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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

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**In the Matter of the Application of Rocky Mountain Power for Approval of a Significant Energy Resource Decision and Request to Construct Wind Resource and Transmission Facilities**

**DOCKET NO. 17-035-40**

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REPLACEMENT DIRECT TESTIMONY OF KATE BOWMAN

ON BEHALF OF

UTAH CLEAN ENERGY

DATED this 6<sup>th</sup> day of December, 2017

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Sophie Hayes  
*Attorney for Utah Clean Energy*

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

2 A. My name is Kate Bowman. My business address is 1014 2<sup>nd</sup> Ave, Salt Lake City, Utah  
3 84103.

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

5 A. I am the Solar Project Coordinator for Utah Clean Energy, a non-profit and non-partisan  
6 public interest organization whose mission is to lead and accelerate the clean energy  
7 transformation with vision and expertise. We work to stop energy waste, create clean  
8 energy solutions, and build a smart energy future.

9 **Q. On whose behalf are you testifying?**

10 A. I am testifying on behalf of Utah Clean Energy.

11 **Q. Please review your professional experience and qualifications.**

12 A. I have worked for Utah Clean Energy for over five years as a project coordinator with a  
13 focus on the development and implementation of programs that provide education about,  
14 expand access to, and facilitate the installation of solar photovoltaic energy. I hold a  
15 bachelor's degree in government with a focus on public policy from Dartmouth.

16 **Q. Have you previously filed testimony with this Commission?**

17 A. Yes. I filed testimony in Phase II of Docket No. 16-035-36, in the matter of Rocky  
18 Mountain Power's STEP Act Initiatives, regarding advanced substation metering. I also  
19 testified in consolidated Docket Nos. 17-035-T07 and 17-035-37 regarding the pricing  
20 method for qualifying facilities under Electric Service Schedule 37.

21 **Q. What is the purpose of your testimony?**

22 A. As Utah Clean Energy's policy witness, I outline factors the Commission should consider  
23 related to PacifiCorp's application for approval of new wind resources and make  
24 recommendations based thereon.

25 **Q. Could you please summarize your testimony?**

26 A. Utah Clean Energy is supportive of PacifiCorp's investment in new Wyoming wind  
27 resources because the projects represent a step toward a cleaner, more renewable grid. It  
28 is Utah Clean Energy's position that it is in the best interest of ratepayers to transition  
29 PacifiCorp's resource mix to carbon-free renewable resources as quickly and as  
30 economically as possible, and PacifiCorp's proposed wind projects will help facilitate  
31 that transition. Utah Clean Energy has significant concerns about the development of the  
32 2017 IRP, which resulted in the selection of the proposed Wyoming wind resources as a  
33 part of the preferred portfolio;<sup>1</sup> nonetheless, we believe PacifiCorp's application  
34 represents an opportunity to acquire economic renewable resources that will benefit Utah  
35 ratepayers. As part any order in this proceeding, Utah Clean Energy recommends that the  
36 Commission require the Company to evaluate economic retirements of its existing coal  
37 fleet and demonstrate that carbon emissions will decrease as a result of this investment.  
38 Utah Clean Energy has not taken a position on the Company's application for approval of  
39 the proposed transmission assets. I will review the testimony of other parties on this  
40 matter and may have additional comments on this subject thereafter.

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<sup>1</sup> See Utah Clean Energy's initial comments in Docket No. 17-025-16, In the Matter of PacifiCorp's 2017 Integrated Resource Plan.

41 **Q. What is Utah Clean Energy’s primary interest in this docket?**

42 A. Utah Clean Energy’s primary interest in this docket is the electricity industry’s impact on  
43 climate change. Scientific consensus points to a need for a rapid reduction in carbon  
44 dioxide (CO<sub>2</sub>) emissions, including a quicker transition to carbon-free renewable  
45 resources in the electricity sector.

46 **Q. Are there regulations requiring the Company to reduce carbon emissions?**

47 A. Not currently in Utah. The Clean Power Plan is in limbo while the Environmental  
48 Protection Agency formulates a formal plan for its repeal or replacement. There will  
49 likely be legal challenges to follow the EPA’s determination.

50 **Q. Are there other reasons the Company should be reducing carbon emissions?**

51 A. Yes. Regardless of the state of the Clean Power Plan, the science of climate change is  
52 clear that it is necessary to make significant reductions in carbon emissions in order to  
53 mitigate and adapt to inevitable impacts. Taking advantage of economic opportunities for  
54 carbon-free renewable resources benefits ratepayers and reduces risk over the long term  
55 by providing fossil fuel-free alternatives for generating electricity in the near term.

56 **Q. Please describe conclusions from current analysis of climate change and its  
57 associated impacts.**

58 A. The Climate Science Special Report (CSSR), the first of two volumes in the Fourth  
59 National Climate Assessment, was just released in November, 2017.<sup>2</sup> I’ve attached it to  
60 my testimony as Exhibit UCE 1—KB.

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<sup>2</sup> The National Oceanic and Atmospheric Administration (NOAA) oversees the preparation of the Fourth National Climate Assessment (NCA4). The Climate Science Special Report (CSSR) is an assessment of the science of climate change and is designed to inform assessment of climate-related risks and decision-making about responses. The CSSR is overseen by a Steering Committee composed of representatives from NOAA, the National Aeronautics and Space Administration (NASA), and the Department of Energy (DOE), the US Global Change Research Program

61 The CSSR concludes that, “[I]t is extremely likely [95-100% likelihood] that human  
62 activities, especially emissions of greenhouse gases, are the dominant cause of the  
63 observed warming since the mid-20th century. For the warming over the last century,  
64 there is no convincing alternative explanation supported by the extent of the  
65 observational evidence.”<sup>3</sup>

66 The Report describes both documented and anticipated changes to the climate in response  
67 to human activities, including the following:

- 68 • Sixteen of the warmest years on record have occurred in the last 17 years.<sup>4</sup>
- 69 • Heatwaves have become more frequent in the United States, and recent record-  
70 setting hot years are projected to become common in the near future.<sup>5</sup>
- 71 • Annual average temperature in the contiguous United States has increased by  
72 1.8°F (1.0°C) since 1901, and over the next few decades (2021–2050), annual  
73 average temperatures are expected to rise by about 2.5°F relative to the recent  
74 past.<sup>6</sup>
- 75 • The occurrence of large forest fires in the western United States has increased and  
76 is projected to further increase.<sup>7</sup>
- 77 • Trends of earlier spring melt and reduced snowpack are already affecting water  
78 resources in the western United States. Under higher CO<sub>2</sub> emissions scenario and  
79 without changes to current water resource management, long-duration droughts  
80 are more likely before the end of the century.<sup>8</sup>

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(USGCRP), and three Coordinating Lead Authors. More information is available at:  
<https://science2017.globalchange.gov/chapter/front-matter-about/>

The 36 page Executive Summary is attached as Exhibit A and is also available at:  
[https://science2017.globalchange.gov/downloads/CSSR2017\\_PRINT\\_Executive\\_Summary.pdf](https://science2017.globalchange.gov/downloads/CSSR2017_PRINT_Executive_Summary.pdf)

<sup>3</sup> USGCRP, 2017: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 470 pp, doi: 10.7930/J0J964J6. <https://science2017.globalchange.gov/>  
See Executive Summary P3.

“Extremely likely” is defined as having a 95-100% likelihood. See Executive Summary P

<sup>4</sup> Climate Science Special Report: Fourth National Climate Assessment, Volume I. Executive Summary, P4.

<sup>5</sup> *Ibid.* P2.

<sup>6</sup> *Ibid.* P2

<sup>7</sup> *Ibid.* P2

<sup>8</sup> *Ibid.* P2

- 81           • “The global atmospheric carbon dioxide (CO<sub>2</sub>) concentration has now passed 400  
82 parts per million (ppm), *a level that last occurred about 3 million years ago*  
83 [emphasis added], when both global average temperature and sea level were  
84 significantly higher than today. Continued growth in CO<sub>2</sub> emissions over this  
85 century and beyond would lead to an atmospheric concentration not experienced  
86 in tens to hundreds of millions of years.”<sup>9</sup>

87  
88           The conclusions from the CSSR are clear, noting “[T]here is broad consensus that the  
89 further and the faster the Earth system is pushed towards warming, the greater the risk of  
90 unanticipated changes and impacts, some of which are potentially large and  
91 irreversible.”<sup>10</sup> The CSSR states that major emissions reductions are necessary to avoid  
92 the worst impacts of climate change. In order to limit global annual average  
93 temperature rise to 3.6°F (2°C) or less, compared to preindustrial levels, net global  
94 carbon dioxide emissions will need to be reduced substantially by 2040, and become zero  
95 or negative later in the century.<sup>11</sup> In order to have a two-thirds chance of limiting  
96 warming to 2°C, future global CO<sub>2</sub> emissions must remain below 230 gigatons. Without  
97 significant reductions in CO<sub>2</sub> emissions, we will exceed this threshold in *approximately*  
98 *20 years* [emphasis added].<sup>12</sup>

99           To quote the CSSR, “choices made today will determine the magnitude of climate change  
100 risks beyond the next few decades.”<sup>13</sup>

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<sup>9</sup> *Ibid.* P2

<sup>10</sup> *Ibid.* P2

<sup>11</sup> *Ibid.* P22

<sup>12</sup> *Ibid.* P22-23. This projection assumes global emissions greater than or equal to the RCP4.5 scenario, which is the second lowest of four CO<sub>2</sub> emissions scenarios included in the CSSR. See P7 for additional information about scenarios used in the CSSR.

<sup>13</sup> *Ibid.* P22

101 Immediate action is necessary to avoid the most severe impacts of climate change and a  
102 more costly future. For this reason, investments in economic renewable resources today  
103 are prudent to ensure an affordable transition for ratepayers. PacifiCorp’s proposed  
104 investment in wind should not eclipse the Company’s continued reliance on fossil fuel  
105 resources. According to Company witness Daniel MacNeil in another docket, “Even with  
106 the 2021 Wyoming wind resources, coal generation represents roughly half of the  
107 Company’s retail load over the next 10 years, while natural gas generation represents  
108 roughly 20 percent.”<sup>14</sup> This is not the portfolio of a company that is appropriately  
109 considering long-term risk, and PacifiCorp will need to do much more than invest in this  
110 wind project to effectively transition to carbon-free resources. Nonetheless, this  
111 investment in wind is a step in the right direction.

112 **Q. What is the connection between climate change and electricity generation?**

113 A. Electricity generation represents our greatest opportunity to avoid the worst impacts of  
114 climate change. The combustion of fossil fuels is the largest single source of CO2  
115 emissions in the US, accounting for about 35 percent of US CO2 emissions.<sup>15</sup> It is in the  
116 best interest of ratepayers for PacifiCorp to transition to carbon-free resources as quickly  
117 as possible to avoid higher costs in the future.

118 Although the U.S. and Utah do not currently have policies that require a reduction in  
119 carbon emissions, advancements in understanding the effects of climate change paint a  
120 clear picture of the real costs associated with continued reliance on fossil fuels. Climate

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<sup>14</sup> Docket No. 17-035-37, “In the Matter of Rocky Mountain Power’s 2017 Avoided Cost Input Changes Quarterly Compliance Filing.” Daniel MacNeil Rebuttal Testimony, lines 285 – 287.

<sup>15</sup> U.S. Environmental Protection Agency, “Overview of Greenhouse Gas Emissions”.  
<https://www.epa.gov/ghgemissions/overview-greenhouse-gases#carbon-dioxide>.

121 change will result in higher temperatures, more severe heat events, and increased forest  
122 fires in the western United States, which will certainly impact PacifiCorp's ability to  
123 provide reliable and affordable electricity. Significant action is necessary in the next  
124 decade to limit the impacts of climate change, and the costs of both addressing climate  
125 change and dealing with its impacts will only rise the longer we wait.

126 **Q. Please describe how climate change might impact electricity generation in Utah.**

127 A. Recent assessments of the impacts of climate change, as described above, identify trends  
128 that will impact electricity generation. Rising temperatures are likely to increase the  
129 frequency and duration of peak load events that the utility must serve in the summer  
130 months. A rise in the incidence of forest fires could increase damage to infrastructure and  
131 resulting grid outages. Disruptions in seasonal water availability affects dispatch of hydro  
132 resources and thermal resources (which rely on water for cooling). Utah's Recommended  
133 State Water Strategy notes that "A warming climate poses serious challenges for Utah's  
134 water future and our ability to plan and prepare for that future."<sup>16</sup> What's more, Utah may  
135 experience changes that are more severe than national trends. While the climactic trends  
136 themselves will impact electricity generation in Utah, increased variability and  
137 unpredictability will make long-term planning processes more difficult and subject to  
138 uncertainty.

139 The following is a summary of observed and projected changes in temperature,  
140 precipitation, and snowpack for Utah and the Southwest:

141 • Temperature:

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<sup>16</sup> Governor's Water Strategy Advisory Team, "Recommended State Water Strategy," July 2017.  
[http://www.envisionutah.org/images/FINAL\\_Recommended\\_State\\_Water\\_Strategy\\_7.14.17\\_5b15d.pdf](http://www.envisionutah.org/images/FINAL_Recommended_State_Water_Strategy_7.14.17_5b15d.pdf). P 70



- 142                   ○ In general, Utah’s climate has warmed at a rate of two to four times  
143                   that of the global climate.<sup>17</sup>
- 144                   ○ The frequency of heat waves (6-day periods with a maximum  
145                   temperature above the 90th percentile) is projected to increase,  
146                   particularly the Southwest.<sup>18</sup>
- 147                   ● Precipitation:
- 148                   ○ Reductions in snowfall and earlier snowmelt at altitudes high enough  
149                   for snow could result in disruptions to western U.S. water delivery  
150                   systems that are expected to lead to more frequent hydrological  
151                   drought conditions.<sup>19</sup>
- 152                   ● Snowpack
- 153                   ○ A reduction in snow water equivalent of 18.9% by 2050 and 78.7% is  
154                   projected by 2100 in the Uinta and Wasatch Ranges.<sup>20</sup>
- 155                   ○ Assuming no change to water resource management practices, several  
156                   important western U.S. snowpack reservoirs effectively disappear by  
157                   2100.<sup>21</sup>
- 158

159 **Q. Will climate change impact Utahns in other ways?**

160 **A.** Yes. The effects of climate change have varied and widespread consequences that will  
161 impact Utahns’ health and our economy.

- 162                   ● Ground Level Ozone –

163                   Ground level ozone is an air pollutant that can cause permanent lung damage,  
164                   in addition to shortness of breath, coughing, and sore throat.<sup>22</sup> As  
165                   temperatures rise, the number of bad ozone days is expected to increase,  
166                   since heat accelerates the chemical reactions that cause ozone. Utah exceeded  
167                   the EPA’s standard for ozone 22 times in summer and fall of 2017.<sup>23</sup>

- 168                   ● Tourism and recreation –

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<sup>17</sup> *Ibid.* P70.

<sup>18</sup> Climate Science Special Report: Fourth National Climate Assessment, Volume I., Chapter 6.

<sup>19</sup> Climate Science Special Report: Fourth National Climate Assessment, Volume I., Chapter 8.

<sup>20</sup> *Ibid.*

<sup>21</sup> *Ibid.* 8

<sup>22</sup> U.S. Environmental Protection Agency, “Health Effects of Ozone Pollution.” <https://www.epa.gov/ozone-pollution/health-effects-ozone-pollution>.

<sup>23</sup> Utah Department of Environmental Quality, “Ozone: Dog Days of Summer Have Us All Panting for Cleaner Air.” September 11, 2017. <https://deq.utah.gov/news/ozone-summer-air>.

169 Projected decreases in snowpack will have severe economic consequences for  
170 Utah’s tourism and recreation industries. A report commissioned by the Park  
171 City Foundation estimates that by 2030 a decrease in snowpack will result in  
172 \$120.0 million in lost output and 1,137 lost jobs. By 2050, these numbers rise  
173 to \$160.4 -\$392.3 million in lost output and 1,520 – 3,717 lost jobs.<sup>24</sup>

- 174 • Agriculture –  
175 Higher temperatures and droughts are likely to interfere with Utah’s farms and  
176 cattle ranches, fires may impair livestock operations, and reduced water  
177 availability would create challenges for ranches and irrigated farms.<sup>25</sup>

178 **Q. Are financial institutions taking climate change risk seriously?**

179 A. Yes. On November 28, 2017, Moody’s issued a press announcement describing how  
180 climate risk could impact local government credit ratings and the importance of taking  
181 steps to mitigate risk.

182 The release explains,

183 “Moody's analysts weigh the impact of climate risks with states and  
184 municipalities' preparedness and planning for these changes when we are  
185 analyzing credit ratings. Analysts for municipal issuers with higher  
186 exposure to climate risks will also focus on current and future mitigation  
187 steps and how these steps will impact the issuer's overall profile when  
188 assigning ratings.”<sup>26</sup>

189  
190 **Q. Are there other (non-climate) benefits of transitioning PacifiCorp’s resource mix to  
191 renewables?**

192 A. Yes. Renewable resources have no fuel costs, which allows ratepayers to avoid risk  
193 associated with uncertain fuel costs and fuel price volatility. Inverter-based renewable

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<sup>24</sup> Stratus Consulting. “Climate Change in Park City: An Assessment of Climate, Snowpack, and Economic Impacts.” September 29, 2009. <http://www.parkcitygreen.org/Documents/2009-Climate-Change-in-Park-City-Report.aspx>. Page 6-2.

<sup>25</sup> U.S. Environmental Protection Agency, “What Climate Change Means for Utah,” August 2016.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ut.pdf>.

<sup>26</sup> Moody’s Investor Service, “Climate change is forecast to heighten US exposure to economic loss placing short- and long-term credit pressure on US states and local governments.” November 28, 2017.

[https://www.moodys.com/research/Moodys-Climate-change-is-forecast-to-heighten-US-exposure-to--PR\\_376056](https://www.moodys.com/research/Moodys-Climate-change-is-forecast-to-heighten-US-exposure-to--PR_376056).

194 resources also provide ancillary services that have reliability and resiliency benefits, such  
195 as synthetic inertia, frequency response, and voltage control.

196 **Q. Do you have concerns about PacifiCorp's 2017 IRP process?**

197 A. Yes. Utah Clean Energy agrees with other stakeholders in the IRP docket who are  
198 concerned about the 2017 IRP process, including inputs and assumptions that informed  
199 the IRP, the transparency of the IRP development process, and PacifiCorp's failure to  
200 appropriately evaluate economic coal plant retirements.<sup>27</sup> Despite our concerns with the  
201 IRP process as a whole, I believe the Wyoming wind resources as proposed by  
202 PacifiCorp represent a significant opportunity to capture new resources that will benefit  
203 ratepayers at an extremely low cost. The time-limited nature of the PTC warrants an  
204 accelerated schedule for the acquisition of these resources.

205 **Q. Does this project demonstrate that there are likely other opportunities to pursue  
206 extremely low cost renewable resources before the expiration of the PTC and ITC?**

207 A. Yes. Investment in this resource should not replace or preclude additional investments in  
208 renewables when they are cost effective. In fact, it is likely that there are additional  
209 opportunities for cost-effective investments in renewable resources within PacifiCorp's  
210 system, including solar resources in Utah. For this reason, Utah Clean Energy  
211 recommended that PacifiCorp acquire solar resources called for later in the IRP in the  
212 near term while ratepayers can benefit from historic low prices and the Federal  
213 Investment Tax Credit.<sup>28</sup>

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<sup>27</sup> See Utah Clean Energy's initial comments in Docket No. 17-025-16, In the Matter of PacifiCorp's 2017 Integrated Resource Plan.

<sup>28</sup> *Ibid.* P16

214 **Q. Could changes to the corporate tax rate, as are currently proposed by Congress,**  
215 **impact the economic benefits of the proposed wind projects?**

216 A. As I understand it, changes to the corporate tax rate are not likely to have a significant  
217 impact on the value of Production Tax Credits (PTCs). While a reduction in the corporate  
218 tax credit will reduce the total tax liability of corporations, taxpayers are permitted to  
219 carry PTC credits back to the preceding tax year and forward to the following 20 years.  
220 Testimony on this issue provided by Greg Jenner on behalf of the Interwest Energy  
221 Alliance in Docket No 20000–520-EA-17 before the Wyoming Public Service  
222 Commission is attached as Exhibit UCE 2—KB.

223 That being said, the final contents of Congress’ tax plan are still to be determined and  
224 other provisions could impact the economic benefits of renewable energy projects. I will  
225 review the testimony of other parties on this matter and may have additional comments  
226 thereafter.

227 **Q. Are there other ways PacifiCorp can maximize the benefits of the proposed**  
228 **Wyoming wind resource for ratepayers regardless of the tax incentive?**

229 A. Yes. As previously discussed, the proposed Wyoming wind resources will provide the  
230 most benefits to ratepayers to the extent that they result in meaningful reductions to  
231 carbon dioxide emissions. Carbon emissions reductions do not result from the production  
232 of clean energy alone; rather they result from a reduction in the use of fossil fuel  
233 resources. To maximize benefits from these projects to ratepayers, PacifiCorp should  
234 demonstrate that the proposed wind projects will result in significant and sustained lower  
235 carbon dioxide emissions. Meaningful carbon emissions reductions will only occur to the  
236 extent that PacifiCorp reduces its reliance on fossil fuel resources, operates its existing

237 fossil fuel resources more efficiently, and retires its existing fossil fuel resources on an  
238 accelerated schedule.

239 In order to maximize the value of PacifiCorp's proposed investment in new wind, the  
240 utility must consider the changing circumstances of its entire system and  
241 comprehensively examine whether new resources should replace existing ones, including  
242 those owned by the utility or acquired by contract. Therefore, Utah Clean Energy  
243 recommends the Utah Commission require the same analysis as is under consideration as  
244 part of the Oregon IRP docket (LC 67). Specifically, the Commission should require  
245 PacifiCorp to assess in a transparent manner the economics of its coal units and  
246 demonstrate whether keeping them online is truly part of an optimal least cost, least risk  
247 portfolio.<sup>29</sup>

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<sup>29</sup> Oregon Commission Staff's recommendations are available at <http://edocs.puc.state.or.us/efdocs/HAC/lc67hac111634.pdf>, beginning at page 30.