Hertz, Judi

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To: Baugh, Zenobia
Cc: Carl Huppert
Subject: Comment on document 2007-22

Your draft paper entitled "Issues for the Sixth Power Plant" discusses a number of matters you think it will be important to address in the next power plan cycle. As you know, Global Energy Decisions (aka Henwood) deals with many of these issues in its independent forecast of WECC Power Markets. Regarding wind volatility, we provide the following thoughts to you:

A) There are two aspects of the wind volatility matter as follows:

1) Hourly wind shapes that are reasonably forecast one day in advance. While one would love to have a flexible hydro system to accommodate this hourly volatility, many parts of the world accommodate this volatility with thermal based resources. This volatility is not much different than retail load demand that varies hourly. We have evaluated this kind of wind volatility with our models by performing hourly dispatch analysis, showing the limits on hydro unit minimum and max, etc. When the wind resource in the portfolio gets so large that the hydro can not be used to compensate for the day ahead schedules of hourly wind, then the model automatically uses the flexibility of other resources (typically gas fired resources) to allow integration of the wind. The model can tell us when the hydro is no longer sufficient and how much it costs when gas fired resources need to be used.

2) The other wind volatility matter relates to the variation of (a) real time actual wind patterns from (b) day-ahead forecast hourly wind patterns. This matter is not unlike the need to accommodate real time retail loads that vary from day-ahead hourly forecast loads. This additional uncertainty may or may not need to be accommodated by requiring a higher level of regulating reserve. If the additional wind volatility works in opposite to load volatility, then regulating reserves may not need to be increased. If additional wind volatility works as a further increase in uncertainty in moment to moment resource needs, the regulating reserves need to be increased. If research shows the regulating reserve requirement will need to go up with more wind, then the models can be run with the increased regulating reserve requirement. Operating costs for providing these additional regulating reserves is reported from the model because the model is performing hourly chronological economic dispatch, to meet the combined load and operating (contingency and regulating) reserve requirement.

B) In addition to modeling deterministic hourly wind patterns and including higher regulating reserve requirements, it is often desirable to reflect the day to day wind volatility in the modeling. In other words, the modeling in (A) above assumes a single "deterministic" input assumption on each day's forecast of the hourly wind pattern on the next day. However, we know that on any day the next day's wind forecast can vary significantly depending on weather conditions. We have also developed the modeling capability to capture this varying weather impact on day-ahead wind pattern forecasts and to determine the economic consequences of these variations. We do this by running 100 or more iterations of each year with Monte-Carlo draws on the daily wind patterns (being sure the Monte-Carlo draws reasonably reflect day to day wind changes). This methodology can also be used to determine the Resource Adequacy contribution of the wind resource. ERCOT has recently engaged us to perform such a study for TEXAS.

Carl Huppert and I would be happy to discuss our modeling approaches to these matters if you are interested.

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