

BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of the Application of :
PacifiCorp for Approval of an IRP-based : **Docket No. 03-035-14**
Avoided Cost Methodology for QF :
Projects Larger than Three Megawatts :
:

SUPPLEMENTAL TESTIMONY OF

PHILIP HAYET

**ON BEHALF OF
THE COMMITTEE OF CONSUMER SERVICES**

OCTOBER 6, 2005

1 **Q. ARE YOU THE SAME PHILIP HAYET THAT FILED DIRECT, REBUTTAL**
2 **AND SURREBUTTAL TESTIMONY IN THIS DOCKET ON BEHALF OF THE**
3 **COMMITTEE OF CONSUMER SERVICES?**

4 A. Yes I am.

5 **Q. WHAT IS THE PURPOSE OF THIS SUPPLEMENTAL TESTIMONY?**

6 A. Its purpose is to respond to Christine Watson-Mikell's public witness testimony filed on
7 September 27, 2005, and to respond to the public testimony submitted on behalf of
8 Mountain West Consulting, LLC, an intervener and participant in the proceedings.

9 **Q. PLEASE SUMMARIZE YOUR TESTIMONY?**

10 A. The Committee has reviewed Ms. Watson-Mikell's testimony, including her exhibit
11 marked Public Witness 1, and the Committee is concerned that the analysis is
12 inappropriate and should not be considered by the Commission in deciding the Schedule
13 38 avoided cost methodology. With regard to Mountain West Consulting's testimony,
14 which includes an Exhibit entitled, "Utah Proposed Capacity Payment Method for
15 Wind", by Michael Milligan, a consultant to NREL, the Committee agrees with NREL's
16 conclusion that the Effective Load Carrying Capability ("ELCC") is the appropriate
17 method to determine the capacity value of wind projects, however, the Committee
18 disagrees with its conclusion that wind capacity should not have to operate with a 35%
19 capacity factor in order to receive a 20% capacity payment.

20 **Q. WHAT IS THE PURPOSE OF MS. WATSON-MIKELL'S EXHIBIT?**

21 A. Ms. Watson-Mikell modified an analysis that the Committee included in its rebuttal
22 testimony, showing the levelized cost of energy to build a wind energy resource. Ms.

1 Watson-Mikell's analysis was conducted for seven specific wind resources in which she
2 appears to address some of the factors that influence the cost of producing energy. The
3 data she examined were generator and transmission direct investment costs, and the
4 capacity factor associated with each unit.

5 **Q. WHAT ARE MS. WATSON-MIKELL'S DATA ASSUMPTIONS AND WHAT**
6 **DID HER RESULTS SHOW?**

7 A. The following table provides the assumptions that Ms. Watson-Mikell used in her
8 analysis, as well as the levelized cost of energy that she calculated.

Unit	Capacity Factor (%)	Capital Cost (\$/kW)	Levelized Cost of Energy (\$/MWh)
Columbine Hills	Not provided	Not provided	52.79
Spanish Fork	30	1,256	57.05
Idaho	31	1,356	58.93
Vansycle	30	1,382	60.07
Kanosh	28	1,356	67.38
Foot Creek	36	2,111	76.34
Evanston	32	2,111	88.38

9
10 These results can be compared to my analysis, in which I assumed a direct capital
11 investment cost of 1,256\$/kW and a capacity factor of 35%, both of which were taken
12 from PacifiCorp's East Side Wind resource assumptions in Table C.28 of its 2004 IRP
13 report. Based on the assumptions that the Committee used, the levelized cost of energy
14 was 46.05\$/MWh.

15 **Q. HAS ANYONE IN THIS CASE VALIDATED THE REASONABLENESS OF HER**
16 **ASSUMPTIONS?**

1 A. As far as I am aware none of the parties in this case have evaluated the reasonableness of
2 Ms. Watson-Mikell's assumptions. But, I am certain that at least one of her assumptions
3 relating to the Spanish Fork capacity factor is incorrect. Wasatch Wind also plans to
4 develop a project in Spanish Fork, and Mr. Tracy Livingston wrote at page 5 of his direct
5 testimony,

6 *The wind resource at the mouth of Spanish Fork Canyon based on my*
7 *three years of extensive comparison of wind resources at other sites in*
8 *Utah is the best in the state and is comparable to several sites in*
9 *Wyoming. The capacity factor is greater than the Evanston Wind Farm*
10 *that we understand is 32% annualized.*

11
12 Correcting Ms. Watson-Mikell's capacity factor assumption using a reasonable value
13 greater than 32%, such as 34%, the cost of the Spanish Fork wind resource becomes
14 47.99\$/MWh, which is fairly close to the 46.05\$/MWh value that the Committee
15 included in its rebuttal testimony.

16 **Q. ARE YOU SUGGESTING THAT THE CORRECT VALUE THAT THE**
17 **COMMISSION SHOULD USE TO SET AVOIDED COSTS IS \$46.05?**

18 A. Not at all. As I stated in my rebuttal testimony, the Committee provided this calculation
19 simply for illustrative purposes and to demonstrate that the avoided cost payments
20 recommended by wind resource proponents are excessive. The Committee would prefer
21 the Commission to rely on the methodology we have recommended, and as improved
22 assumptions become available, those should be used. Ms. Watson-Mikell's testimony
23 reveals that fixing a price rather than applying a methodology can significantly
24 overestimate the avoided cost of wind resources.

1 **Q. WHAT MIGHT EXPLAIN WHY MS. WATSON-MIKELL'S CALCULATIONS**
2 **ARE SO HIGH?**

3 A. I can think of two reasons. Ms. Watson-Mikell's table shows that four of the six wind
4 projects have capacity factors that are below 32% which is fairly low, when considering
5 the fact that usually the first wind resources built within a state are located where the
6 wind is the strongest. Mr. Livingston told us that his project at Spanish Fork is a good
7 location that will result in an annual capacity factor greater than 32%. Second, Ms.
8 Watson-Mikell assumed a transmission capital cost that ranged from 0\$/kW to 855\$/kW.
9 According to Ms. Watson-Mikell, Foote Creek and Evanston both have reasonable
10 capacity factors of 36% and 32% respectively, yet they both have very high transmission
11 capacity costs of \$855/kW. This results in a levelized energy cost that is over 76\$/MWh
12 for both of those resources. Based on that cost, it would be completely unreasonable to
13 expect that the IRP least cost plan would have selected 1,400 MW of wind resources as
14 part of its preferred least-cost portfolio.

15 **Q. DO YOU BELIEVE THAT ANYONE IN THE WIND INDUSTRY WOULD**
16 **AGREE THAT 76\$/MWH IS TYPICAL OF THE COST OF WIND RESOURCE**
17 **ENERGY?**

18 A. I highly doubt it. Currently, I am involved in an effort to implement a renewable
19 portfolio standard ("RPS") in Louisiana, and I have had to research the cost to build
20 various renewable energy technologies. Most of the sources that I have seen suggest that
21 the cost of wind energy should range from about 30\$/MWh to about 60\$/MWh. For
22 instance the American Wind Energy Association's website suggests this is the cost for

1 wind resources. Also, the Energy Information Administration projects in its 2005 Annual
2 Energy Outlook that the cost of wind energy ranges from 28\$/MWh to 48\$/MWh.¹ The
3 National Renewable Energy Laboratory (“NREL”) suggests that the cost of utility scale
4 wind resources is 40\$/MWh.² But, the Committee realizes that the cost of renewable
5 resources will change over time, driven by factors such as the currently reported increase
6 in steel costs. Therefore, the Committee recommends that PacifiCorp should compute
7 avoided costs using the most currently available cost estimates at the time a QF resource
8 requests indicative avoided cost pricing.

9 **Q. DO YOU HAVE A RESPONSE TO MICHAEL MILLIGAN’S COMMENTS**
10 **SUBMITTED ON BEHALF OF MOUNTAIN WEST CONSULTING?**

11 A. Yes. Mr. Milligan of the National Renewable Energy Laboratory praises PacifiCorp for
12 having used a reliability-based approach to determine the capacity value of wind-
13 generated energy. The approach is called the Effective Load Carrying Capability
14 (ELCC) of a resource. Essentially it determines the equivalent reliability value of an
15 intermittent resource when compared to another generation resource. In the case of wind,
16 the wind resource is compared to the reliability of a thermal unit and the results
17 determine the equivalence of a MW of wind capacity compared to a MW of a thermal
18 resource. While I agree completely with NREL’s praise of the use of the ELCC method,
19 I do not agree with Mr. Milligan’s criticisms. One criticism relates to the fact that
20 PacifiCorp only conducted an ELCC analysis for one month. While I would agree that it

¹ Energy Information Administration, 2005 Annual Energy Outlook, Table 20, Table 22. Levelized costs of new conventional and renewable generation in two cases, 2010 (2003 cents per kilowatthour), [http://www.eia.doe.gov/oiaf/aeo/pdf/0383\(2005\).pdf](http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2005).pdf)

1 would be beneficial to include additional near-peak hours in the evaluation, I don't
2 believe that PacifiCorp's results are unreasonable. In fact, in the paper authored and cited
3 by Mr. Milligan, he notes that Puget Sound Energy bases its capacity credit on an
4 analysis using its one-month winter peak.³

5
6 I also disagree with Mr. Milligan's recommendation that PacifiCorp erroneously assumes
7 a 20% capacity payment for a 35% on peak capacity factor. In deriving this relationship,
8 PacifiCorp has determined that 1 MW of a wind resource that operates with a 35%
9 capacity factor during on-peak hours will provide the same reliability benefit as .2 MW
10 or 20% of a thermal resource that operates during the same on-peak hours. Thus, it is
11 important to require that wind QFs achieve a 35% on-peak hour capacity factor to receive
12 the 20% capacity payment. This assumption was consistent with calculations performed
13 in the IRP that determined that 1,400 MW of wind capacity would be economic for
14 PacifiCorp's system. For example, in a year in which PacifiCorp needed to add 200 MW
15 of new resources to satisfy its 15% reserve requirement, if 200 MW of wind resources
16 were determined to be economic, then PacifiCorp only valued that capacity to be worth
17 40 MW (.2 * 200 MW). As a result, in its IRP, PacifiCorp still planned for the addition
18 of another 160 MW of thermal resources to satisfy its reserve margin requirement in that
19 year.

² NREL Wind Power Today, 2004 Wind Energy Research Highlights, Page 4,
<http://www.nrel.gov/wind/pdfs/37147.pdf>

³ Milligan & Porter, *Determining the Capacity Value of Wind: A Survey of Methods and Implementation*, to be
presented at Wind Power 2006 Conference, <http://www.nrel.gov/docs/fy05osti/38062.pdf>

1 **Q. DOES MR. MILLIGAN HAVE ANY OTHER CRITICISMS THAT YOU**
2 **DISAGREE WITH?**

3 A. Yes, Mr. Milligan does not appear to realize that if a wind QF generates above a 35%
4 capacity factor, it would be able to receive a capacity payment based on a value greater
5 than 20% of the capacity cost of a CCCT unit. I am sure that Mr. Milligan would be
6 pleased to know that PacifiCorp included this in its avoided cost methodology for wind
7 resources.

8 **Q. DOES THIS CONCLUDE YOUR SUPPLEMENTAL TESTIMONY?**

9 A. Yes, it does.