

**Before the
Public Service Commission of Utah**

In The Matter of the Investigation of the)
Costs and Benefits of PacifiCorp's Net)
Metering Program)

Docket No. 14-035-114

**Rebuttal Testimony of
Tim Woolf**

On The Topic of
The Benefit-Cost Framework for Net Energy Metering

On Behalf of
Utah Clean Energy, the Alliance for Solar Choice, and Sierra Club

September 8, 2015

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1 **1. INTRODUCTION AND QUALIFICATIONS**

2 **Q. Please state your name, title, and employer.**

3 A. My name is Tim Woolf. I am a Vice President at Synapse Energy Economics, located at
4 485 Massachusetts Avenue, Cambridge, MA 02139.

5 **Q. On whose behalf are you testifying in this case?**

6 A. I am providing evidence on behalf of Utah Clean Energy, the Alliance for Solar Choice,
7 (TASC) and Sierra Club (together the “Joint Parties”).

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

9 A. The purpose of my rebuttal testimony is to respond to the direct testimonies presented by
10 Rocky Mountain Power (RMP), the Office of Consumer Services (OCS), and the
11 Division of Public Utilities (the Division).

12 **2. SUMMARY OF FINDINGS AND RECOMMENDATIONS**

13 **Q. Please summarize your primary findings regarding the net energy metering (NEM)**
14 **benefit-cost frameworks proposed by other parties in this docket.**

15 A. RMP’s proposal conflates the two issues of cost-effectiveness and rate design, and
16 therefore does not provide the Commission with the information needed to make
17 important decisions regarding NEM. Further, the Company’s proposal conflicts with the
18 NEM statute, conflicts with the Commission’s orders in this docket, and conflicts with
19 conventional benefit-cost analysis (BCA) for both demand-side and supply-side
20 electricity resources in Utah.

21 I agree with the way that the OCS has framed the relationship between cost-effectiveness
22 analysis and rate design: the two should be considered separately. I also agree with
23 several elements of OCS's proposal for a long-term cost analysis. However, I do not
24 agree that the lost revenues should be considered as a cost in the long-term analysis. I
25 also disagree with the short-term analysis proposed by OCS. A rate impact analysis
26 would provide much more meaningful information on the impacts of non-NEM
27 customers.

28 The Division's proposal confuses cost-effectiveness with rate design, in much the same
29 way that RMP's does. Also, the Division's proposal does not provide sufficient detail
30 regarding how all the relevant impacts of NEM would be treated.

31 **Q. Please summarize your illustrative cost impact and rate impact analyses.**

32 A. In my direct testimony, I presented an illustrative rate impact analysis to demonstrate
33 how such an analysis can be performed. In my rebuttal testimony below, I provide a
34 parallel cost impact analysis to demonstrate how both analyses can be used together. My
35 illustrative cost impact analysis suggests that, under current rate designs, NEM is likely
36 to be highly cost-effective in Utah, with net benefits ranging from tens of millions to
37 perhaps a billion dollars, in terms of reduced revenue requirements across all customers.
38 My rate impact analysis suggests that under some scenarios NEM will cause rates for all
39 customers to decline, while in others it will cause rates to increase at a very modest rate.

40 **Q. Please summarize your primary recommendations.**

41 A. I continue to stand by all of the recommendations provided in my direct testimony. In
42 particular:

-
- 43 • The Commission should reiterate that a benefit-cost analysis should be conducted
44 separately from rate design determinations, and clarify that rate design alternatives
45 should be considered in light of the results of the benefit-cost analysis.
- 46 • The Commission should require that the NEM cost impact analysis be based on the
47 net present value of revenue requirements (PVRR), consistent with the conventional
48 practice of evaluating all types of supply-side and demand-side resources in Utah.
- 49 • The Commission should clarify that lost revenues from distributed generation
50 resources should not be included in the cost impact analysis in any way.
- 51 • The Commission should require that a rate impact analysis be used to indicate the
52 extent to which customers who do not install distributed generation resources might
53 be harmed by those that do.

54 **3. REBUTTAL OF ROCKY MOUNTAIN POWER TESTIMONY**

55 Summary of RMP's Proposal

56 **Q. Please summarize RMP's proposal for a cost-benefit analysis for NEM.**

57 A. The Company's proposed benefit-cost framework has two parts:

- 58 • Part one considers the excess energy of the NEM customer's PV system, i.e., the
59 energy that is generated by the PV system that exceeds the customer's electricity
60 demand.¹ For this part of the NEM generation, the PV is viewed as a supply-side
61 resource. The benefits of this generation would be valued at the same avoided cost as

¹ Clements Direct Testimony, page 2, line 40

62 those used for the PURPA contracts for utility-scale PV resources, which currently is
63 roughly 5 c/kWh.² The costs of this generation would be valued at the retail rate that
64 the NEM customer would avoid by the PV generation, which for residential
65 customers would currently range from 8 to 14 c/kWh.³

66 • Part two considers the remainder of the energy generated by the NEM customer’s PV
67 system, i.e., during those hours when the PV system is generating less than the
68 customer’s electricity demand.⁴ The costs and benefits for this part of the PV
69 generation would be assessed using the Company’s existing cost of service model.⁵
70 NEM customers would be assigned a separate rate class from other customers, and
71 the cost of service model would be applied to the new NEM class. RMP claims that
72 using a cost of service study would allow the Company to “assign costs to NEM
73 customers based on how they use the utility system.”⁶

74 The Company claims that both parts are necessary for the benefit-cost analysis, and both
75 parts are necessary for rate design.⁷

76 **Q. Does the Company provide any initial results of its proposed benefit-cost**
77 **framework?**

78 A. Yes. With regard to part one of RMP’s proposed framework, Witness Clements notes that
79 NEM under the current rate design is not cost effective, because the costs (which should

² Clements Direct Testimony, page 4, line 74

³ Clements Direct Testimony, page 4, lines 77 - 78.

⁴ Clements Direct Testimony, page 2, lines 36 - 39.

⁵ Clements Direct Testimony, page 3, lines 45 - 48.

⁶ Steward Direct Testimony, page 3, lines 64 - 65.

⁷ Clements Direct Testimony, page 2, lines 39 - 40.

80 be based on the retail rates avoided by NEM customers of 8 to 14 c/kWh), exceed the
81 benefits (which should be based upon the PURPA avoided costs for utility-scale PV of
82 roughly 5 c/kWh). The Company claims that “this conclusion dictates that the rate
83 structure for the net metering program be modified to better align costs and benefits for
84 excess energy.”⁸

85 **Q. Does the Company offer recommendations on rate design?**

86 A. RMP recommends that NEM customers be assigned to a separate rate class, which is a
87 rate design issue. The Company notes that part two of its framework, which applies to the
88 separate rate class, “will be carried out in a future ratemaking proceeding and combined
89 with the then-current result of the first part of the framework to establish a fair rate
90 structure for NEM customers.”⁹

91 **Q. Do you agree with RMP’s proposal?**

92 A. No, I do not. RMP’s proposal conflates the two issues of cost-effectiveness and rate
93 design, and therefore does not provide the Commission with the information needed to
94 make important decisions regarding NEM. Further, the Company’s proposal conflicts
95 with the NEM statute, conflicts with the Commission’s orders in this docket, and
96 conflicts with conventional benefit-cost analysis for both demand-side and supply-side
97 electricity resources in Utah.

⁸ Clements Direct Testimony, page 5, lines 99-103.

⁹ Clements Direct Testimony, page 5, lines 101 - 103.

98 **Q. What do you think would be the outcome of adopting RMP’s proposal?**

99 A. First, adopting the Company’s proposal will not provide the critical information
100 necessary to assess the costs and benefits of NEM in Utah. Second, if RMP’s proposal
101 were to be adopted, then (a) customers would have much less financial incentive to install
102 PV; (b) there would be little, if any, new PV systems installed on customers’ premises;
103 (c) millions of dollars of electricity cost savings (in terms of present value revenue
104 requirements) would be forgone; (d) the nascent PV industry would leave Utah for better
105 opportunities in other states; and (e) the objectives of the NEM statute would not be met.

106 RMP Conflates Rate Design and Cost-Effectiveness

107 **Q. Why do you say that RMP has conflated rate design and cost-effectiveness?**

108 A. Part two of the Company’s proposed framework is explicitly based on rate design issues.
109 It requires NEM customers to be placed in a separate rate class, which is a rate design
110 issue. It also requires the costs and the benefits of NEM to be determined within a cost of
111 service framework, which is used to inform rate design and is not used to inform cost-
112 effectiveness. The Company is clear that the objective of part two of its framework is to
113 “assign costs to NEM customers based on how they use the utility system.”¹⁰ Assigning
114 costs to customers is one aspect of rate design; it is not relevant for determining cost-
115 effectiveness.

¹⁰ Steward Direct Testimony, page 3, lines 64 - 65.

116 **Q. Is there anything wrong with combining rate design and cost-effectiveness in the**
117 **same analysis?**

118 A. Yes. Benefit-cost analyses have a different goal than cost of service analyses and rate
119 design. The ultimate goal of a resource benefit-cost analysis is to determine whether a
120 utility should invest in, implement, or otherwise support a particular resource. The goal of
121 a cost of service study is to determine how to allocate costs among customer classes, and
122 to inform rate design for each customer class.

123 By combining the benefit-cost analysis with rate design, the Company's proposal will not
124 achieve the ultimate goal of benefit-cost analyses, which is to provide the (statutorily
125 required) information necessary to decide how to implement or support NEM. Even
126 worse, the Company's proposal will provide information that is misleading, because it
127 does not reflect the way that costs and benefits will actually be incurred under NEM in
128 Utah.

129 **Q. Please describe why RMP's proposal will provide information that is misleading**
130 **and will not provide the information necessary to decide how to implement or**
131 **support NEM.**

132 A. As described in my direct testimony, the cost impact analysis for NEM should include all
133 the costs and benefits that will affect customer revenue requirements over the long term.
134 It is standard practice throughout the electricity industry to analyze costs and benefits of
135 electricity resources based on the present value of revenue requirements. This is how the
136 costs and benefits of electricity supply-side and demand-side resources are evaluated in
137 the context of integrated resource planning (IRP) in every jurisdiction that I am aware of.

138 It is also how the costs and benefits of ratepayer-funded demand-side resources are
139 evaluated in many states, including Utah.

140 One of the most significant problems with the Company's proposal is that *it does not*
141 *analyze or present the costs and benefits in terms of present value of revenue*
142 *requirements.*

143 **Q. Please explain why part one of RMP's proposal does not rely upon the present value**
144 **of revenue requirements to determine costs and benefits.**

145 A. Part one of the Company's proposal applies to what the Company refers to as the "excess
146 generation." However, the Company's proposal does not recognize how excess
147 generation will actually be treated under NEM in Utah, in terms of *revenue requirements.*
148 The NEM statute requires that any excess generation from a distributed PV system in one
149 monthly billing period be automatically rolled over to the next billing period. This means
150 that, for the purposes of costs imposed on the electricity system, there will be no excess
151 generation in any one hour or any one month. In other words, *the Company will not incur*
152 *any additional costs in terms of revenue requirements from NEM in any one hour or*
153 *month.*¹¹

154 The only way the Company could incur additional costs, in terms of revenue
155 requirements, from the NEM program, is at the end of the annual billing cycle when
156 unused credits must be accounted for. For this excess generation, if there is any, the
157 Company will create a NEM credit equal to the amount of generation times the

¹¹ Perhaps with the exception of costs for integration of PV, as described in my direct testimony on line 327.
RMP's proposal does not account for these costs, so they are not relevant to this point on RMP's proposal.

158 customer's retail rate. This is the only time throughout the whole process where the
159 Company might have to increase revenue requirements to make a payment for NEM.
160 However, the NEM statute does not require that the NEM credits for excess generation be
161 used to make payments to the host customer, as implied by the Company's proposal.
162 Instead, the NEM credits will be used to offset the cost of the discounted rate that is
163 offered to low-income customers. What that means in practice is that the NEM credits for
164 excess generation will be used to *reduce the revenue requirements* that would have been
165 recovered from customers to pay for the discounted low-income rate. Therefore, the
166 NEM credits for the excess generation *will not increase revenue requirements at all*. This
167 means that there are no costs associated with the NEM excess generation in Utah.
168 On the other hand, there is no question that there will be benefits from the excess
169 generation. These benefits will be equal to the costs of generation, transmission, and
170 distribution avoided by distributed generation, as described in more detail in my direct
171 testimony,¹² and the direct testimony of Joint Parties Witness Norris.
172 To summarize, in terms of revenue requirements, the excess generation credits from an
173 annual billing cycle, will require essentially no costs and will provide significant benefits.
174 This means that excess generation from NEM in Utah will always be cost-effective. This
175 conclusion is exactly the opposite of the conclusion reached by Witness Clements,¹³
176 which indicates just how misleading the Company's proposal can be.

¹² Woolf Direct Testimony, page 17, lines 329 - 344.

¹³ Clements Direct Testimony, page 5, lines 99-99.

177 **Q. Please explain why part two of RMP’s proposal does not rely upon the present value**
178 **of revenue requirements to determine costs and benefits.**

179 A. Part two of the Company’s proposal is based entirely on the results of a cost of service
180 study for a rate class of NEM customers. A cost of service study reveals little to nothing
181 about the costs and benefits of a resource, in terms of revenue requirements. In the
182 Company’s own description, the revenue requirements are determined first, and then
183 costs are allocated across classes, and cost of service studies are used “as a guide to
184 inform the decisions on the amount of revenue to be collected from each class and the
185 resultant rate structures.”¹⁴

186 I see this focus on a cost of service study to be a fundamental flaw in part two of the
187 Company’s proposal. This part of the analysis will not provide any information regarding
188 the conventional measure of costs and benefits: the present value of revenue
189 requirements. As described above, information regarding the present value of revenue
190 requirements is necessary to decide whether an investment or a resource will benefit
191 customers and is in the public interest.

¹⁴ Clements Direct Testimony, pages 9-10, lines 209-215.

192 **Q. RMP notes that the Commission has required that only costs and benefits that**
193 **“accrue to ratepayers of the utility” and “impact the utility’s cost of service” should**
194 **be included in the framework to determine NEM costs and benefits. Does this mean**
195 **that the framework must be based on a cost of service study?¹⁵**

196 A. No. I interpret the “impact on the utility’s cost of service” and the costs and benefits that
197 “accrue to ratepayers” to be the same thing as revenue requirements. The revenue
198 requirements reflect the utility’s costs to serve customers and they reflect the costs and
199 benefits that affect ratepayers. Using the impacts that affect the utility’s actual costs of
200 service is very different from using a cost of service study to allocate costs.

201 **Q. Does part two of RMP’s proposal contain other fundamental flaws?**

202 A. Yes, part two contains several fundamental flaws. First, I am not aware of any state or
203 province that uses a cost of service study as the basis for determining cost-effectiveness
204 of an electricity or gas resource option. RMP’s proposal for part two is completely
205 contrary to standard industry practice.

206 Second, a cost of service study only looks at the impacts of costs for a single year or test
207 year. It is widely recognized that cost-benefit analyses for a particular resource should
208 use a long-term study period that is at least as long as the operating life of the resource in
209 question. In the case of PV resources, the benefit-cost analysis should include at least 20
210 years. Again, RMP’s approach is completely contrary to standard industry benefit-cost
211 analysis (“BCA”) practice.

¹⁵ Clements Direct Testimony, page 9, lines 199-202.

212 Third, one of the key goals of a cost of service study is to determine how to allocate costs
213 among customer classes. However, benefit-cost analyses are not concerned with cost
214 allocation among customer classes. Different types of supply-side resources (generation,
215 transmission, distribution), and different types of demand-side resources (energy
216 efficiency, demand response, distributed generation) can all have different implications
217 for cost allocation across customer classes, but these implications are not considered in
218 benefit-cost analyses. Again, RMP's approach is completely contrary to standard industry
219 BCA practice.

220 Fourth, the Company's proposal will, by design, result in a NEM rate design that ensures
221 that there are no negative impacts on non-participants.¹⁶ But this is not the objective of
222 benefit-cost analysis. The objective of the benefit-cost analysis, as stated by the statute,
223 and as stated by the Company several times, is to identify the impacts on electricity
224 customers, including non-participants. This is very different from the goal of *eliminating*
225 *all negative impacts* on non-participants. As I describe in my direct testimony, the goal of
226 eliminating all negative impacts on non-participants, i.e., attempting to avoid any
227 inequity between customers, (a) is not a standard that is applied to other electricity
228 resources, and (b) can result in perverse outcomes that are not in the customers' interest

¹⁶ Clements Direct Testimony, page 19, lines 432-433 The Company asserts that the PURPA avoided cost methodology requires that customers be indifferent to PURPA purchases. (Direct Testimony of Clements, page 18, lines 413-413.) However, this is not an explicit requirement of the PURPA avoided costs; it happens to be an outcome of the way PURPA defines avoided costs. Also, PURPA avoided costs do not apply to demand-side resources that raise this issue of inconsistent impacts between program participants and non-participants. The Company also asserts that the NEM statute requires a "customer indifference" approach. (Direct Testimony of Clements, page 19, lines 432-434.) However, this is a misrepresentation of the very quote from the NEM statute that RMP presents; the statute requires that the costs and benefits to non-NEM customers be assessed, but not that non-NEM customers be completely indifferent to NEM.

229 or the public interest.¹⁷ Further, to the extent the Commission does want to consider the
230 impact on non-participants *after* it has completed the benefit-cost analysis, the rate
231 impact analysis I presented in my direct testimony provides for that consideration.

232 Fifth, the Company's proposal to use a cost of service study does not account for the
233 benefits that distributed PV generation provides to the electricity system in terms of
234 avoided costs (energy, generation capacity, transmission, or distribution) for the
235 distributed PV generation that is subject to part two. As described in the Company's
236 testimony, the cost of service study will indicate the "benefits" to some customers
237 associated with different cost allocation approaches,¹⁸ but these do not include the real
238 benefits of the PV generation: the reduction in revenue requirements as a result of the
239 avoided costs.

240 **Q. Please return to the question of why RMP's proposal will not provide an indication**
241 **of the actual costs and benefits of NEM.**

242 A. It is not entirely clear how the Company proposes to combine the results of parts one and
243 two of its proposal to determine the costs and benefits of NEM. Witness Clements uses
244 the results of part one to conclude that the current NEM structure results in costs that
245 exceed the benefits. However, this does not address the ultimate question in this case,
246 because (a) the results of part one do not rely on sound BCA practices, as described
247 above, and (b) the results of part two are not yet factored into the analysis. The PV
248 generation that would apply to part two of the Company's proposal could be a significant

¹⁷ Woolf Direct Testimony, page 13 – 14, lines 270 - 279

¹⁸ Clements Direct Testimony, page 11, lines 250-255

249 portion, perhaps the majority, of the total PV generation. To exclude that portion of the
250 PV generation when assessing costs and benefits makes no sense and has not been
251 justified by the Company.

252 In sum, by not providing the results of the analysis in terms of present value of revenue
253 requirements, the Company's proposal does not provide the Commission, or
254 stakeholders, the information that is typically used, and that is critically necessary, to
255 determine whether NEM is cost-effective and in the public interest.

256 **Q. Does RMP's proposal provide an indication of the costs and the benefits to non-**
257 **participants in the NEM program?**

258 A. No. Assessing the costs and benefits of NEM on non-participants is clearly one of the
259 requirements of the NEM statute. However, the Company's proposal says nothing about
260 the costs and benefits to the non-participants of the current NEM rate design. What the
261 Company's proposal does, in effect, is to modify the NEM rate design (in part two) to
262 ensure that NEM customers do not shift any costs at all to non-participants (without
263 regard for actual costs or benefits).

264 This is not the same as estimating the costs and benefits to non-participants. The
265 Company's proposal does not answer the critical question here, which is: "What are the
266 costs and benefits of the current NEM policy, with the current rate design, for all
267 customers and for non-participants?" The Company's proposal does not answer the
268 critical follow-up question either, which is: "How would a modified rate design affect the
269 costs and benefits to all customers and to non-participants?" This is the critical question
270 that is implied by the NEM statute where it states that the Commission must "determine a

271 just and reasonable charge, credit, or ratemaking structure, including new or existing
272 tariffs, in light of the costs and benefits.”¹⁹ The Company’s proposal will not provide the
273 information to answer either of these required questions.

274 **Q. What is the best way to demonstrate the costs and benefits of NEM to all customers,**
275 **including non-participants?**

276 A. As described in my direct testimony, it will be necessary to conduct two analyses: (a) a
277 cost impact analysis, based on revenue requirements, to indicate the impacts across all
278 customers; and (b) a rate impact analysis to indicate how rates will change as a result of
279 NEM.

280 The Company’s proposal fails to recognize the critical fact that the primary impacts on
281 non-NEM customers will be experienced through rate impacts. The avoided costs of the
282 PV generation will put downward pressure on rates, and the recovery of revenue
283 requirements over reduced sales will put upward pressure on rates. As indicated in the
284 rate impact analysis presented in my direct testimony, and presented again here in Section
285 7, NEM might lead to higher or lower rates, depending upon whether the avoided costs
286 determined for distributed solar are higher or lower than the retail rates. This sort of rate
287 impact analysis is the best way to indicate the costs and benefits of NEM to non-
288 participants.

¹⁹ Utah Code Ann. § 54-15-105.1

289 **Q. Is RMP’s proposal consistent with the NEM statute?**

290 A. No. The NEM statute is clear that the rate design should be considered *in light* of the
291 cost-benefit results. In order to consider rate design in light of the BCA results, the rate
292 design analysis should not be part of the BCA, and it certainly should not be used to
293 define the outcome of the benefit-cost analysis results as the Company’s proposal does in
294 part two.

295 **Q. Is RMP’s approach consistent with the Commission’s order in this docket?**

296 A. No. The Commission has stated that the purpose of this docket is to:

297 [P]erform a cost-benefit analysis and determine whether the benefits of the net
298 metering program will exceed the costs (“Step One”). Second, the
299 Commission is to determine a “just and reasonable” ratemaking structure in
300 light of the results of the analysis performed in the first step (“Step Two”). As
301 discussed above, the purpose of this phase of the docket is to create an
302 analytical framework to accomplish Step One.²⁰

303 The Commission is very clear that this portion of the docket is to identify a framework
304 for assessing the costs and benefits of NEM, separately from the question of how to
305 design rates. Once a BCA framework for NEM is established, it can be used (in the next
306 phase of this docket) to evaluate current rate designs, as well as alternative rate designs
307 that might result in better impacts on customers, including non-NEM customers. The
308 Company’s proposal, by conflating cost-effectiveness with rate design, (a) does not
309 provide the BCA framework that the Commission has asked for, and (b) has unilaterally

²⁰ Utah Public Service Commission, Order re: Conclusions of Law on Statutory Interpretation and Order Denying Motion to Strike, Docket No. 14-035-114, July 1, 2015.

310 predetermined what the rate design should be without a proper understanding of the costs
311 and benefits of the current rate design or alternatives to it.

312 RMP Incorrectly Dismisses the DSM Benefit-Cost Framework

313 **Q. On what grounds does RMP dismiss the demand-side management (DSM) benefit-**
314 **cost framework as not relevant for the purpose of NEM benefit-cost analyses?**

315 A. The Company provides several reasons why the DSM BCA framework should not be
316 used for the NEM BCA framework. I address each in turn below.

317 **Q. What is the first point that RMP uses to dismiss the DSM benefit-cost framework?**

318 The Company claims that “the traditional DSM tests are useful tools for determining
319 whether a program should be offered for acquiring cost-effective resources, but they are
320 not designed for setting rates.”²¹

321 **Q. Do you agree with this point?**

322 A. No. On the contrary, this remark from RMP makes it perfectly clear that the Company
323 has confused and conflated cost-effectiveness with rate design. The Commission’s orders
324 in this docket are very clear that (a) the objective of this phase of the docket is to assess
325 the costs and benefits of NEM, i.e., to determine the extent to which NEM is a cost-
326 effective resource; and (b) rate design issues are to be addressed separately from the BCA
327 issues, in the next phase of this docket.

²¹ Steward Direct Testimony, page 13 line 252.

328 It makes no sense for the Company to dismiss the DSM benefit-cost framework on the
329 grounds that they are only appropriate for determining cost-effectiveness, when
330 determining cost-effectiveness is the only objective of this phase of the proceeding.
331 Similarly, it makes no sense to dismiss the DSM benefit-cost framework on the grounds
332 that they are not appropriate for setting rates, when setting rates is not the objective of
333 this phase of the proceeding.

334 **Q. What is the second point that RMP uses to dismiss the DSM benefit-cost**
335 **framework?**

336 The Company claims that DSM is different from NEM because generally DSM
337 “participants receive a one-time financial incentive for the measures that they take in
338 addition to bill savings for reduced usage. In contrast, the primary incentive for net
339 metering is conferred to participants through a bill reduction and offset to full retail rates
340 for excess output.”²²

341 **Q. Do you agree with this point?**

342 A. No, not at all. First, it is not accurate to say that customers participate in DSM programs
343 only because of the financial incentive offered by the utility. The primary reason that
344 customers adopt efficiency measures is to offset their energy costs, which is the same
345 reason that motivates most customers to install PV systems. Second, even if it were
346 accurate to make this distinction, it would not justify rejecting the Utility Cost Test, i.e.,

²² Steward Direct Testimony, page 14, lines 267 - 268.

347 where the costs and benefits are defined by PVRR, which is the conventional way
348 throughout the utility industry to assess the costs and benefits of electricity resources.

349 **Q. What is the third point that RMP uses to dismiss the DSM benefit-cost framework?**

350 The Company claims that “[w]hile both distributed generation and DSM reduce the
351 energy requirements for a customer, they are fundamentally different in that their reduced
352 usage may not align with the peak.”²³

353 **Q. Do you agree with this point?**

354 A. No, not at all. Again, it is not accurate to make the blanket distinction that DSM and PV
355 are fundamentally different in terms of whether their reduced usage aligns with peak.
356 Many efficiency measures save energy during peak hours; for example, efficient air
357 conditioners. Also, there may be times when PV systems generate power outside of the
358 system peak, e.g. in the morning and early afternoon. And again, even if it were accurate
359 to make this distinction, it would not justify rejecting the Utility Cost test, i.e., where the
360 costs and benefits are defined by PVRR, which is the conventional way throughout the
361 utility industry to assess the costs and benefits of electricity resources.

362 **Q. Are you recommending that the DSM cost-effectiveness tests be used to assess the**
363 **costs and benefits of NEM in Utah?**

364 A. No, not entirely. I recommend that NEM be evaluated on the basis of the present value of
365 revenue requirements, which is the standard practice for evaluating electricity resources
366 in general, including in the context of IRP. A benefit-cost framework based on the

²³ Steward Direct Testimony, page 14, lines 272 - 274.

367 present value of revenue requirements is consistent with the Utility Cost Test that is used
368 in Utah to evaluate the cost-effectiveness of DSM. This consistency supports the logic of
369 using such a framework for NEM as well, but that is very different from saying that all
370 the DSM tests must be used in evaluating NEM.

371 **Q. Please summarize your points on whether and how the DSM benefit-cost framework**
372 **could be applicable to NEM.**

373 A. As stated throughout my direct testimony and this rebuttal testimony, the only way to
374 provide meaningful information on the costs and benefits of NEM is to put them in terms
375 of revenue requirements. This metric will provide an indication on the actual impacts
376 across all customers, and is consistent with standard industry practice for evaluating the
377 costs and benefits of electricity resources.

378 The Utility Cost Test that is used in Utah to evaluate the cost-effectiveness of DSM is
379 based on this same concept of accounting for all costs and benefits that will affect
380 revenue requirements. Therefore, my NEM BCA proposal is completely consistent with
381 the way that DSM resources are evaluated in Utah, as it should be. The Company's
382 proposal is completely inconsistent with DSM evaluation in Utah, yet the Company has
383 provided no compelling evidence as to why this should be so.

384 **4. REBUTTAL OF OFFICE OF CONSUMER SERVICES TESTIMONY**

385 **Q. Please briefly describe the OCS proposal for evaluating the costs and benefits of**
386 **NEM.**

387 A. In sum, OCS recommends two analyses to evaluate the costs and benefits of NEM: a
388 long-term analysis to assess the costs and benefits to the utility, and a short-term analysis
389 to assess the costs and benefits to non-participating customers.²⁴

390 OCS’s proposal for a long-term analysis is comparable to, and attempts to achieve the
391 same objective, as my recommendation for a cost impact analysis, with one key
392 difference that I will describe below. OCS’s proposal for a short-term analysis is
393 comparable to, and attempts to achieve the same objective, as my recommendation for a
394 rate impact analysis—again with some key differences that I will describe below.

395 **Q. Do you agree with the way that OCS has characterized the relationship between**
396 **benefit-cost analysis and rate design?**

397 A. Yes. The OCS is clear that the analysis of the costs and benefits of NEM “should be
398 completed as a standalone step or analysis prior to the process of setting just and
399 reasonable rates.”²⁵ OCS also states that if the benefit-cost analysis does not show that
400 NEM provides net benefits, then “those results should be brought back to policy makers
401 for additional consideration.”²⁶

²⁴ Beck Direct Testimony, page 3, lines 52 - 56

²⁵ Beck Direct Testimony, page 3, lines 62 - 63

²⁶ Beck Direct Testimony, page 4, lines 70 - 71

402 I agree with this interpretation of the NEM statute, as well as the Commission's orders in
403 this docket. This is a critical point that the Company has confused, leading to a proposal
404 with several fundamental flaws, as described above.

405 **Q. Do you agree with OCS's proposed NEM benefit-cost framework?**

406 A. There are several elements of OCS's proposal that I agree with, but there are also several
407 important elements that I do not agree with. I will describe the OCS's long-term and
408 short-term proposals separately.

409 **Q. Please describe your views regarding OCS's proposal for a long-term analysis of**
410 **NEM costs and benefits.**

411 A. There are several elements of OCS's proposal for a long-term analysis that I agree with.
412 These include the following:

- 413 • I agree with OCS that "the study length should be long enough to capture growth in
414 net metering penetration, and life cycle impacts on capital investment costs. This
415 study period length is typical of what is used for any resource planning study."²⁷
- 416 • I agree with OCS that the long-term cost impact analysis should be based on revenue
417 requirements.²⁸ As I describe above and in my direct testimony, revenue
418 requirements is the key metric that is used throughout the electricity industry to
419 indicate costs and benefits to customers.

²⁷ Hayet Direct Testimony, page 12, lines 269 - 272.

²⁸ Hayet Direct Testimony, pages 16-17, lines 359 - 369.

420 • I agree with OCS that the long-term cost impact analysis should present the results in
421 terms of the present value of revenue requirements.²⁹ Again, converting the revenue
422 requirements to present value dollars is the conventional metric used to evaluate
423 supply-side and demand-side resources.

424 • I agree with OCS that the long-term analysis should include the following types of
425 benefits: “avoided energy, capacity, transmission, and distribution costs, as well as
426 avoided transmission and distribution (“T&D”) line losses.”³⁰ I have not evaluated
427 all of the details proposed by OCS for how these benefits should be calculated, but I
428 generally agree with the types of benefits listed.

429 • I agree with OCS that the long-term analysis should include program administration,
430 integration of the net metered resources, and increased distribution costs caused by
431 the distributed generation energy.³¹ I have not evaluated all of the details proposed
432 by OCS for how these costs should be calculated, but I generally agree with the types
433 of costs listed.

434 However, there is one key element to OCS’s proposal for a long-term analysis that I do
435 not agree with: I do not agree that lost revenues should be considered a cost in this
436 analysis.

²⁹ Hayet Direct Testimony, page 7, 153 - 157.

³⁰ Hayet Direct Testimony, page 7 line 163 - 165.

³¹ Hayet Direct Testimony, page 7 line 161 - 163.

437 **Q. How does Witness Hayet include lost revenues in his long-term analysis?**

438 A. In Witness Hayet's illustrative example, he begins by estimating that NEM will reduce
439 revenue requirements across all customers by roughly \$1 million.³² Then he estimates the
440 impacts on non-NEM customers as a result of embedded fixed cost being shifted to them
441 from NEM customers.³³ These embedded fixed costs do not require any new revenue
442 requirements, and in fact are not new costs at all. They represent the recovery of existing
443 fixed costs that is needed as a result of the lost revenues from NEM generation. Including
444 these so-called "costs" turns the net benefit of \$1 million to a net cost of \$1.9 million.³⁴

445 **Q. Please explain why you do not agree with OCS about treating lost revenues this way**
446 **in the long-term analysis?**

447 A. In my direct testimony, I explain in detail why lost revenues should not be included in the
448 cost impact analysis (i.e., the long-term analysis to indicate the costs and benefits of
449 NEM across all customers). In sum, the lost revenues should not be used in the cost
450 impact analysis because (a) the lost revenues do not increase revenue requirements and
451 therefore should not be included in a revenue requirement analysis; (b) the lost revenues
452 are derived from fixed costs that are embedded in rates and will be incurred in both the
453 future scenario without NEM and the future scenario with NEM, and therefore should not
454 be included in only the scenario with NEM; (c) including lost revenues in the analysis is
455 misleading and does not provide the information necessary to determine cost-

³² Hayet Direct Testimony, page 17, Table 1 and lines 367-369.

³³ Hayet Direct Testimony, page 17, Table 1 and lines 369-375.

³⁴ Hayet Direct Testimony, page 18, lines 388-389.

456 effectiveness; (d) including lost revenues in the analysis will not result in the lowest costs
457 to customers; and (e) including lost revenues in the analysis in an attempt to eliminate
458 customer inequity can lead to perverse results, where significant benefits are foregone in
459 order to avoid *de minimus* rate impacts.³⁵

460 I agree with OCS that it is the lost revenues that result in a shifting of costs from NEM
461 customers to non-NEM customers.³⁶ However, the purpose of the long-term revenue
462 requirements analysis (i.e., the cost impact analysis) is to indicate the impacts of NEM
463 across all customers; not to indicate the impacts on any one subset of customers. The
464 impacts of cost-shifting on non-NEM customers, if any, can be analyzed using a rate
465 impact analysis. To include the lost revenues as a cost in the cost impact analysis
466 provides misleading results that do not indicate either the impacts across all customers or
467 the impacts on non-NEM customers.

468 **Q. Please describe your views regarding OCS's proposal for a short-term analysis of**
469 **NEM costs and benefits.**

470 A. OCS's proposal for a short-term analysis is intended to assess the impacts on non-NEM
471 customers.³⁷ Thus, the goal of OCS's short-term analysis is consistent with the goal of
472 my recommendation for a rate impact analysis. However, the short-term analysis
473 proposed by OCS suffers from some fundamental flaws, and should not be used as an
474 indication of the impacts on non-NEM customers.

³⁵ Woolf Direct Testimony, pages 9- 11, lines 165-230.

³⁶ Hayet Direct Testimony, page 16, line 350 - 351.

³⁷ Hayet Direct Testimony, page 13 lines 302-304.

475 **Q. Please describe the flaws of OCS’s proposal for a short-term analysis of NEM costs**
476 **and benefits.**

477 A. The impacts of NEM on non-NEM customers are driven by the increased rates that are
478 required to recover fixed costs over fewer sales. Therefore, the most meaningful way to
479 demonstrate the impacts of NEM on non-NEM customers is through a long-term rate
480 impact analysis, such as the one that I have proposed.

481 OCS’s proposal does not properly present the impacts on non-NEM customers for two
482 reasons. First, the OCS’s proposal for a short-term analysis only includes the costs and
483 benefits over the short term—in fact, only over a single year. Distributed PV systems can
484 provide long-term benefits, to NEM and non-NEM customers, in terms of reduced
485 generation, transmission, and distribution capacity costs over a long term. A short-term
486 analysis will not capture these long-term benefits, and will therefore understate the net
487 benefits to NEM and non-NEM customers.

488 Second, a proper rate impact analysis can put rate impact results in terms of the percent
489 increase in rates, or increases in c/kWh, in order to provide results that are easily
490 understandable, meaningful, and not misleading. The impacts of NEM on non-NEM
491 customers are not driven by increased costs (as represented by increased revenue
492 requirements), but rather by having to recover fixed costs over fewer sales. Thus, the
493 second flaw with OCS’s proposal is that the short-term analysis puts the results in terms
494 of increased costs, rather than in terms of the percent increase in rates, or increases in
495 c/kWh, which can be misleading.

496 **Q. Witness Hayet has provided an illustrative example of the short-term NEM analysis**
497 **that OCS is proposing. Do you have any comments on his illustrative example?**

498 A. Yes, I have some very general comments. First, I cannot comment on the validity of
499 Witness Hayet's assumptions, because he has not provided sufficient information
500 describing how they were determined. His assumptions regarding the energy savings
501 from NEM, the revenue requirements required from all customers, and the avoided
502 capacity costs of NEM are not fully described, and Witness Hayet points out that they are
503 approximations that are only for illustrative purposes.³⁸ Consequently, the Commission
504 should not interpret any of the results as an indication of the costs and benefits for all
505 customers or for non-NEM customers.

506 Second and more importantly, Witness Hayet's analysis does not provide results in a way
507 that can be meaningfully interpreted by the Commission or others. In Table 3 of his
508 testimony, he presents the total cost increases to non-NEM customers over three different
509 scenarios, in terms of millions of dollars. However, without putting these results into the
510 context of customer rates and bills, which is how customers will be affected, it is difficult
511 to interpret what the results mean. What does it mean for non-NEM customers if their
512 costs increase by \$1.9 million in the base case? How does this compare with the total
513 benefits to all utility customers from NEM?

514 Witness Hayet does report that non-NEM residential customers might have to pay \$9 per
515 month more as a result of NEM. This is an example of a useful metric that puts the rate
516 impact into a meaningful context. However, this result does not tell the whole story. This

³⁸ Hayet Direct Testimony, page 27, lines 552 - 555
Rebuttal Testimony of Tim Woolf
Docket No. 14-035-114
Joint Parties Exhibit 5.0

517 result is for the high PV growth case, which assumes 40% growth in PV installations. If
518 this amount of PV were to be installed on the RMP system, then the net benefits across
519 all customers would be significant, on the order of hundreds of millions, perhaps billions,
520 of dollars.³⁹

521 Presenting the customer bill impact from the other two scenarios shows a very different
522 picture. Using Witness Hayet's own analysis, the base case scenario and 20% growth
523 scenario suggest that non-NEM customers might experience monthly bill increases of
524 roughly \$0.2 and \$1.72, respectively.⁴⁰ I do not mean to suggest that I support these
525 results, for reasons described above. I present them here to indicate the importance of
526 putting any such results in the proper context.

527 **5. REBUTTAL OF DIVISION OF PUBLIC UTILITIES TESTIMONY**

528 **Q. Please summarize the Division's proposal for evaluating the costs and benefits of**
529 **NEM.**

530 A. The Division recommends that the costs and benefits of NEM be evaluated using a cost
531 of service framework.⁴¹ However, it does not provide much detail on which types of costs
532 and which types of benefits would be included in this framework, or much detail
533 regarding the methodology used for comparing costs.

³⁹ See Section 6 for a discussion of the net benefits of NEM under assumptions of different penetration rates. Witness Hayet's high PV growth case assumes that roughly 13 percent of residential customers would install rooftop PV. This level of penetration is higher than my Ten Percent Penetration scenario, suggesting that the net benefits of Witness Hayet's high PV growth case could be higher than those in my Ten Percent Penetration scenario, generally speaking.

⁴⁰ Hayet Direct Testimony, Exhibit OCS-2.2.

⁴¹ Davis Direct Testimony, page 5, lines 78-80.

534 The Division recommends that two studies be prepared: one that does not account for
535 excess generation and one that does.⁴² According to the Division, a comparison of the
536 two studies would indicate the benefits of NEM.⁴³ The Division adds that “other costs”
537 not captured in this comparison can be evaluated separately.⁴⁴ However, the Division is
538 not clear what these other costs are or how they would be evaluated.

539 **Q. Do you agree with the Division’s proposal?**

540 A. The Division’s proposal does not provide sufficient detail for me to comment on it in any
541 depth. However, I have a few general comments.

542 **Q. Do you agree with Division’s recommendation that the costs and benefits of NEM
543 should be evaluated using a cost of service framework?**

544 A. No. As described above in Section 3, a cost of service study is not appropriate for
545 evaluating costs and benefits of resources. The Division seems to be confusing cost-
546 effectiveness with rate design, the same way that RMP does.

547 One of the Division’s primary recommendations is that “the Commission should adopt a
548 type of cost of service framework for determining how to apportion costs and benefits to
549 net metering customers.”⁴⁵ In addition, the Division notes that “[a] cost of service study is
550 generally a starting point for establishing what set of costs and revenues are appropriately
551 assigned to each group of customers.”⁴⁶ Further, the Division rejects the use of a DSM

⁴² Davis Direct Testimony, page 7, lines 106-116.

⁴³ Davis Direct Testimony, page 7, lines 116-117.

⁴⁴ Davis Direct Testimony, page 7, lines 118-120.

⁴⁵ Davis Direct Testimony, page 5, lines 78-80.

⁴⁶ Davis Direct Testimony, page 6, lines 88-90.

552 test framework, because it “does not believe that a DSM test framework will readily lead
553 to the development of a reasonable rate structure.”⁴⁷

554 In all of these cases, the Division is mixing up rate design with cost-effectiveness. The
555 purpose of cost-effectiveness analyses is to determine the benefits and costs of a
556 particular resource across all customers, in order to help decide whether to invest in,
557 implement, or support that resource. Cost-effectiveness analyses are not intended to
558 “apportion costs and benefits,” or to assign costs to groups of customers, or to be used to
559 develop a reasonable rate structure. The Division’s recommendations apparently are more
560 driven by rate design objectives than cost-effectiveness objectives.

561 **Q. What is the problem with mixing up cost-effectiveness and rate design?**

562 A. As described in Section 3 of my testimony, conflating cost-effectiveness and rate design
563 will not provide the information required by the NEM legislation and needed by the
564 Commission. It will not indicate the costs and benefits to all customers, and potentially
565 not even the costs and benefits to non-NEM customers. Even worse, it might provide
566 information that is misleading or incorrect.

567 Further, conflating cost-effectiveness and rate design is not consistent with the NEM
568 statute, which clearly requires that the two issues be addressed separately. Before any
569 decisions are made on rate design, the Company, the Commission, and the stakeholders
570 need to review the NEM costs and benefits, to all customers and to non-NEM customers,
571 of the current rated design. Then, in light of those results, the Commission should

⁴⁷ Davis Direct Testimony, page 6, lines 84-85.

572 consider whether to keep the current ratemaking structure or whether alternative
573 ratemaking options are warranted.

574 **Q. The Division recommends that the benefits and costs of NEM account for the**
575 **allocation of costs from PacifiCorp to Utah customers.⁴⁸ Do you agree?**

576 A. Yes. The NEM benefit-cost framework should account for the all the costs and benefits
577 that will affect the revenue requirements of RMP's Utah customers. The allocation of
578 costs from PacifiCorp to Utah customers can have a significant impact on the revenue
579 requirements allocated to Utah, and this should be accounted for in any NEM benefit-cost
580 analysis. Given that the amount of costs allocated from PacifiCorp to Utah customers is
581 based upon both Utah's peak demand and energy sales, I would expect that NEM
582 generation would help reduce the amount of costs that are allocated from PacifiCorp to
583 Utah customers.

584 **Q. Do you account for the impact that NEM will have on the allocation of costs from**
585 **PacifiCorp to Utah customers in your cost impact and rate impact analyses**
586 **described below?**

587 A. No, I do not account for these impacts because my analysis is a relatively simple,
588 illustrative analysis. Any NEM cost-benefit analysis conducted by the Company should
589 properly account for the impacts that NEM will have on the allocation of costs from
590 PacifiCorp to Utah customers.

⁴⁸ Davis Direct Testimony, pages 3 – 4, lines 42 - 47
Rebuttal Testimony of Tim Woolf
Docket No. 14-035-114
Joint Parties Exhibit 5.0

591 **6. ILLUSTRATIVE COST IMPACT ANALYSIS**

592 Background

593 **Q. Please describe the role of a cost impact analysis and a rate impact analysis.**

594 A. As described in my direct testimony, a complete assessment of the cost-effectiveness of
595 NEM requires a cost impact analysis and a rate impact analysis. The cost impact analysis
596 indicates the impacts across all customers, in terms of the long-term present value of
597 revenue requirements, while the rate impact analysis indicates the impacts on non-NEM
598 customers, in terms of increased rates.

599 **Q. Did you provide an illustrative analysis in your direct testimony?**

600 A. Yes, I provided an illustrative rate impact analysis in my direct testimony. At that time I
601 placed priority on the rate impact analysis over a cost impact analysis, because cost
602 impact analyses are common-place and widely understood in electricity industry cost-
603 effectiveness contexts, while rate impact analyses are much less common and less well
604 understood.

605 **Q. Why are you providing a cost impact analysis at this time?**

606 A. The direct testimonies of the Company, OCS, and the Division indicate that there is a lot
607 of confusion among the parties regarding the conventional methodology for analyzing the
608 costs and benefits of an electricity resource, i.e., conducting a cost impact analysis.

609 Further, Witness Hayet presents an illustrative short-term analysis of NEM costs and
610 benefits that is fundamentally different from the cost impact analysis that I recommend.

611 For these reasons, I believe that it is important to present an illustrative cost impact

612 analysis to demonstrate how my recommendations can be applied in practice, and how

613 they differ from the other parties. As with my illustrative rate impact analysis, my cost
614 impact analysis is prepared using several high-level approximations for some of the key
615 inputs. A more comprehensive cost impact analysis should be conducted to provide more
616 accurate impacts of the NEM costs and benefits, after the Commission has ruled on the
617 framework and input assumptions.

618 Methodology and Assumptions

619 **Q. Please describe how you prepared an illustrative cost impact analysis for net energy**
620 **metering in Utah.**

621 A. I developed a workbook model for this purpose. Exhibit TW-6 provides a print-out of the
622 key elements of the workbook.

623 My cost impact and rate impact analyses are essentially the same analysis. They use the
624 same methodologies, input assumptions, and time period. The only difference between
625 the two is the way results reported. The cost impact analysis presents cost impacts in
626 terms of present value of revenue requirements, while the rate impact analysis presents
627 rate impacts in terms of cents/kWh and percent increase in rates.

628 Here are the key elements of the cost and rate impact analyses:⁴⁹

- 629
- The analyses cover a study period of 20 years.
- 630
- The analyses are applied to the residential rate class.

⁴⁹ For more detail, see Woolf Direct Testimony, pages, 20 - 24, and lines 397 - 487

-
- 631 • The analyses compare hypothetical scenarios: one assuming that no new PV is
632 installed over the study period (the Without-PV scenario), and another assuming a
633 certain amount of PV is installed due to NEM (the With-PV scenario).
- 634 • For each scenario, the analyses include a forecast of utility sales, costs, and rates for
635 the study period. A comparison between the two scenarios reveals the difference in
636 sales, costs, and rates caused by NEM.
- 637 • The calculations are based on the assumption that rates are adjusted every year to
638 account for reductions in electricity sales as a result of the DGPV.⁵⁰
- 639 • I assume an illustrative range of avoided costs, from \$60/MWh to \$120/MWh, in
640 levelized terms.
- 641 • I assume an illustrative range of PV penetration levels; one case where 5 percent of
642 customers install PV over 10 years (the Five Percent Penetration scenario), and
643 another case where 10 percent of customers install PV over 10 years (the Ten
644 Percent Penetration scenario).

645 **Q. Did you change any assumptions from those used in your direct testimony?**

646 A. For the purpose of the cost impact analysis, I made a simplistic assumption about
647 program administration costs and the costs that may be required to integrate PV onto
648 RMP's electricity grid. I assume that these costs would be \$5/MWh for each MWh of PV
649 generation. I have no information regarding what these cost might actually be. I include

⁵⁰ This assumption tends to overstate the actual rate impacts, potentially by a significant amount. In those years without a rate case, there will be no increase in rates as a result of savings from NEM customers.

650 these illustrative costs in my analysis to indicate that there may be such costs associated
651 with NEM and how they would be included in the analysis.

652 This assumption regarding these PV costs will affect the rate impact analysis as well as
653 the cost impact analysis. Therefore, my rate impact estimates presented here are slightly
654 different from those of my direct testimony. But the difference is immaterial.

655 **Q. Are there any differences between the cost and the rate impact analyses?**

656 A. Both analyses used the same methodologies, inputs, and assumptions to compare the
657 costs, sales, and rates of the With-PV to the Without-PV scenarios. In the cost impact
658 analysis, the lost revenues are not included, because they do not affect revenue
659 requirements. In the rate impact analysis, lost revenues are included, because that is how
660 lost revenues affect ratepayers—by increasing rates.

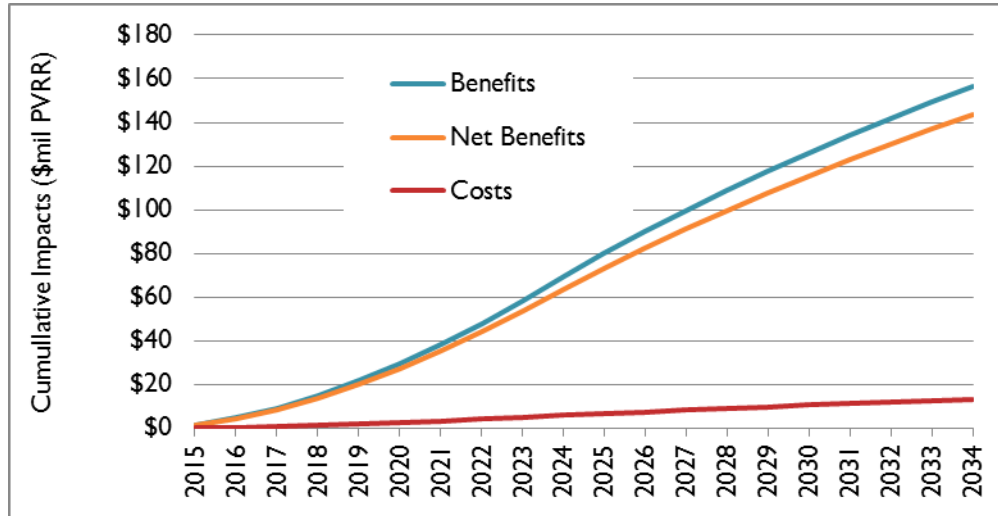
661 Summary of Results

662 **Q. Please summarize the results of the cost impact analysis for the Lower Avoided Cost
663 and Five Percent Penetration scenario.**

664 A. Figure 1 presents the NEM costs, benefits, and net benefits for the Lower Avoided Cost
665 and the Five Percent Penetration scenario. The results are presented in terms of
666 cumulative present value revenue requirements, which means that each year indicates the
667 cumulative present value of costs and benefits up through that year. The cumulative
668 costs, benefits, and net benefits for the entire study period are presented in 2034, the last
669 year. For this scenario, the cumulative net benefits of NEM for the entire study period are
670 estimated to be roughly \$143 million PVRR.

671 As indicated, the costs of NEM are quite small relative to the benefits because they
672 include only the costs associated with program administration and PV integration on the
673 grid. The benefits include all of the avoided costs, which are assumed to be \$60/MWh in
674 this case.

675 **Figure 1. Cost Impact Results, Lower Avoided Costs, Five Percent Penetration**



676

677 **Q. Please summarize the results of your cost impact analysis for the other scenarios**
678 **that you analyzed.**

679 A. The results of all scenarios analyzed are summarized in Table 1. For each of the scenarios
680 analyzed, the table presents the cumulative PVRR results for the Without-PV relative to
681 the results for the With-PV scenario. The net benefits are simply the benefits less the
682 costs, and the benefit-cost ratio is simply the benefits divided by the costs.

683

Table 1. Results of the Illustrative Cost Impact Analysis: Cumulative PVRR

	Five Percent Penetration		Ten Percent Penetration	
	Lower Avoided Costs	Higher Avoided Costs	Lower Avoided Costs	Higher Avoided Costs
PVRR Without PV (\$ Mil)	\$10,082	\$10,082	\$10,082	\$10,082
PVRR With PV (\$ Mil)	\$9,939	\$9,482	\$9,795	\$8,882
Net Benefits (\$ Mil)	\$143	\$600	\$287	\$1,200
Benefit-Cost Ratio	12	24	12	24

684

685

This illustrative analysis indicates that the net benefits of NEM (in PVRR) might range from tens of millions of dollars to over one billion dollars, depending upon the scenario.

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687

It also indicates that the benefit-cost ratio of NEM will range from a low of 12 to a high of 24. In other words, for every ratepayer dollar (in revenue requirements) spent on

688

689

NEM, there will be roughly 12 to 24 dollars savings (in reduced revenue requirements)

690

across all ratepayers.

691

Q. Your analysis suggests that NEM will be very cost effective under each scenario analyzed. Why are the results so favorable toward NEM?

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693

A. This cost impact analysis indicates that NEM is very cost-effective because behind-the-meter PV generation is provided to the utility at a very low cost. Aside from program administration and PV integration costs, the PV power is essentially provided for free.

694

695

696

The host customers incur the vast majority of the resource cost by installing the PV

697

system with their own funds. This is a simple fact that often gets obscured in all of the

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complex debates regarding cost allocation, cost of service, and rate design.

699 **Q. Your analysis suggests that NEM will be highly cost-effective under a range of**
700 **different assumptions, because most of the NEM costs are born by the host**
701 **customer. Is this the end of the story?**

702 A. No. The cost impact analysis presents the NEM costs and benefits for all customers as a
703 whole, but it says nothing about the impacts on non-NEM customers. As with all benefit-
704 cost analyses, the cost impact analysis does not address cost allocation or cost shifting
705 that might occur between customers. That is why I recommend that the cost impact
706 analysis be supplemented with a rate impact analysis. I show how this can be done in the
707 following section.

708 **7. THE ULTIMATE GOAL: ASSESSING BOTH COSTS AND RATES**

709 **Q. How should both the cost impacts and rate impacts be considered together?**

710 A. Table 2 presents a summary of the results of my cost and rate impact analyses. The net
711 benefits and the benefit-cost ratios are taken from Table 1. The annual and cumulative
712 rate impacts are described in my direct testimony.⁵¹

⁵¹ Woolf Direct Testimony, pages 20 - 29, lines 397-549. The rate impacts presented here are slightly different than those in my direct testimony, because these updated rate impacts account for the administration and integration costs of NEM. The updated cost and rate impact analysis is presented in Exhibit TW-6.

713

Table 2. Results of the Illustrative Cost and Rate Impact Analyses

	Five Percent Penetration		Ten Percent Penetration	
	Lower Avoided Costs	Higher Avoided Costs	Lower Avoided Costs	Higher Avoided Costs
Net Benefits (\$ Mil)	\$143	\$600	\$287	\$1,200
Benefit-Cost Ratio	12	24	12	24
Annual (year-to-year) Rate Impact	0.2%	-0.01%	0.4%	-0.1%
Cumulative Rate Impact by 2024	1.8%	-0.7%	3.7%	-1.4%

714

In the scenarios with high avoided costs, there are likely to be significant NEM net

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benefits across customers as a whole, in the range of \$600 to \$1,200 million; and the rates

716

are likely to be *reduced* by NEM. In these cases, there is no question that NEM will be

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beneficial for all customers, including non-NEM customers.

718

In the scenarios with low avoided costs there are still significant net benefits across

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customers as a whole from NEM, in the range of \$143 to \$287 million; but the rates may

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increase leading to increased bills for non-NEM customers. These results provide the

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most direct indication of the extent to which cost-shifting might affect non-NEM

722

customers. In these cases, the Commission must strike a balance between the opportunity

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to reduce costs across all customers, and the potential for increased rates.

724

- In the Five Percent Penetration scenario, the benefit-cost ratio of 12 and the net

725

benefits of \$143 million must be considered against an annual rate impact of

726

0.2 percent for 10 years.

727

- In the Ten Percent Penetration scenario, the benefit-cost ratio of 12 and the net

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benefits of \$287 million must be considered against an annual rate impact of

729

0.4 percent for 10 years.

730

In these scenarios where rates are expected to increase, the Commission generally has

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two options. It could decide to keep the current rate structures in place, on the grounds

732 that the modest rate impacts are acceptable relative to the net benefits. Or it could
733 consider alternative ratemaking options.

734 **8. RECOMMENDATIONS**

735 **Q. Please summarize your primary recommendations.**

736 A. I continue to stand by all of the recommendations provided in my direct testimony. In
737 particular:

- 738 • The Commission should find that a benefit-cost analysis should be conducted
739 separately from rate design determinations, and clarify that rate design alternatives
740 should be considered in light of the results of the benefit-cost analysis.
- 741 • The Commission should require that the NEM cost impact analysis be based on net
742 present value of revenue requirements, consistent with the conventional practice of
743 evaluating all types of supply-side and demand-side resources in Utah.
- 744 • The Commission should clarify that lost revenues from distributed generation
745 resources should not be included in the cost impact analysis in any way.
- 746 • The Commission should require the Company to conduct a rate impact analysis to
747 indicate the extent to which customers who do not install distributed generation
748 resources might be harmed by those that do.

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

750 A. Yes, it does.