

**Renewable
Northwest
Project**

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Renewable Northwest Project

May 5, 2010

Pete Warnken
PacifiCorp
825 NE Multnomah
Portland, OR 97232

Dear Mr. Warnken,

Renewable Northwest Project (RNP) appreciates the additional opportunity to comment on PacifiCorp's wind integration study methodology after the well-done and informative workshop held on April 28. We would like to reiterate our previous observation that the present study generally represents a great leap forward and is strongly suggestive of the new and well-deserved emphasis PacifiCorp is placing on producing a credible wind integration cost study.

We stand by the previous comments presented, and generally support comments being developed separately by staff of the National Renewable Energy Laboratory and the Pacific Northwest Power and Conservation Council which have graciously provided early drafts of their submissions to RNP for comment.

We would also like to take this opportunity to provide a few additional comments and underscore aspects of previous ones. As we pointed out on April 28, we continue to be concerned about the proposed methodology for developing unavailable ("missing") data. As stated, and outlined at the April 28 workshop, the proposed methodology remains unclear to some extent and appears likely to miss certain important aspects of the data that need to be replicated. We would like to stress that irrespective of the methodology ultimately used, it is vitally important to establish validation criteria that the developed data must pass. At a minimum, we feel the developed data should reasonably reflect observed (or derived from NREL data) correlations among the projects. The distributions of ten-minute to ten-minute and hour-to-hour generation changes should be reasonably close to those at observed projects of similar sizes (nameplate capacity).

Although there are clear limitations to the NREL data set, we strongly recommend mining that data for any information that can inform this process. Examples may include seasonality of wind generation at the site locations, and historical correlations (which may also change seasonally). Given the paucity of data for some sites, leveraging the NREL data where possible makes great sense to us.

We would also recommend an interesting and potentially useful paper regarding using existing wind data to estimate data for correlated wind projects: "Considering wind speed correlation of WECS in reliability

evaluation using the time-shifting technique”, R Billinton, K. Xie, *Electric Power Systems Research*, 79 (2009) 687–693.

It bears repeating that holding all “following” reserves in the model is problematic if the model cannot release them to be dispatched as necessary to meet changes in inter-hour wind/load variability. This is of concern because entering both following and regulation reserves into PaR will likely over estimate the cost of accommodating with wind variability.

As we pointed out in the April 28 workshop, it will be extremely important to bear in mind how the integration costs are expected to be used. For example, it would be inappropriate to add wind integration costs that include costs of holding and dispatching reserves to an IRP PaR model run in which additional reserves are being held out and the wind is represented as an hourly pattern of wind generation.

The potential for confusion around use of the terms “regulation” and “following” that RNP pointed out in our previous comments and in the April 28 workshop appears to exist in the PacifiCorp document itself. In the third paragraph on the first page, regulation is defined (consistent with BPA and others) as variability “...managed *within* ten minute timeframes” (emphasis added). Conversely, on page 6 regulation is defined (for wind) as “variability *among* ten-minute intervals...” (emphasis added) This latter definition is consistent with the ensuing mathematical formulations later in that section. Again, we urge PacifiCorp to be as clear and consistent as possible.

PacifiCorp made clear in the April 28 workshop, its intent on establishing the “regulation” reserve requirements as four-times the standard deviation of ten-minute load-net-wind variability. At the same time, PacifiCorp proposes determining the “following” reserve requirements from specific percentile levels of the distribution for hourly variability. We would like to emphasize that it is more consistent and much clearer if the basis for determining “regulation” reserves is changed to be consistent with the probability-based “following” reserve methodology.

Finally, we note that the proposed methodology for assessing the cost of day-ahead wind forecast error does not appear to be adjusted for other day-ahead forecasting errors. Just as the wind variability needs to be netted against load variability to determine reserve levels, so should wind forecast error be netted against load forecast error in determining additional day-ahead transaction costs. For example, if the day-ahead load forecast is too high, but the wind forecast is too low there will be a lesser effect than examining the wind error in isolation.

Again, we offer these suggestions in the spirit of being as helpful as possible, mindful of the relatively short time available for this relatively ambitious study. Please feel free to consult less formally as needed or appropriate.

Sincerely,

A handwritten signature in blue ink that reads "Ken Dragoon". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Ken Dragoon
Research Director
Renewable Northwest Project