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**MEMORANDUM**

To: Utah Public Service Commission  
From: Division of Public Utilities  
Philip Powlick, Director  
Artie Powell, Manager, Energy Section  
Thomas Brill, Technical Consultant  
Joni Zenger, Technical Consultant  
Subject: In the Matter of the Acknowledgement of PacifiCorp's Integrated Resource Plan,  
Docket No. 09-2035-01.  
Date: May 6, 2010

**ISSUE**

On April 16, 2010, PacifiCorp (Company) sent a Project Method paper to public stakeholders for comments with responses due on May 5, 2010. The Company held a stakeholder meeting on April 28, 2010, where it presented, in a PowerPoint slideshow, its four-step approach that it proposes to use in the project methodology for the 2010 Wind Integration Cost Study. The Division of Public Utilities (Division) submits the following comments on the Company's Project Method paper and PowerPoint presentation to both the Company and the Utah Public Service Commission (Commission).

**BACKGROUND**

The Company held a 2010 Wind Integration Study Public Input Meeting, where it described the Company's proposed Project methodology for its 2010 Wind Integration Cost Study and outlined its updated schedule. Prior to the meeting, on April 16, 2010 the Company sent to stakeholders a Project Method paper to review for comments. The Division appreciates the Company's improved process of provide meeting materials in advance of public meetings, as

we previously had requested. In addition, the Division commends the Company for creating a website and posting parties' comments for review. However, the Division requests that the Company post the individual comments separately as they are filed, rather than summarizing all comments and posting them as one document.

At the Public Input Meeting held on April 28, 2010, which the Division attended, the Company reviewed the updated schedule as well as the project method. The schedule outlined on page 2 of the presentation leaves seven calendar days for comments from the stakeholder meeting, and nineteen calendar days for the Division to comment on the Project Method Paper. Therefore, the Division is only able to provide cursory comments at this time. The Division's final comments on the methodology and results will be filed with the Commission when PacifiCorp files a Wind Integration Study in Utah on August 2, 2010.<sup>1</sup>

## **COMMENTS ON THE PROJECT METHODOLOGY**

The Division appreciates the opportunity to provide input on the Company's proposed project method for the 2010 Wind Integration Study and reminds the Company that in the Commission's 2008 IRP Order, the Commission directed the Company "to address the Division's concerns" in its wind integration study.<sup>2</sup>

### **Method**

As a general concern, the Division has repeatedly requested that data tables be provided in Excel rather in Adobe. In the Company's project paper, again on pp. 8, 9, and 11 for Figures 2, 3, 4, and 5, the exact equations and data tables are not provided; therefore, the Division cannot determine if the method is even being implemented correctly. We request that all data be provided in its original format and if possible provide work papers used in the study. Additionally, several key formulas in the project paper appear to be incorrect. The Division requests that these be corrected and a new version of the Project Paper be made available.

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<sup>1</sup> The Oregon Commission IRP Order directed the Company to complete its Wind Integration Study by August 2, 2010. Order No. 10-166, February 24, 2010, p. 13.

<sup>2</sup> Report and Order, Docket No. 09-2035-01, April 1, 2010, p. 41.

## **Development of Wind Generation Data**

The Division agrees with the Company's project method to use as much real, observed, and concurrent data as possible. The Division is also pleased that the Company has retained The Brattle Group to obtain missing wind data, derive the statistical parameters, and simulate the wind data. However, the Division strongly opposes the derivation method for obtaining wind data for which there is no historical data available. The Division believes that the Company should use anemometer data collected from each site prior to construction and this, with the application of the appropriate power curve and correction from gross to net output, would be more representative of the actual wind data than performing sequential testing through econometric models to develop the data.

However, if the Company continues with this methodology, or there are sites which anemometer data are unavailable, the Company should address a key statistical issue. Starting on about page four, the Company describes its method of populating missing data for its wind plants. The procedure essentially repeatedly estimates a regression model until the parameter estimates of the model converge. This approach or proposed methodology is analogous to the multiple comparisons problem in, among other applications, hypothesis testing or construction of confidence intervals. In general, using the same data to perform multiple or sequential tests is not a good idea because of the effect such procedures have on the overall confidence levels for the final estimates. In short, confidence intervals or significance levels can be very different from what would be expected given a certain experimental design. The Company's paper explaining its proposed methodology to populate the missing wind data makes no mention of this problem and a potential solution. Before moving ahead with the Company's proposed methodology for populating the missing wind data, the Company needs to provide an explanation or proposal on how this problem will be addressed.

The multiple comparison problem is well known, for instance, in Analysis of Variance (ANOVA) comparisons of means from multiple populations. A rejection of the initial null hypothesis that all the means are the same does not indicate which of the means are different. To determine which mean is different requires a series of subsequent tests. However, as indicated

above, simply applying a series of pair wise t-tests will lead to a significance level significantly larger than expected.<sup>3</sup> Therefore, an adjustment must be made to the test to control the significance level. Several available tests, such as Tukey's Honestly Significant Difference or the Kruskal-Wallis test, have been developed preciously to address this problem.

In the Project Paper, especially on page 5, the Company should provide an example or scenario using the Expectation Maximization algorithm described in the paper in order for parties to fully understand the approach. Also, the Expectation Maximization algorithm needs to be defined more clearly. Additionally, the project paper lacks specificity in several key areas that make it difficult for parties to decipher the intent or method the Company will follow in its final study. Therefore, echoing a request that was made at the April 28<sup>th</sup> meeting, the Division recommends that the Company prepare a detailed numerical example of its proposed methodology with formulas and results intact. Since the methodology proposes using the Company's IRP models, which are not easily presented in summary fashion and take considerable time to run, these steps of the numerical example could be discussed with hypothetical results.

### **Calculating Incremental Operating Reserve Requirements**

The Division concurs with comments filed by the Renewables Northwest Project on April 23, 2010, regarding the calculation of wind reserve requirements. Rather than calculating and applying reserves seasonally, wind reserve requirements should be applied based on the wind output.

### **Estimating Load Following Reserve Requirements**

The Company needs to provide more information on the culled bins referenced on pages 10-11. Also, the Company needs to provide the graph of bin analyses in Excel format in order for parties to conduct sensitivity analyses of the example.

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<sup>3</sup> Since the significance level or test size determines the probability of a Type I Error, a larger significance level implies a greater likelihood of rejecting a true null hypothesis.

## **CONCLUSION**

The Division appreciates this opportunity to provide some initial comments at this time and hopes that the Company constructively applies our feedback to the study. The Division's final comments on the overall design and results of the study will be filed with the Commission when PacifiCorp files a Wind Integration Study in Utah.

cc: PacifiCorp IRP Mailbox  
Dave Taylor, Rocky Mountain Power  
Michele Beck, Office of Consumer Services