APPLICANTS' EXHIBIT 51

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

CASE NO. EL05-022

IN THE MATTER OF THE APPLICATION BY OTTER TAIL POWER COMPANY

ON BEHALF OF THE BIG STONE II CO-OWNERS

FOR AN ENERGY CONVERSION FACILITY SITING PERMIT FOR THE

CONSTRUCTION OF THE BIG STONE II PROJECT

PREFILED REBUTTAL TESTIMONY

OF

JEFFREY J. GREIG

VICE PRESIDENT AND GENERAL MANAGER
BUSINESS & TECHNOLOGY SERVICES DIVISION

BURNS & MCDONNELL ENGINEERING COMPANY

JUNE 16, 2006

3516

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

PREFILED REBUTTAL TESTIMONY OF JEFFREY J. GREIG

Q: Please state your name and occupation.

A: My name is Jeffrey J. Greig, Vice President and General Manager of Burns & McDonnell's Business & Technology Services Division.

Q: Did you provide direct testimony in this proceeding?

A: Yes, Applicants' Exhibit 23.

Q: In rebuttal, to whose direct testimony are you responding?

A: I am responding to the May 26 testimony of Mr. David Schlissel and Ms. Anna Sommer of Synapse Energy Economics, Inc.

Q: What issues do you address in your rebuttal testimony?

A: The purpose of my testimony is to clarify the record regarding the report I prepared entitled *Analysis of Baseload Generation Alternatives* Applicants' Exhibit 23-A, and to respond to the misperceptions reported by Mr. David Schlissel and Ms. Anna Sommer.

Q: What was the purpose of the Analysis of Baseload Generation Alternatives study?

A: The purpose of study was to compare alternative baseload generation technologies capable of providing up to 600 MW of reliable, dispatchable capacity and energy to meet baseload requirements. Mr. Schlissel and Ms. Sommer seem to imply that the Applicants relied on the study as justification for participating in the Big Stone Unit II plant in the absence of prudent and appropriate utility resource planning. Neither the Applicants nor Burns & McDonnell have ever portrayed the evaluations presented in the *Analysis of Baseload*

Generation Alternatives as a comprehensive assessment of need or an integrated evaluation of supply and demand-side alternatives.

The evaluation compares baseload generation alternatives only and demonstrates that a 600 MW supercritical pulverized coal (PC) plant is a least-cost generation alternative for the Big Stone station site on a life-cycle basis considering capital and operating costs compared to numerous other baseload generation alternatives. This conclusion did not change when a carbon tax of $3.64/ton of CO_2 (2005$) was assumed, which is the high-end CO_2 externality value the Minnesota Public Utilities Commission requires utilities to use in assessing resources located within the state of Minnesota.

Q: Mr. Schlissel and Ms. Sommer claim that the economic analysis presented in the *Analysis of Baseload Generation Alternatives* is critically flawed. How do you respond?

A: Schlissel and Sommer's main criticism of our study is that, in their view, Burns & McDonnell assumes that wind requires 100 percent backup. They claim that wind should be assigned a capacity value and that, by doing so, the amount of natural gas-fired power "backing up" the wind resource can be reduced. See their May 26 testimony, pages 11-14.

However, the study never claimed that wind requires 100 percent backup. For the 600 MW combined cycle gas turbine (CCGT) project plus 600 MW wind case set forth in the study, the 600 MW CCGT plant is the baseload alternative being compared to the 600 MW PC plant. Both are reliable, dispatchable generation resources that can be operated to meet baseload capacity and energy requirements. The wind component was added to the CCGT project alternative to enhance its economic performance by displacing higher cost gas-fired energy production with non-firm wind energy when available. The evaluation was focused on

comparing baseload project alternatives, not developing combinations of resources on a system basis as a substitute for utility resource planning efforts. This was previously explained in the Applicant's response to Question 69 of the Sixth Set of Interrogatories and is explained further in Bryan Morlock's Rebuttal Testimony, Applicants' Exhibit 42.

Q: What are the results of the *Analysis of Baseload Generation Alternatives* if the CCGT project size is decreased to reflect an assumed capacity value for a 600 MW wind plant?

A: For the reasons just stated, and as further discussed in the rebuttal testimony of Bryan Morlock, I do not think it is appropriate, for purposes of the *Analysis of Baseload Generation Alternatives* study, to reduce the size of the assumed 600 MW gas plant to reflect the fact that wind has a capacity value. Wind is not a baseload resource. Gas is generally not a baseload resource, but can be operated in that fashion and we assumed in our comparison of a wind-gas alternative to Big Stone Unit II that a gas-fired CCGT was the baseload resource. Accordingly, if we were to reduce the size of the CCGT to something under 600 MW, we no longer have 600 MW of baseload power.

However, even if we were to modify the analysis to reduce the size of the natural gas plant, there is no change in our overall conclusion that Big Stone Unit II is the Applicant's lowest cost baseload resource by a wide margin. I modified our analysis by reducing the size of the CCGT project from 600 MW to 510 MW. This reflects the assumption that a dedicated 600 wind farm would have a 15% capacity value, or 90 MW. As stated in Bryan Morlock's testimony, Schlissel and Sommer's statement that a wind development might receive a 25% capacity value is not supported. All other assumptions remained the same. Table 1 presents the net present value by which the wind-gas alternative exceeds Big Stone Unit II.

Table 1
Net Present Value Busbar Cost (millions)

Resource Alternative	Combined [2] B&McD Cases: No CO_2	Combined [2] B&McD Cases: PUC High CO_2 [1]
Coal 600 MW	**$2,452**	**$2,686**
600 MW Wind + 600 MW CCGT - NO PTC	**$3,425**	**$3,483**
600 MW Wind + 510 MW CCGT - NO PTC	**$3,357**	**$3,414**
600 MW Wind + 600 MW CCGT - WITH PTC	**$3,163**	**$3,221**
600 MW Wind + 510 MW CCGT - WITH PTC	**$3,095**	**$3,153**

Notes:
[1] PUC High CO_2 Case is based on a $3.64/ton carbon tax in 2005 and escalated at 2.5%. Results in a 2005 levelized cost of $4.50/ton in 2005$.
[2] Investor owned and public power NPV results combined 38.67%/61.33% based on respective ownership shares.

If the PTC is not extended, forcing the Applicants to implement a gas-fired CCGT project with wind resources for baseload capacity and energy could result in a direct cost impact of approximately $905 million to $973 million for the ratepayers, plus further expose them to volatile natural gas prices, in order to mitigate the possibility of a future carbon tax on Big Stone Unit II. Even assuming the high end of the approved Minnesota PUC CO_2 externality value of $3.64/ton (2005$) was established by 2011 at the federal or state level as a direct cost and applied to every ton of CO_2 emitted from Big Stone Unit II, an additional direct cost impact of approximately $728 million to $797 million could apply to the ratepayers if the Applicants are forced to implement a gas-fired CCGT project with wind resources for baseload capacity and

energy. Even further assuming that the PTC is extended, the direct cost impacts could still total in the hundreds of millions of dollars.

Q: What is your response to the claim by Mr. Schlissel and Ms. Sommer that the value of the PTC is understated at $12/MWh?

A: Actually, we agree with this statement. In our internal pro forma analyses, we estimate a value of approximately $22/MWh, which is consistent with the studies referenced by Mr. Schlissel and Ms. Sommer. We had reflected a cost of wind of $50/MWh in the absence of the PTC in an effort to be more than fair in our assumptions regarding how the wind energy market may react in the future to the expiration of the tax credit. However, if Mr. Schlissel and Ms. Sommer were trying to create the impression that $22/MWh (or something higher) should be subtracted from the $50/MWh estimate to arrive at a cost of $28/MWh (or something lower) for wind energy in 2011 assuming the PTC is extended in current form, that would be a misleading position. A more realistic assumption is that the expiration of the PTC will result in an additional cost of $22/MWh (or something higher) to our current estimate of wind cost with the PTC of $38/MWh for a resulting cost of $60/MWh. This would further decrease the economics of a CCGT plus wind case.

Q: Do you think that Mr. Schlissel and Ms. Sommer have adequately justified the amount of wind resource they use in their wind-gas scenarios?

A: Tables 1 and 2 on page 17 of their May 26, 2006 testimony assume wind-gas scenarios including 800 MW and 1200 MW of wind capacity. These scenarios also include concomitantly large amounts of wind energy. For instance, in their 1200 MW wind scenario, 91% of the energy

from the combined wind-gas alternative would be produced by wind. See their May 26 testimony, page 14, line 3.

Mr. Morlock addresses this issue in detail in his rebuttal testimony, but I also have several issues with these amounts of wind energy and capacity. First, as noted, the *Analysis of Baseload Generation Alternatives* was not developed to be a substitute for each Applicant's resource planning efforts to evaluate different mixes of supply and demand-side alternatives.

Second, the *Analysis of Baseload Generation Alternatives* was prepared on a busbar cost basis. This is a reasonable approach if transmission impacts between the alternatives under consideration are relatively similar. Each of the baseload generation alternatives considered by the Burns & McDonnell study was developed to supply up to 600 MW of baseload capacity and energy. For the 600 MW CCGT plus wind case, the wind component was assumed to be non-firm purchases. Thus, the Burns & McDonnell wind-gas scenario, like the other baseload scenarios we considered, requires 600 MW of transmission. In contrast, it is not appropriate for Mr. Schlissel and Ms. Sommer to argue that 800 MW or 1200 MW of wind should be combined with 300 MW to 480 MW of CCGT while not addressing the transmission system impacts to accommodate up to 1620 MW of resources compared to 600 MW of resources.

Third, if Mr. Schlissel and Ms. Sommer believe that greater and greater amounts of wind can be added to the system, relied on every day as accredited capacity to meet the load serving needs of utilities including critical loads, and can be integrated with relatively no incremental operating or additional transmission cost impacts other than busbar costs, then I am not sure why they propose adding any gas-fired CCGT capacity. In the case entitled alternative four consisting of 1200 MW of wind and 300 MW of CCGT, the CCGT is only used for 402,000

MWh of energy per year at a very high cost. The logical extension of this proposal is that a lower cost case could have been developed if all capacity and energy needs were met with increasing amounts of wind. I do not believe this represents a prudent approach to meeting baseload capacity requirements.

Q: Does this complete your rebuttal testimony?

A: Yes.