

2006 Integrated Resource Plan Technical Workshop

Friday, January 13, 2006
12:30 pm – 4:00 pm (Pacific)

Meeting Summary

Idaho	Terri Carlock (ID-PUC), Rick Sterling (ID-PUC)
Oregon	Lisa Schwartz (OPUC), Maury Galbraith (OPUC), Brian Kuehne (PGE), Horace Tso (PGE), Justine Klure (ODOE)
Utah	Don Hendrickson (Energy Strategists), Elizabeth Brereton (DPU), Nancy Kelly (CCS), Andrea Coon (DPU), Ron Slusher (DPU), Glade Sowards (DAQ), Gregory Probst (MWC), Cheryl Murray (CCS), Kelly Francone (Energy Strategists), Sara Baldwin (UCE), Abdinasir Abdulle (DPU)
Washington	Yohannes Mariam (WUTC), Hank McIntosh (WUTC)
Wyoming	Denise Parrish (WY-OCA)
Regional	Ann Gravatt (RNP), Steve Weiss (NVEC), Roger Hamilton (WWW), Natalie McIntire (RNP), Jason Eisendorfer (CUB)
PacifiCorp	<u>In Portland:</u> Greg Duvall, Ken Dragoon, Dan Swan, Stan Williams, Stacey Kusters, Chuck Gilfof, Matt Ruckwardt, Terri Ikeda, Virinder Singh, Thompson Dina, <u>In Utah:</u> Pete Warnken, Dan Peterson

Renewable Workshop Objectives and Overview

Ken Dragoon of PacifiCorp facilitated this technical workshop on renewables. Objectives for this technical session were to outline proposed renewable resource analysis plan for the 2006 IRP. The other objective was to create and open work session to take questions and comments on the proposed methodology. The proposed renewable resource analysis plan will update and revise methodologies for computing wind resource incremental reserve requirements, system balancing costs, capacity contribution, and develop a supply curve for input to the Capacity Expansion Module (CEM).

General Comments

PacifiCorp proposed to continue using wind resources as a proxy for all renewable resources due to the availability of wind resources, and the generally low cost relative to other renewable resources. Availability of data has increased and will be used along with available data from the National Renewable Energy Laboratory (NREL) to refine the analysis. PacifiCorp does not have data from Utah sites, though some NREL data is available. PacifiCorp will revisit Green Tag value. Available historical data will be used to find correlations among sites and to leverage information from increased wind generation on our system. Nancy Kelly asked whether both large scale and small distributed

solar resources would be represented in the supply table. Ken Dragoon, replied that both would be represented in the supply tables, though probably not run through CEM due to the relatively high costs of solar.

Incremental Reserve Requirements

Ken Dragoon indicated that data from representative wind sites for which we have hourly data would be used wherever possible in the analyses. A new method for determining incremental reserve requirements based on the uncertainty of hour-to-hour load changes was introduced. The new method is consistent with efforts underway by PacifiCorp to quantify load following reserves generally. The methodology compares the forecast hour-to-hour change in load with the actual, to assess the incremental amount of regulating (spinning) reserve needed. The same methodology is employed, counting wind generation as a negative load, to evaluate reserve requirements with various levels of wind is added to the system. PacifiCorp will also examine whether the needed level of reserve requirements are likely to affect resource decisions.

System Balancing

It was recognized in the 2003 IRP that the variability of wind resources cause overall system dispatch costs to increase when compared to more constant-output resources. This system balancing cost surrounding was discussed. System balancing costs are computed internal to the model, and no change to that methodology is proposed.

Some critiques of the 2003 methodology pointed out that there may be additional costs associated with the perfect foreknowledge built into the dispatch model. It is proposed that those additional potential costs may be represented as potential errors in day-ahead natural gas nominations due to mis-forecasting load and wind.

Wind penetration levels will be assessed using the CEM model. There will be no explicit system balancing cost component as the model incorporates those costs internally.

PacifiCorp suggested it might not explicitly value the system balancing costs because of criticism in the past that wind should not be compared against flat contracts as was done in 2003. It was acknowledged that some methodology may be necessary in order to value the economics of proposed plants outside of the IRP model.

Capacity Contribution Analysis

PacifiCorp proposed to use a variety of sites, and various collections of sites, to get a range of capacity contributions. Capacity contribution will be derived from a peak load carrying capability (PLCC) method based on maintaining a constant loss of load probability. The proposed “Z-method” provides a quick method of assessing PLCC necessary to do this work. The Z-method was discussed later in the meeting due to the details of how it is calculated.

Green Tag Valuation

PacifiCorp proposed to revisit the value of green tags by observing the market value of tags in states where renewable portfolio standards have been adopted. An assessment will be made regarding the likelihood of RPS standards in the states PacifiCorp serves, and those in the immediate vicinity.

There was general agreement that this was a reasonable approach, though there was discussion of the applicability of green tag values where the available resource varied considerably from that in the PacifiCorp states.

Modeling Renewables

PacifiCorp plans to develop a supply curve of representative wind sites using cost-to-build and transmission costs information along with historical or quasi-historical wind data¹. The CEM tool will then be used to evaluate the representative wind resources on the same basis as other generating resources in the modeling plan. The 1,400 MW target will be reassessed with the new methodology. PacifiCorp was asked whether documentation for the CEM model was available.

The value of Green Tags will be taken into account, along with the costs associated with incremental reserve requirements.

This concluded the first part of the workshop and the remainder of the workshop was spent discussing the Z-Statistic Method that was initiated on slide 10 of the presentation.

Z-Statistic Method for Estimating Resource Peak Load Carrying Capability

This secondary presentation provided details surrounding a method to determine Peak Load Carrying Capability in a paper submitted to IEEE by Ken Dragoon and Victor Dvortsov. Ken developed this short presentation to provide a better understanding of the method and paper.

Time was spent explaining slide 2 which shows a representative probability distribution of On-Peak Surplus Capacity. The main features of the graph are an expected surplus, and standard deviation of the surplus around the mean value. The Z-statistic is formed as the ratio of the surplus to the standard deviation. The Z-statistic represents how high the expected (average) surplus is in terms of the number of standard deviations it is above zero. Ken stressed this is 90% of what we will look at during this presentation.

The curve could represent a historical view of how peak surpluses vary. The Z-statistic is an indication of the reliability of the system and the shaded area is the Loss of Load Probability (LOLP). The curve may or may not look like the one on the slide, but the Central Limit Theorem suggests that for a system composed of a very large number of random elements (e.g., loads and resources) that the curve will approach a normal bell curve.

It was pointed out that adding peak load moves the curve left, increasing LOLP. Adding generation moves it to the right. Adding the same amount of expected peak load and generation would bring the system back to where it started except that the curve ends up being flattened and thus increasing LOLP. To keep from increasing LOLP, the system must become more surplus than before the load and resource were added. One way to estimate that increased amount of surplus is to require the Z-

¹ Quasi-historical wind data was defined as historical wind speed data taken from specific sites that is converted to hourly generation as though a wind project were in place during that historical period.

statistic (a measure of reliability) to remain unchanged. Mathematically, this results in an equation that ultimately shows the effective load carrying capability of the added resource.

Some concern was expressed that the on-peak hours should represent more than the single peak hour, or even summer hours—that winter peak hours be included as well. It was further suggested that the number of hours be selected based on computing the LOLP for each hour of the year. PacifiCorp responded that it may not be possible to evaluate LOLP for all the hours of the year.

Next Steps

PacifiCorp's next Technical Workshop Meetings are scheduled for January 24 (Load Forecasting) and February 10th (Demand Side Management).