle Load Research Study  
400 Program.

401 **Q. Do you agree with Ms. Murray's recommendation that customers on proposed**  
402 **Schedule 2E, who would not be part of the load research study, be ineligible for**  
403 **the Annual Guarantee Payment?**<sup>23</sup>

404 A. No. I think that providing some protection against a severely adverse annual bill impact  
405 will be a necessary tool to persuade customers to enroll. I think that without the Annual  
406 Guarantee Payment, enrollment in the EV TOU Pilot could be low, because many  
407 customers might view time-of-use as simply too risky a proposition for them.  
408 Achieving a decent participation rate in the pilot from customers who are not randomly  
409 selected to be on the load research study is important, because the Company hopes to  
410 learn some important things from the ASG. Which rate option is more desirable? How  
411 might these time-of-use rates impact potential PEV adoption? Which marketing  
412 methods are the most effective? These are some of the questions which cannot be  
413 answered with the load research study alone.

414 Furthermore, I do not think that the Annual Guarantee Payment makes  
415 enrollment in time-of-use without risk for customers. As I discussed in my rebuttal of

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<sup>23</sup> See lines 257 through 271 of OCS witness Ms. Cheryl Murray's Direct Testimony.

416 DPU witness Mr. Davis, customers who do not sufficiently respond to the time-based  
417 price signal would still face a potential 10 percent annual bill increase along with the  
418 potential for high monthly bills even with the Annual Guarantee Payment.

419 **REBUTTAL OF MS. SARAH WRIGHT**

420 **Q. Please summarize the direct testimony of UCE witness Ms. Sarah Wright.**

421 A. Ms. Wright argues that the Company's proposed rate options for the EV TOU Pilot  
422 undermine the policy objective of promoting energy conservation, since they do not  
423 include inverted tier block pricing.<sup>24</sup> She also argues that the Company's proposed rate  
424 options would unduly reward large energy users and punish small energy users.<sup>25</sup> Ms.  
425 Wright proposes two alternative rate options. Her first rate option "(UCE Option 1)"  
426 has a roughly 3:1 on-/off-peak energy price differential and inverted tier pricing for  
427 kilowatt hour consumption greater than 1,000 for both on- and off-peak kilowatt  
428 hours.<sup>26</sup> The on-peak period that she proposes for UCE Option 1 is the same as the  
429 Company's proposed on-peak period for the pilot, except that it excludes the winter  
430 non-holiday weekday morning period (8am to 10am).<sup>27</sup> Her second rate option "(UCE  
431 Option 2)" employs a similar rate design, but includes a 3.4 cents per kilowatt hour  
432 super off-peak energy charge that applies to usage between midnight and 6am each  
433 day.<sup>28</sup>

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<sup>24</sup> See lines 154 through 176 of UCE witness Ms. Sarah Wright's Direct Testimony.

<sup>25</sup> See lines 129 through 153 of UCE witness Ms. Sarah Wright's Direct Testimony.

<sup>26</sup> See lines 268 through 273 of UCE witness Ms. Sarah Wright's Direct Testimony.

<sup>27</sup> See lines 248 through 254 of UCE witness Ms. Sarah Wright's Direct Testimony.

<sup>28</sup> See lines 309 through 326 of UCE witness Ms. Sarah Wright's Direct Testimony.

434 **Q. Do you agree with Ms. Wright that the Company's proposed rates would**  
435 **undermine energy efficiency?**

436 A. No. While the Company's proposed rate options offer prices that are less during the  
437 off-peak period, the prices during the on-peak period are much higher. Both of the  
438 Company's proposed rate options encourage energy conservation during all hours, but  
439 specifically prioritize conservation that targets the periods of time when the Company's  
440 peaks occur. Both rate options also continue to support customers making investments  
441 in energy efficiency and avoiding wasteful energy consumption.

442 The expectation with the EV TOU Pilot is that customers will be able to shift  
443 some of their usage, particularly PEV charging, to the off-peak period and effectively  
444 reduce their contribution to the Company's peaks. Most customers would not be able  
445 to entirely eliminate their energy consumption during the on-peak period. Since many  
446 customers will likely have usage during the on-peak period, there will be even more of  
447 an incentive to reduce usage during those times through energy efficiency measures.

448 **Q. Have you prepared an analysis that demonstrates that the Company's proposed**  
449 **TOU rate options would send conservation price signals that are similar to those**  
450 **sent by present Schedule 1 tiered rates?**

451 A. Yes. To further understand how the price signal from the Company's proposed TOU  
452 rate options would compare to current Schedule 1 tiered rates, I prepared Exhibit  
453 RMP\_\_\_(RMM-2R). Taking the profiles from the energy efficiency measures of  
454 residential cooling and residential lighting, I determined the proportions of these  
455 profiles that occur during the Company's proposed on- and off-peak periods as well as  
456 the proportions that occur during the summer and winter months for 1,000 kilowatt

457 hours of annual energy savings. From these proportions, I calculated an average price  
458 for savings on both measures for a customer on TOU Rate Option 1, TOU Rate Option  
459 2, Schedule 1 subject to the highest tier prices, and Schedule 1 subject to the lowest tier  
460 price.

461 From the average profile for cooling-related energy efficiency, the average price  
462 for bill savings from this measure is 12.43 cents per kilowatt hour and 14.68 cents per  
463 kilowatt hour for TOU Rate Option 1 and TOU Rate Option 2, respectively. This  
464 compares to average price of bill savings of 8.85 cents per kilowatt hour for a customer  
465 on Schedule 1 who is subject to the lowest tier of energy charges and 14.39 cents per  
466 kilowatt hour for a customer on Schedule 1 who is subject to the highest tier of energy  
467 charges. In other words, a customer on TOU Rate Option 2 who enacted cooling-related  
468 energy efficiency measures would face slightly higher average savings to a customer  
469 on Schedule 1 who was subject to the highest tier of energy charges.

470 The result for lighting-related energy efficiency also shows average bill savings  
471 between the two TOU rate options and Schedule 1 which are in a similar range. From  
472 the average profile for lighting-related energy efficiency, the average price for bill  
473 savings from this measure is 10.29 cents per kilowatt hour and 10.41 cents per kilowatt  
474 hour for TOU Rate Option 1 and TOU Rate Option 2, respectively. This compares to  
475 average price of bill savings of 8.85 cents per kilowatt hour for a customer on Schedule  
476 1 who is subject to the lowest tier of energy charges and 11.98 cents per kilowatt hour  
477 for a customer on Schedule 1 who is subject to the highest tier of energy charges. For  
478 lighting-related energy efficiency measures, a customer on TOU Rate Option 2 would

479 face average savings that is about 15 percent lower than a customer on Schedule 1 who  
480 was subject to the highest tier of energy charges.

481 **Q. Does time-of-use send a better price signal for energy efficiency than non time**  
482 **differentiated pricing?**

483 A. Yes. When the Company evaluates energy efficiency as part of the Integrated Resource  
484 Plan “(IRP)” process, it determines that different conservation measures have more  
485 value than others.<sup>29</sup> The differences in value generally relate to the ability of a particular  
486 conservation measure to reduce load during the time of the Company's peak. Well-  
487 designed time-of-use rates that target consumption at peak times, like those proposed  
488 by the Company, provide a stronger price signal for those conservation measures that  
489 have more value. For example, RMP \_\_\_(RMM-2R), which I just described, shows that  
490 the average price of bill savings under both of the Company's proposed TOU rate  
491 options, are greater for cooling-related energy efficiency than for lighting-related  
492 energy efficiency. This is consistent with the Company's 2015 IRP DSM Decrement  
493 Study, which also shows a value for residential cooling measures that is greater than  
494 for residential lighting measures.<sup>29</sup>

495 **Q. Do you think that energy charges for the EV TOU Pilot should be subject to**  
496 **inverted tier block pricing?**

497 A. No. Inverted tier block pricing, under which customers pay more for energy that they  
498 use each month in excess of some threshold, does not align well with the core principles  
499 which I espoused for the EV TOU Pilot in my direct testimony. Specifically, I do not

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<sup>29</sup> See PacifiCorp Class 2 DSM Decrement Study for the 2015 IRP which can be found at [http://www.pacificorp.com/content/dam/pacificorp/doc/Energy\\_Sources/Demand\\_Side\\_Management/2015/2015\\_Class\\_2\\_DSM\\_Decrement\\_Study.pdf](http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/2015/2015_Class_2_DSM_Decrement_Study.pdf).



500 think inverted tier pricing aligns with the core principles of encouraging electric vehicle  
501 adoption and ease of use/customer acceptance. Energy prices that become higher as a  
502 customer uses more energy during a monthly billing period directly dis-incentivize  
503 PEV adoption. A customer who makes the decision to purchase or lease a PEV and  
504 charge it at home will use incrementally more kilowatt hours than they would have  
505 otherwise. This incremental usage associated with PEV charging will be more likely to  
506 be charged at a higher price tier than that customer's other existing usage. Charging a  
507 higher energy price for a customer's PEV charging increases the payback period  
508 associated with the decision to drive a PEV and can potentially hamper PEV adoption.

509 Inverted tier pricing layered on top of time-of-use rates may also be more  
510 confusing for customers and harder for them to understand. It is of primary importance  
511 for the pilot that customers understand well the time periods for which prices are higher  
512 or lower under time-of-use rates. Including a component that also makes energy more  
513 costly as a customer uses more during a monthly billing period may confuse customers  
514 and distract from the message to them to manage their loads to avoid the on-peak  
515 period. Including both a time-of-use element and an inverted tier block element within  
516 the rates for the pilot may also make it harder for a customer to evaluate whether to  
517 enroll.

518 Charging a lot for energy during the on-peak period along with charging less  
519 for usage during the off-peak period sends a robust cost-informed price signal to which  
520 customers can respond. Including inverted prices which increase cost as overall usage  
521 rises distracts from the primary price signal to shift usage away from the on-peak  
522 period, can be confusing to customers, and can undermine PEV adoption. Also, while

523 time-of-use pricing has a basis in cost, tiered energy charges introduce arbitrary  
524 demarcation(s) over the course of a billing month which are not cost-based.

525 **Q. Ms. Wright cites a presentation made by the Regulatory Assistance Project**  
526 **“(RAP)” that indicates that time-of-use rates which include inclining tier block**  
527 **rates can more effectively encourage conservation. Please comment.**

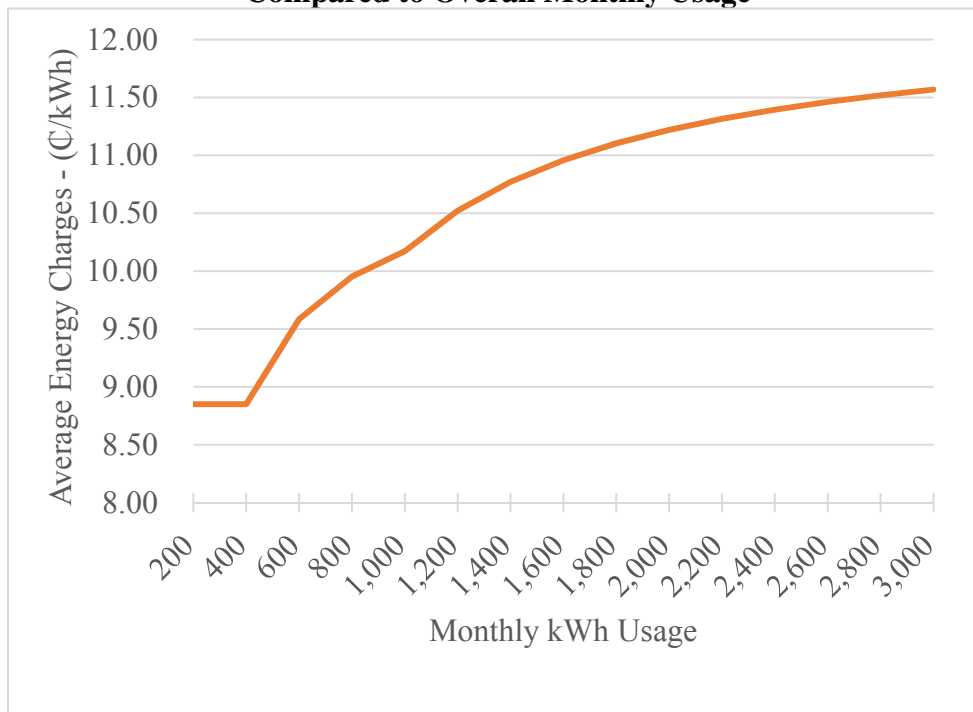
528 A. On November 3, 2016, RAP made a presentation regarding time-of-use rates to  
529 participants of the workshop sessions. In its presentation, RAP presented a table that  
530 suggested that a time-of-use rate with inclining tier pricing reduces peak demand and  
531 total energy more than a time-of-use rate without inclining tier pricing. I think that this  
532 table that Ms. Wright presents in her direct testimony should be viewed with some  
533 skepticism. Without the underlying data for the table, which shows very generic ranges  
534 of change to baseline energy and peak demand from different rate design structures, it  
535 is hard to substantiate these claims and whether they would specifically apply to  
536 customers in the Company’s Utah service territory. Certainly, there are far more  
537 variables than the mode (i.e. critical peak pricing, demand charges, time-of-use with or  
538 without tiers) of a rate design that would impact the extent to which participants may  
539 conserve energy or reduce peak load. I do not know whether the rate designs being  
540 examined in RAP’s table may be from other parts of the country or the even the world,  
541 where electricity may be more costly. I also do not know whether the underlying  
542 characteristics of the customers from the utilities included in RAP’s table are similar to  
543 the Company’s customers. To accurately measure the extent to which tiered pricing  
544 may actually influence energy usage and peak loads for time-of-use customers, it would  
545 be necessary for a well-designed statistically significant study to be conducted which

546 would test customers with tiered rates to a control group which did not have tiered  
547 prices. I think that the information which RAP presented, while interesting, does not  
548 present clear evidence that a time-of-use rate with tiers would achieve greater energy  
549 and peak reductions than a time-of-use rate without tiers or that there is a reasonable  
550 cost basis for the tiers.

551 **Q. Ms. Wright claims that the Company's proposed rates could unfairly benefit**  
552 **larger energy users and penalize smaller energy users. Please discuss the impacts**  
553 **of the Company's proposed rates for the pilot to customers with different usage**  
554 **sizes and put them into context.**

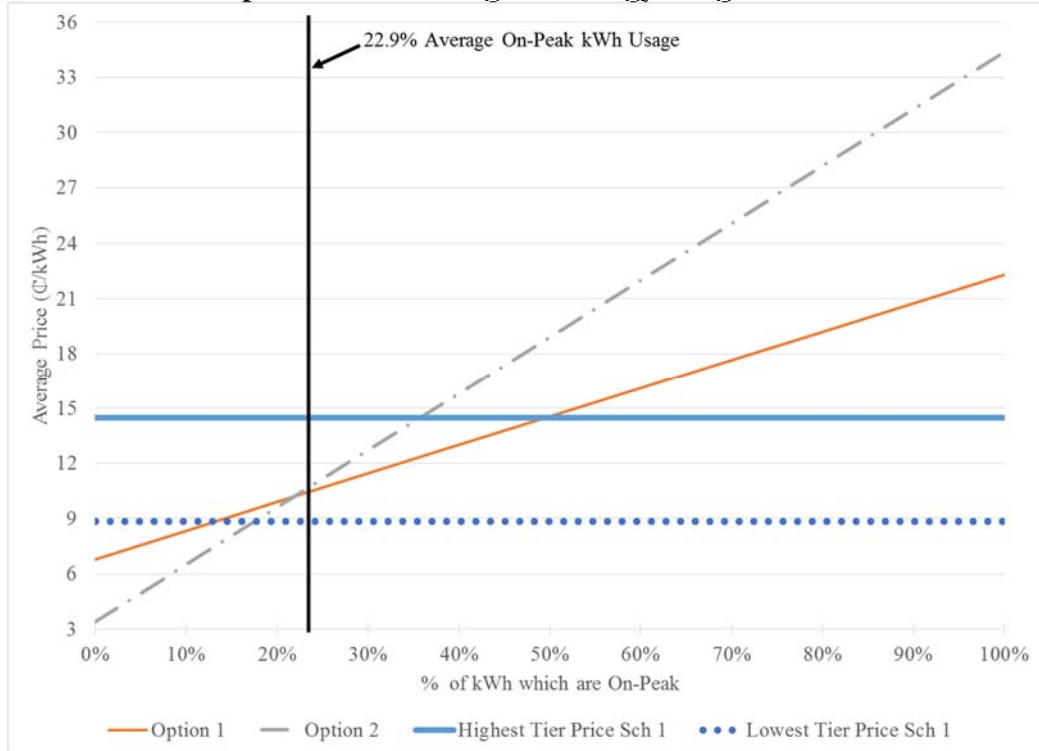
555 A. The Company's present rates for residential customers include inverted block pricing  
556 which makes the average price of energy higher for customers with higher overall  
557 monthly usage and lower for customers with lower overall monthly usage. Figure 1  
558 below shows the price signal which Schedule 1, the Company's standard tariff for  
559 residential customers, presents to customers where average energy charges rise with  
560 overall monthly consumption.

**Figure 1. Schedule 1 Average Energy Charges Compared to Overall Monthly Usage**



561 The Company's proposed Option 1 and Option 2 do not discriminate based upon overall  
562 monthly usage, but rather send a more cost-informed price signal by varying average  
563 energy price for both large and small energy users by the extent to which they use  
564 energy in different time periods. Figure 2 below shows the price signal presented by  
565 the Company's proposed Option 1 and Option 2 where average energy price varies by  
566 the extent to which a customer uses during the on- and off-peak periods.

**Figure 2. Proposed Schedule 2E Average Energy Charges Compared to Percentage of Energy Usage that is Off-Peak**



567 As can be seen above in Figure 2, on-peak energy charges for both Option 1  
 568 and Option 2 have a higher price than the price of the highest tier on Schedule 1. Figure  
 569 2 also shows that the off-peak energy charges for both of the Company’s proposed rate  
 570 options are less than the price of the lowest tier on Schedule 1. The different bill  
 571 comparisons presented by the Company and also by UCE reflect the impacts to  
 572 customers at different overall energy usage levels assuming that they would have the  
 573 average hourly profile. Large energy users who use disproportionately more energy  
 574 during the on-peak period could have bills much higher than they would have had  
 575 otherwise on Schedule 1. Conversely smaller energy users who use disproportionately  
 576 more energy during the off-peak period could have bills much lower than they would  
 577 have had otherwise on Schedule 1. I do not think that the Company’s proposed rate  
 578 options for the pilot unjustly reward large users nor unjustly punish small users. The

579 Company's proposed rate options would simply charge customers an average energy  
580 price that reflects the degree to which they use energy during different time periods  
581 without rewarding smaller users or punishing larger users.

582 **Q. What is your general opinion of the rate options which Ms. Wright proposes for**  
583 **the EV TOU Pilot?**

584 A. I think that the rate options which Ms. Wright proposes for the EV TOU Pilot run  
585 contrary to many of the core principles discussed at the workshops. Below is a  
586 discussion why I think that the rate options which she proposes are problematic relative  
587 to some of these core principles:

588 **Encouraging Electric Vehicle Adoption** - UCE Option 1 and UCE Option 2 both  
589 include inverted tier pricing. As I discussed earlier in my rebuttal of Ms. Wright,  
590 inverted tier pricing can dis-incentivize PEV adoption. On UCE Option 1, off-peak  
591 usage greater than 1,000 kilowatt hours in a month has a price of about 9.7 cents per  
592 kilowatt hour. This is only about five percent less than the average of energy charges  
593 for current Schedule 1 and about 43 percent and 186 percent higher than the Company's  
594 proposed Option 1 and Option 2 off-peak energy charges, respectively. While a  
595 customer's potential bill savings may vary considerably and be dependent upon  
596 individual circumstances, I think that there is much less opportunity to save money  
597 charging a PEV during the off-peak period with UCE Option 1 than with either of the  
598 Company's proposed options. Table 1 below presents the percentage savings a  
599 customer with an average profile shifting 25 percent of her usage to the off-peak period  
600 could achieve on UCE Option 1 as compared to the Company's proposed Option 1 and  
601 Option 2.

**Table 1. Bill Savings from Switching 25 percent of Usage from On-Peak to Off-Peak for UCE Option 1 and Company Option 1 and Option 2**

<b>Savings from Switching 25 percent Usage from On-Peak to Off-</b>			
<b>kWh</b>	<b>UCE Option 1</b>	<b>Company Option 1</b>	<b>Company Option 2</b>
500	-0.6 percent	-0.4 percent	7.6 percent
750	5.0 percent	5.1 percent	13.0 percent
1,000	7.7 percent	7.8 percent	15.6 percent
1,250	6.7 percent	11.4 percent	18.9 percent
1,500	6.0 percent	13.6 percent	21.1 percent
1,750	5.5 percent	15.2 percent	22.6 percent
2,000	5.2 percent	16.4 percent	23.7 percent
2,500	4.7 percent	17.9 percent	25.1 percent
3,000	4.4 percent	19.0 percent	26.1 percent

602 As can be seen in Table 1, a customer with an average hourly profile who had  
 603 shifted 25 percent of energy to the off-peak period would save more under all usage  
 604 levels presented in the bill comparison with the Company’s rate options than with UCE  
 605 Option 1.

606 For UCE Option 2, there may be a better opportunity to save on charging a PEV,  
 607 since the super off-peak energy charge is as low as the off-peak energy charge from the  
 608 Company’s proposed Option 2. I will specifically address why I think that UCE Option  
 609 2 is problematic later in my testimony.

610 **Promoting Economic Efficiency** - As discussed above, UCE Option 1 provides a  
 611 weaker price signal for customers to shift usage away from the on-peak period than  
 612 either of the Company’s proposed rate options. I think that UCE Option 1 would  
 613 therefore be less effective at encouraging changes in behavior that would reduce usage  
 614 at the times of the Company’s peaks.

615 **Ease of Use/Customer Acceptance** - As discussed earlier in my rebuttal of Ms. Wright,  
 616 I believe that her proposed rates, which include both time-of-use and inverted tier block

617 elements, will be more confusing for customers than the Company's proposed rate  
618 options.

619 **Q. What is your response to the super off-peak energy charge proposed by Ms.**  
620 **Wright for UCE Option 2?**

621 A. I think that including a third time-of-use period for a super off-peak is more confusing,  
622 not cost-based, and may not provide PEV drivers sufficient time to charge their vehicles  
623 during the period.

624 **Q. Please explain why the super off-peak energy charge concept that Ms. Wright**  
625 **presents for UCE Option 2 is not cost-based.**

626 A. The basis for the on-peak and off-peak periods for the Company's proposed rate options  
627 is that the on-peak period specifically targets the hours under which the vast majority  
628 of the Company peaks occur. The Company chose this design, because significant value  
629 exists in targeted reductions to coincident peak load. As discussed earlier in my rebuttal  
630 testimony, about 60 percent of the residential class's cost of service study in the last  
631 general rate case was demand-related. For the times selected by the Company, having  
632 on-peak energy prices much higher than those during the off-peak period has a strong  
633 basis in cost.

634 In contrast, Ms. Wright's proposed super off-peak period is informed by times  
635 when UCE determined that loads were the lowest.<sup>30</sup> I do not think that this construct is  
636 well grounded by cost of service-based principles. Depending upon the tier, the off-  
637 peak energy charge is between 4.4 cents and 7 cents higher than the super off-peak  
638 energy price. Since neither the off-peak period nor the super off-peak period occur at

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<sup>31</sup> See lines 365 through 392 of UCE witness Ms. Sarah Wright's Direct Testimony.



639 the same times as the Company's peaks, the only significant basis for a difference in  
 640 cost between the two periods would be the difference in wholesale prices between both  
 641 periods. During the workshops, the Company presented the Company's average  
 642 forecast wholesale power prices at the Palo Verde hub for non-holiday weekdays.  
 643 Please refer to Figure 3 below for hourly forecast Palo Verde prices for non-holiday  
 644 weekdays.

**Figure 3. Average Hourly Forecast Palo Verde Prices for 2017**



645 As can be seen in Figure 3, average wholesale price does not have large absolute  
 646 differences by time period relative to the magnitude of total retail residential rates.  
 647 Comparing these average non-holiday weekday prices shows that prices during UCE's  
 648 off-peak period are about \$8.66 per megawatt hour or about 0.9 cents per kilowatt hour  
 649 higher than for UCE's super off-peak period during the summer months and about  
 650 \$4.25 per megawatt hour or about 0.4 cents per kilowatt hour higher than for UCE's  
 651 super off-peak period during the winter months. Ascribing far more value to Ms.

652 Wright's proposed off-peak period than to her proposed super off-peak period is not  
653 supportable.

654 **Q. Do you think that Ms. Wright's proposed super off-peak period would provide a**  
655 **sufficient amount of time for a customer to charge a PEV?**

656 A. I think that it could be challenging for some customers to fully charge their PEVs during  
657 the six hour super off-peak period proposed by Ms. Wright. While this may be less of  
658 a concern for customers who have installed a Level 2 charger, customers who have a  
659 Level 1 charger can only achieve about 4.5 miles per hour of charging.<sup>31</sup> During Ms.  
660 Wright's six hour super off-peak window, a customer could only charge his PEV for 27  
661 miles of range with a Level 1 charger. This could result in customers needing to install  
662 more expensive Level 2 chargers, which could potentially be avoided with the  
663 Company's proposed time-of-use periods which include more hours of less costly  
664 energy and are more closely based upon cost as I demonstrated earlier in my testimony.

665 **Q. Do you agree with Ms. Wright's recommendation to eliminate the morning period**  
666 **(8am to 10am) from the winter on-peak hours which the Company proposed?**

667 A. No. The 8am to 10am morning period during the winter months may not be a time  
668 when Utah's loads are higher, but it is a time when the Company's overall six state  
669 system peaks occur during the winter. The Company plans on a system wide basis and  
670 costs are specifically assigned to the state of Utah based upon 12 monthly system  
671 coincident peaks. These two hours should remain part of the on-peak period for the  
672 pilot.

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<sup>32</sup> Saxton, T. (2011, January 31). *Understanding Electric Vehicle Charging*. Retrieved from <https://pluginamerica.org/understanding-electric-vehicle-charging/>.

673 **RESPONSE TO MR. KENNETH L. WILSON**

674 **Q. Please summarize WRA witness Mr. Wilson's testimony.**

675 A. Mr. Wilson strongly supports the Company's proposed EV TOU Pilot, since it was  
676 developed collaboratively and would provide useful insights into time-of-use rates as  
677 they relate to customers who charge PEVs.<sup>32</sup> Mr. Wilson recommends that all aspects  
678 of the Company's proposed EV TOU Pilot, except one, be approved by the  
679 Commission. Mr. Wilson recommends that the proposed load research study run for a  
680 second year, since this would provide more data and the first year could have atypical  
681 weather.<sup>33</sup>

682 **Q. What are your thoughts on running the load research study for a second year?**

683 A. I agree with Mr. Wilson that a second year of data could be more useful. A single year  
684 may have unusual weather that would not be typical of most years. I would also add  
685 that customers may gain experience during their first year on time-of-rates and be able  
686 to more effectively shift usage to the off-peak period in a second year.

687 **Q. Do you think that the load research study should include a second year?**

688 A. I do not think that load research study participants should be required to be on the study  
689 for two years. While the information obtained from a second year would be useful, I  
690 am concerned that requiring a second year could be too difficult of a decision for many  
691 customers to make. Based upon discussions I have had with more externally facing  
692 Company employees, requiring a second year for the load research study may be too  
693 much of a burden for many customers. If customers believe that the requirements of

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<sup>33</sup> See lines 14 through 26 of WRA witness Mr. Kenneth L. Wilson's Direct Testimony.

<sup>34</sup> See lines 153 through 161 of WRA witness Mr. Kenneth L. Wilson's Direct Testimony.

694 participating in the load research study are too onerous, the Company may not achieve  
695 the necessary level of participation to obtain scientific results.

696 Although the Company's proposed load research study only includes a one year  
697 customer commitment, the Company would continue collecting hourly profile  
698 information from participants in the load research after the first year. Many of the  
699 participants may remain on the rate option assigned to them. Also many on the control  
700 group may not choose to enroll in one of the time-of-use rate options. Even without a  
701 customer commitment, there may still be adequate data from the second year to make  
702 some useful inferences.

703 I recommend that the Commission require only a single year commitment from  
704 load research participants. However, if the Commission determines that a two year  
705 commitment should be required, I recommend that the Annual Guarantee Payment,  
706 which ensures that customers do not pay more than 110 percent of what their annual  
707 energy charge would have been under Schedule 1, be applied for two years for the load  
708 research study participants. The provision for the Annual Guarantee to apply for two  
709 years could be included in the load research study tariff, Schedule 121, I proposed  
710 earlier in my testimony. Requiring a two year commitment without an Annual  
711 Guarantee Payment for both years would make load research study recruitment very  
712 challenging.

713 **REBUTTAL OF MR. JAMES ELLIS**

714 **Q. On lines 154 through 161 of his direct testimony, ChargePoint witness Mr. Ellis**  
715 **recommends that the Company allow participants of the EV TOU Pilot to be**  
716 **metered through the “embedded metering capabilities” of charging stations.**  
717 **Could the Company bill proposed Schedule 2E customers on the readings from a**  
718 **third-party sub-meter on a charging station?**

719 A. No. I believe that Mr. Ellis’ suggestion reflects a misunderstanding of the Company’s  
720 proposed EV TOU Pilot. The Company’s proposed Schedule 2E is not intended to be  
721 a tariff that would apply to a separately metered PEV charger. The Company’s  
722 proposed EV TOU Pilot would be what is considered a “whole house” pilot. In other  
723 words, the time differentiated energy charges on the Company’s proposed Schedule  
724 2E would be applied to all household energy consumption, not just the charging of a  
725 PEV. Without installing a new meter for the entire household, a residential customer  
726 could not be billed under proposed Schedule 2E. While I appreciate Mr. Ellis’ desire  
727 to share creative solutions to minimize the costs of the pilot, utilizing the embedded  
728 metering capabilities of a charging station would not eliminate the need to install a  
729 new meter.

730 **Q. Are there other reasons why utilizing the “embedded metering capabilities” of**  
731 **charging stations to bill customers on the pilot would be problematic?**

732 A. Yes. There are several reasons why this would be problematic. First, utilizing the  
733 information from third-party equipment that has not necessarily been designed to  
734 measure energy at a level of precision that is revenue grade could cause the Company  
735 to inaccurately bill customers. These “meters” are not subject to the same testing

736 requirements as the Company's meters which are required to ensure accurate billing  
737 determinants over the life of the meter. Second, there could be potentially many  
738 different charging station manufacturers with different measurement and  
739 communication protocols. Developing the processes to integrate that data from those  
740 sub-meters into the Company's billing system would be more costly than the cost to  
741 install new time-of-use meters for the limited number of participants that the Company  
742 intends to have on the pilot. Third, the need to incorporate "meter" reads from multiple  
743 different vendors into Company's systems could needlessly expose the Company to  
744 cyber-attacks. Fourth, as mentioned earlier in my testimony, the Commission has a  
745 statutory obligation to authorize the Company to establish a program that includes  
746 "time of use pricing for electric vehicle charging" before July 1, 2017. Revising the  
747 Company's proposed EV TOU Pilot to incorporate sub-metering from charging  
748 equipment would likely complicate the pilot's design such that this deadline would be  
749 missed. Finally, there are losses that are incurred between the point of delivery to the  
750 customer at the meter and any charging equipment which would not be appropriately  
751 captured by charger's sub-metering. For all of these reasons along with the Company's  
752 proposed pilot design being for a "whole house" time-of-use pilot that requires  
753 metering of all household usage, the Commission should reject Mr. Ellis's  
754 recommendation.

755 **CONCLUSION**

756 **Q. Please summarize your rebuttal testimony.**

757 A. The Company's proposed rate options are the most reasonable of those proposed by all  
758 parties who submitted testimony in this proceeding. It balances all of the important

759 principles for a pilot which I discussed in my direct testimony and would meet the goals  
760 of the STEP legislation. The Company's proposed Annual Guarantee Payment feature  
761 for Schedule 2E is reasonable and would make it easier for customers to make the  
762 decision to enroll. The Company's plans for its load research study were well designed  
763 and will result in accurate and actionable information without stratifying on the variable  
764 of charger type.

765 **Q. What is your recommendation for the Commission?**

766 A. The Company recommends that the Commission approve the Company's proposed EV  
767 TOU Pilot as modified in this testimony along with its proposed Schedule 2E and  
768 Schedule 121.

769 **Q. Does this conclude your rebuttal testimony?**

770 A. Yes.