Comments on PacifiCorp Project Methodology for 2010 Wind Integration Cost Study (May 5, 2010)

Dear Mr. Warnken,

Thank you for providing the additional detail concerning the wind integration study methodology contained in the April 16, 2010 document "Project Method for 2010 Wind Integration Cost Study" and the April 28, 2010 public meeting. The methodology is a great improvement over that use in the 2008 IRP. We do have several concerns with possible double counting in the method and offer the following suggestions to further clarify and improve the methodology.

Synthesizing Data for Future Wind Plants

The NREL WWSIS meso scale wind data set is still the best method for analyzing the integration impacts of future wind facilities and we encourage PacifiCorp to use that data set with time-synchronized loads. The PacifiCorp proposed method of synthesizing data based on time-lagged data from existing wind plants would work if wind always blew from the same direction, at the same speed, and remained coherent over long distances. Since wind does none of these things previous studies have found that time lagged synthesized wind data is not very good. It is very important in any event to represent the geographic dispersion impacts on the wind data correctly. Use of the meso scale data allows for the creation of wind plants of nearly any size by aggregating multiple 30-MW clusters of wind energy. That recognizes the impact of geographic diversity, as the data is built on actual weather data and not just statistical correlation. It is inappropriate to use data from a wind plant of one size to generate data for a wind plant of another size. Synthesizing data for new wind plants in regimes with different capacity factors will be difficult as well.

Given the time constraints and the fact that the NREL meso scale data is not available for the most recent years we recognize that alternative analysis methods will likely be used. We encourage PacifiCorp to verify the method of synthesizing wind plant output data by testing the method on a plant for which there is real data. Pick an existing plant and eliminate its data from the analysis. Synthesize data for the selected plant based on the stated methodology and data from the other plants. Then thoroughly compare the synthesized data with the actual data over time scales from minutes to seasonal and capacity factor.

Calculating Reserve Requirements

Page 2 states that operating reserve requirements "will be calculated seasonally for application in the production cost simulations". The statement on page 6 "The estimation of Regulation and Load Following reserve capacity requirements, and their combination into a single reserve capacity position may be done seasonally, and is discussed in detail below." also raises concerns. Similarly, on pg 13 "Allotting the seasonally calculated reserves differential (under Regulation and Load Following sections above) results in a seasonal or annual schedule of additional spinning and non-spinning operational reserves required for the studied wind penetration level".

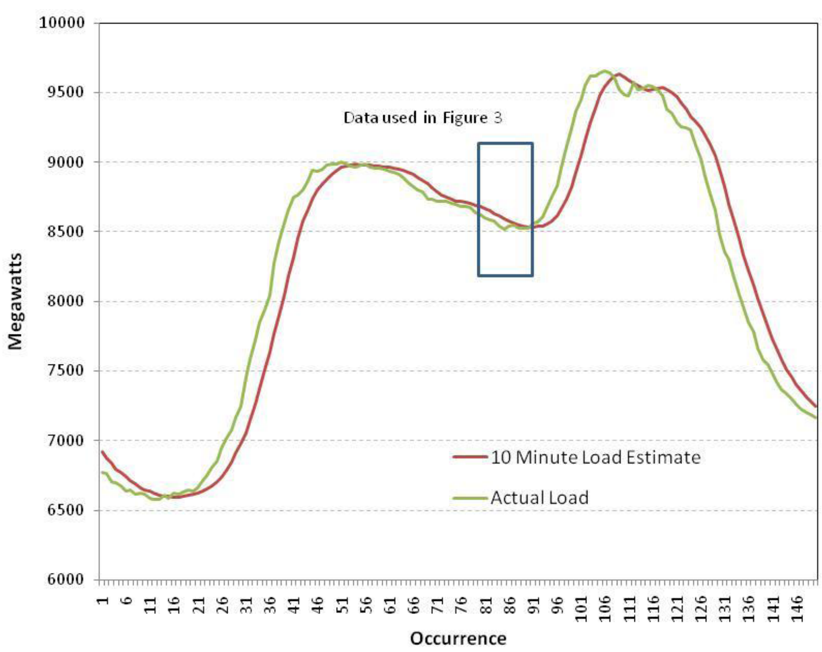
Wind reserve requirements should be determined based on the wind output during the operating day or hour. There is no need to carry additional up reserves when the wind is at full output. Similarly there is no need to carry down reserves when the wind is at zero. Load has a similar characteristic. Down ramping reserves are not required during the morning ramp up and up ramping reserves are not required during the evening ramp down. Applying reserves seasonally will greatly overstate the reserve requirements and result in incorrect production cost calculations.

Combining regulation and load following is inappropriate as well. Load following should be obtained first from the flexibility of the generators on economic dispatch and responsive load rather than from a regulating reserve.

It is also necessary to include the reserves in the unit commitment time frame but release them in the operating time frame so that they are free to respond to the net-load variability and uncertainty. This is different from how contingency reserves and regulation need to be modeled. It is not completely clear from the write-up if this will be done.

Calculating Load Following and Regulation

As we discussed in our previous comments, the use of a rolling average to separate regulation and load following is one we and others have used. It is simple, robust, and appropriate. We are concerned that the method PacifiCorp has chosen, to use the 60 minutes prior to the operating interval, combines both the regulation variability and a persistence-based forecast error.



"Figure 2 A one-day plot of the rolling 60-minute average ten-minute estimate plotted against observed system load."

To calculate the regulation variability burden itself the rolling average should be centered on the actual data. That is, the rolling average should be an average of the 30 minutes before the interval and 30 minutes after the interval. The 20 minute rolling average discussed on page 142 of the EWITS final report, which was used to separate the minute-to-minute variability is centered on the operating interval.

EWITS used a 60 minute rolling average before the operating interval to calculate the wind forecast error, not the variability. Wind forecast error needs to be netted with load forecast error to determine the overall uncertainty that the system must compensate for. Though it would be advantageous to wind to use a persistence forecast, it would be inappropriate to use the same method for load due to the availability of more accurate forecasting techniques. Load forecasts, though not perfect, are typically better than persistence. Both day-ahead and hour-ahead load forecast error needs to be included, however and we are glad to see that Pacificorp appears to be including the load forecast error terms.

Thanks you for your consideration

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