OTTER TAIL POWER COMPANY
Docket No: EL10-011

Response to: Otter Tail Power Company
Analyst: Bryan D. Morlock
Date Received: 02/25/2011
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Responding Witness:

Question No. : SD-OTP-06

On page 6 of your testimony (lines 4-17) you state that Otter Tail's modeling of wind in its IRP was not reasonable. On page 6, lines 34-35 you state "No other utility that I am aware of makes the faulty assumption that wind is fully predictable or reliable." Please provide documents that show how other utilities treat wind in their IRP modeling. Provide information for every IRP that you are familiar with that models wind in their IRP.

RESPONSE:

Attachment 1 to SD-OTP-06 - MDU 2009 IRP:

See page 24, where MDU states as follows:

In addition to the Diamond Willow and Cedar Hills wind farms, generic wind generation was also allowed to compete with other future resource options. Wind is characterized as having high installation costs, but very low energy costs, since there is no cost for the fuel (wind), only operating and maintenance costs. Also, a $20/MWh (after tax) Production Tax Credit, which was modeled as a negative variable O&M, was assumed to be in effect for wind generation until 2012. **However, the disadvantage of wind is that it is an intermittent resource because of its variability. Therefore, the installation of wind requires other additional resource to produce energy during times of less than desirable wind conditions.**

Attachment 2 to SD-OTP-06 - Idaho Power 2006 IRP:

On page 45, Idaho Power states the following:

Without federal tax incentives, RPSs, a carbon adder or high gas prices , it may be several years before wind generation can consistently compete economically with other generation alternatives.

On page 49, Idaho Power lists the disadvantages of wind power, including the statement that wind is an "Intermittent and non-dispatchable resource".

Attachment 3 to SD-OTP-06 - Avista 2007 IRP:

On page 6-16, Avista states:

Wind is one of the most volatile energy resources available to utilities. Since storage, apart from some integration with hydro, is not a financially viable option, capturing the resource's volatility in the power supply model is necessary to correctly determine its impacts on the overall market as well as the value of any acquisition.

On page 7-16, Avista states:

Recent studies confirm that wind generation consumes increasing amounts of generation flexibility. They show that wind integration costs range from $2 to $10 per MWh.

Attachment 4 to SD-OTP-06 - Black Hills Power 2007 IRP:

On page 33, Black Hills states:

Biomass and wind are technologically mature although the primary drivers for wind technology development remain the federal production tax credits and renewable portfolio standards enacted by states.

On page 26, Black Hills states:

Although wind energy resources often present regulating challenges to utility operators, BHC will rely on WAPA to regulate new wind generation, therefore, no regulating constraints were captured or modeled in the course of conducting this IRP.

Attachment 5 to SD-OTP-06 - Duke Energy Carolinas 2007 IRP:

The publicly available portion of this IRP does not discuss the modeling of wind facilities.

Attachment 6 to SD-OTP-06 - PacifiCorp 2007 IRP:

On page 200 of Appendix J, PacifiCorp states:

As the company installs larger volumes of wind resource generation, the cost to integrate these intermittent resources is anticipated to increase. This is because more non-wind resources must be held back to allow flexibility to follow the intra-hour volatility of the wind generation. Resources with the greatest dispatch flexibility that are not already in use to serve load are typically used for integration. The hour to hour dispatch of non-wind resources is not a trivial decision. The company's owned hydro plants with storage capability and the Mid-Columbia hydro contracts, all of which have the highest flexibility, can often provide the needed flexibility. However, these hydro resources

do not have enough volume to integrate all of the anticipated wind variability. Partially loaded gas turbines can provide additional flexibility. Due to its low cost, coal is normally fully utilized to serve load rather than backed off to provide wind integration. It is flexible resources that are operating on the margin that influence the cost of wind integration. When evaluating the effect of the fuel type of resource additions on PacifiCorp's cost to integrate wind resources, it is most likely that the IRP natural gas-fired additions will have the most effect on integration costs.

Attachment 7 to SD-OTP-06 - Progress Energy Carolinas 2007 IRP:

On page 8, Progress Energy Carolinas states:

Wind projects have high fixed costs but essentially no operating costs. Therefore, at high enough capacity factors they could become economically competitive with the conventional technologies identified. However, geographic and atmospheric characteristics affect the ability of wind projects to achieve those capacity factors. Wind projects must be constructed in areas with high average wind speed. In general, wind resources in North Carolina are concentrated in two regions. The first is along the Atlantic coast and barrier islands. The second area is the higher ridge crests in western North Carolina. Because wind is not dispatchable and provides little or no capacity value, it may not be suited to provide consistent capacity at the time of the system peak. Offshore wind power, an emerging technology, may provide greater potential for North Carolina in the future. North Carolina benefits from offshore wind and shallow water that is less than 30 meters deep within 50 nautical miles of shore. Once the technology is developed and the regulatory process is established, this untapped energy source may contribute capacity and energy production for North Carolina. PEC will continue to monitor the progress and the cost effectiveness of this technology.

Attachment 8 to SD-OTP-06 - Santee Cooper 2004 IRP:

Santee Cooper did not consider wind facilities in this IRP.

Attachment 9 to SD-OTP-06 - Idaho Power 2009 IRP:

Idaho Power states on page 67 as follows:

Several CCCT plants, including Idaho Power's Langley Gulch project, are planned in the region due to recently declining natural gas prices, the need for baseload energy, and additional operating reserves needed to integrate wind resources.

Idaho Power lists one of the disadvantages of wind power as being an "intermittent and non-dispatchable resource" on page 70.

Attachment 10 to SD-OTP-06 – Holy Cross 2007 IRP:

Holy Cross does not discuss the modeling of wind resources in this IRP.

Attachment 11 to SD-OTP-06 – Minnesota Power 2010 Resource Plan:

On page 7, Minnesota Power lists as one of their planned components the following:

> Addressing the emerging issues associated with expanded renewable use and a carbon-constrained environment. These issues include wind integration, required transmission infrastructure and a shift toward non-traditional dispatch to meet customer energy requirements. This shift will at times prioritize the use of renewable resources over fossil fuel resources to meet renewable energy and carbon reduction objectives.

Attachment 12 to SD-OTP-06 – Kansas City Board of Public Utilities 2005 IRP:

On page 15, in discussing the evaluation of a purchase of wind energy, the Company states:

> There are many benefits to this purchase even though the cost is currently higher than the cost of power if it were generated by traditional resources.

Attachment 13 to SD-OTP-06 – MEAN 2007 2005 IRP:

MEAN does not discuss the modeling of wind in this IRP.

Attachment 14 to SD-OTP-06 – Georgia Power 2010 IRP:

On Page 16-16, Georgia Power states the following:

> Available wind resources in the southeastern U.S. are not adequate to support significant utility scale use of this technology. Advanced wind turbines that can utilize lower wind speeds could increase potential.