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

LARRY ANDERSON
SENIOR PLANNER/ECONOMIST
SOUTHERN MINNESOTA MUNICIPAL POWER AGENCY

JUNE 16, 2006

TESTIMONY OF

TABLE OF CONTENTS

BEFORE THE SOUTH DAKOTAPUBLIC UTILITIES COMMISSION

DIRECT REBUTTALTESTIMONY OF

LARRY ANDERSON

I. INTRODUCTION

Q: Please state your name and business address.

A: Larry Anderson, 500 First Avenue, Rochester, Minnesota 55902.

Q: Did you previously submit testimony in this proceeding?

A: Yes. I submitted direct testimony, Applicants' Exhibit 13.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q: What is the purpose of your testimony?

A: I will respond on behalf of Southern Minnesota Municipal Power Agency (SMMPA) to the May 26, 2006, testimony of Minnesota Center for Environmental Advocacy (MCEA) witnesses Schlissel and Sommer questioning SMMPA's need for baseload capacity, capacity surpluses and various resource planning issues.

Q: Please summarize your testimony.

A: SMMPA has need for the additional baseload capacity and energy that Big Stone Unit II is designed to provide. SMMPA has performed detailed resource planning studies that demonstrate this need. In addition, SMMPA also has plans for significant increases in demand-side management (DSM) and renewables, in concert with Big Stone Unit II and other developments.

III. NEED FOR AND TIMING OF BASELOAD CAPACITY

Q: At pages 3 to 4 of their May 26 testimony, MCEA witnesses Schlissel and Sommer state that the SMMPA and other Applicants do not need additional baseload capacity in 2011. Do you agree?

A: No.

Q: How does SMMPA know it needs baseload capacity, rather than other sources?

A: SMMPA has performed detailed system studies to examine their future energy resource needs. These studies, which I will describe later in my rebuttal testimony, show the need for Big Stone Unit II's baseload capacity starting in 2011, along with other resources including demand-side management (DSM) and renewables.

Q: On page 20, line 23, MCEA witness Schlissel and Sommer say that none of the Applicants considered additional demand-side management efforts in place of Big Stone II. Do you agree?

A: No. Demand side management (DSM) is included in SMMPA's Integrated Resource Planning process. On page 6 and 7 of my direct testimony I explain SMMPA's DSM efforts.

Q: What do you conclude regarding DSM efforts?

A: The SMMPA has already included a substantial amount of DSM in its plans. These are efforts that MCEA witnesses Schlissel and Sommer have neglected to mention or acknowledge in their testimony.

Q: Is SMMPA subject to the Minnesota Renewable Energy Objective (REO)?

A: Yes.

Q: What does the REO require SMMPA to accomplish?

A: SMMPA must demonstrate "good faith efforts" to supply at least 10% of their retail sales in Minnesota using qualifying renewable energy sources.

Q: Is SMMPA's progress toward the REO reviewed by the state of Minnesota?

A: Yes, it is reviewed in detail by the Minnesota Department of Commerce.

Q: Describe SMMPA's efforts in complying with the REO.

A: SMMPA has developed a portfolio strategy for meeting the targets established with the REO. That strategy envisions multiple ownership structures including: (1) SMMPA-owned, small renewable projects connected to member utility distribution systems, where feasible; (2) SMMPA equity ownership (along with other owners) in larger projects when available; (3) Power Purchase Agreements (PPA's) for both the renewable energy and the green attributes associated with those projects; (4) Community Based Energy Development (C-BED) projects; and (5) Tradable Renewable Credits (TRC's). The strategy also envisions a mix of technologies including wind, biogas, a small hydro, and municipal solid waste-to-energy.

IV. RESOURCE PLANNING

Q: Do you agree with MCEA witness Schlissel and Sommer testimony on page 23 which implies that SMMPA failed to consider alternatives to Big Stone Unit II?

A: No. As described in my direct testimony on page 3, SMMPA considered a range of alternatives through its resource planning process, including through its capacity expansion modeling.

Q: What is capacity expansion modeling?

A: In general terms, capacity expansion modeling is an analytical process where resource planners use system optimization software tools to assist them in developing least-cost resource

plans. There are a number of different software models available to do this process, but most of them operate on similar principles.

Operating parameters and associated costs of various demand-side and supply-side resources, along with other assumptions, are input to the model. The model typically then performs multiple iterations of cost calculations, using varying mixes of the demand-side and supply-side options available to it, and calculating the total cost outcome resulting from each mix of options. Through this process, the planners determine the relative cost of each plan compared to others.

SMMPA uses the EGEAS optimization software model for its expansion planning studies for filing its IRP with the Minnesota PUC. SMMPA uses EGEAS's present worth of revenue requirements objective function in developing the least-cost IRP.

In short, EGEAS uses a peak and energy forecast, viable power supply resources, and viable demand-side resources and integrates them to develop a least-cost capacity plan or plans that SMMPA can use to plan for its future resources to meet its customers demands.

Q: Does the capacity expansion planning computer software always provide the optimum answer?

A: No. The software is a tool in the process, but is not the entire answer. While it is useful, the resource planner must always apply good, expert and experienced judgment to the model's results when selecting a plan to recommend.

Q: How long has SMMPA been using capacity expansion modeling?

A: In SMMPA's initial IRP's, we used a resource planning tool known as Production Simulation Program (PSIM) developed by Power Technologies, Inc. While PSIM could

incorporate the DSM modeling from our DSM model (Comprehensive Market Planning and Analysis System - COMPASS®), its integration capabilities were limited. To overcome this limitation, SMMPA acquired EGEAS (described earlier) from Stone & Webster. While too late to be used in the development of SMMPA's 1997 filing, this capacity expansion modeling process has been used starting in 1998, and was the basis for the SMMPA 2000 and 2003 IRP approved by the Minnesota PUC.

Q: Please describe the results of the capacity expansion modeling undertaken by SMMPA.

A: Our capacity expansion modeling, and the Minnesota PUC's review and approval of it, started with our preparations for our 2000 Integrated Resource Plan (IRP) that we filed on July 1, 2000. SMMPA's current IRP was filed on July 1. 2003, and the Minnesota PUC subsequently approved our 2003 IRP in April of 2004.

As presented in the Base Case of our 2003 IRP (See Table VII-15 under Plan Development, Page VII-28 of SMMPA's 2003 IRP, attached as Exhibit 45-A) our Preferred Plan, which was developed using capacity expansion planning modeling, included:

- All four DSM Programs considered.
- 16 Groups of Wind Turbines (in groups of 3.8 MW of nameplate capacity each) to be installed to comply with 100% of our REO.
- 3 Landfill Gas additions (in groups of 2.4 MW each).
- 3 Peaking Purchases (in groups of 12 MW each).
- One natural gas-fired, combined-cycle unit (53 MW) installed in 2008, and;
- One Pulverized Coal Unit (53 M\W) installed in 2013.

Of particular interest to the current Big Stone Unit II discussion are the planning sensitivity scenarios that were also performed as part of the 2003 IRP. These sensitivity scenarios, included in the same Resource Plan approved by the Minnesota PUC, were also performed using the EGEAS capacity expansion model.

Q: What did these additional planning scenarios performed as part of SMMPA's approved 2003 IRP determine?

A: One of the attributes of the EGEAS capacity expansion modeling approach is the model's ability to readily conduct scenario analysis. In addition to the Base Case optimization in the 2003 IRP, ten additional scenario analyses were conducted. These additional scenarios considered sensitivities of the plan to changing assumptions such as potential changes in the load forecast, changes in capital costs, high and low externality costs and changes in natural gas prices. This kind of scenario analysis not only helps demonstrate the robustness of the identified plan, but also helps the utility understand and anticipate scenarios which do not appear to be the most likely at the time, but could occur. This is a good example of my earlier statement that a computer model alone does provide the answers. The model needs the thoughtful judgment of the planner to develop useful results.

SMMPA's 2003 IRP was a classic example of how important scenario analysis can be. In addition to the Base Case, SMMPA modeled ten additional cases, a summary of which is included as Applicants' Exhibit 45-A. A number of these sensitivity cases demonstrate how sensitive SMMPA's system needs are to the price of natural gas. For example, for the following paired scenarios with the same combination of assumptions, with only gas prices being varied:

- Consider Cases 1 and 2 - In Case 2, with Base natural gas prices, the model selected two-53 MW gas-fired combined-cycle units in 2008 and 2013. However, in Case 1 with high

natural gas prices, the model continued to choose one combined cycle unit, but switched the 2013 unit to 53 MW pulverized coal unit, with an additional coal unit being added in 2018.

- Cases 3 and 4 - Similarly, in Case 4 with Base natural gas prices, the model selected three natural gas-fired units in 2008, 2013 and 2018. However, in Case 3 the model chose three pulverized coal additions instead in those same years.

- Cases 5 and 6 - In Case 6 with Base natural gas prices, the model selected a single gas-fired unit in 2008 and a pulverized coal unit in 2014. In Case 5, the model chose pulverized coal additions in 2008 and 2013, and no gas-fired units.

- Cases 7 and 8 - Similar to the previous comparisons, high gas prices resulted in the selection of additional pulverized coal units.

These results are not surprising, given SMMPA's load shape and the resulting need for additional baseload energy. Exhibit 45-B shows how SMMPA's load duration curve has changed and is projected to change to 2020. The shaded horizontal bar in the exhibit sits on top of SMMPA's baseload resource (Sherco 3) and approximates the size of the 53 MW facility modeled in our IRP. Currently, that resource would have to operate over 2,000 hours, as shown by the intersection of the shaded bar and the 2005 load curve. By 2010, that facility would have to operate over 4,000 hours. While natural gas units are relatively inexpensive to construct, they are not designed to operate economically at such high capacity factors.

The high natural gas scenarios described above modeled natural gas at $5.00 per MMBtu. The Base Case natural gas price was $3.01 per MMBtu.

Q: Why is this relevant?

A: This simply means at natural gas prices at or higher than $5.00/MMBtu, natural gas-fired alternatives become uneconomic. Our price forecasts for natural gas (from the U.S. Department of Energy) place natural gas at over $7/MMBtu in 2006. While that forecast projects some slight decreases in the next several years, the forecast remains at approximately $7/MMBtu in 2011,

and increasing thereafter. Thus, based on these costs for natural gas, our approved IRP in Minnesota was consistent with our efforts to pursue our proposed, 47 MW participation in Big Stone Unit II as a least-cost option for our customers, combined with our plans for conservation and renewables.

Q: Where is it found, in your approved 2003 IRP, the need for at least 53 MW of pulverized coal in 2008 and beyond?

A: The result of SMMPA's sensitivity analysis is found in Table VII-I5 Page VII-28. That page is attached to this testimony as Exhibit 45-A.

Q: Has SMMPA performed additional capacity expansion modeling since the approved 2003 IRP?

A: Yes.

Q: Please summarize the results of that additional modeling.

A: Because natural gas prices continue to climb beyond even our high gas price scenario in our 2003 IRP, our most recent analyses continued the trends we observed in the sensitivity cases within our 2003 IRP. That is, a 100 MW share of a pulverized coal plant in 2011 is our least-cost alternative. A 50 MW share of a pulverized coal plant would be our second-best plan followed by a 50 MW, gas-fired alternative.

Q: Is it correct that SMMPA is one of the Applicants that could use more baseload capacity than their proposed share of Big Stone Unit II?

A: Yes. As I noted in my previous response, our capacity planning modeling determined that our least-cost level of baseload in 2008 is a 100 MW share of a pulverized coal facility; or 53 MW more than our proposed 47 MW share in Big Stone Unit II. Because Big Stone Unit II,

SMMPA's preferred option, is not expected to come on-line until 2011, SMMPA intends to seek to bridge the gap with an energy and capacity market purchase.

Q: What's next for SMMPA's capacity expansion planning efforts?

A: We are currently performing modeling for our 2006 IRP filing in Minnesota. That plan is scheduled to be filed with the MPUC in July 2006. SMMPA's 47 MW of Big Stone Unit II is now a part of SMMPA's committed resources, for planning purposes. Given the load shape of SMMPA's resource need, coupled with projected natural gas prices, we expect that when this modeling is completed it will show a need for additional baseload, suggesting that perhaps even the 100 MW baseload need we identified earlier this year may be conservative (i.e., low). Together with our ongoing conservation, and renewable efforts, completing Big Stone Unit II as planned is an integral part of our least-cost, integrated resource plan.

Q: Does this conclude your prepared testimony?

A: Yes.

The results of the base integration analysis and sensitivity scenarios are shown in Table VII-15.

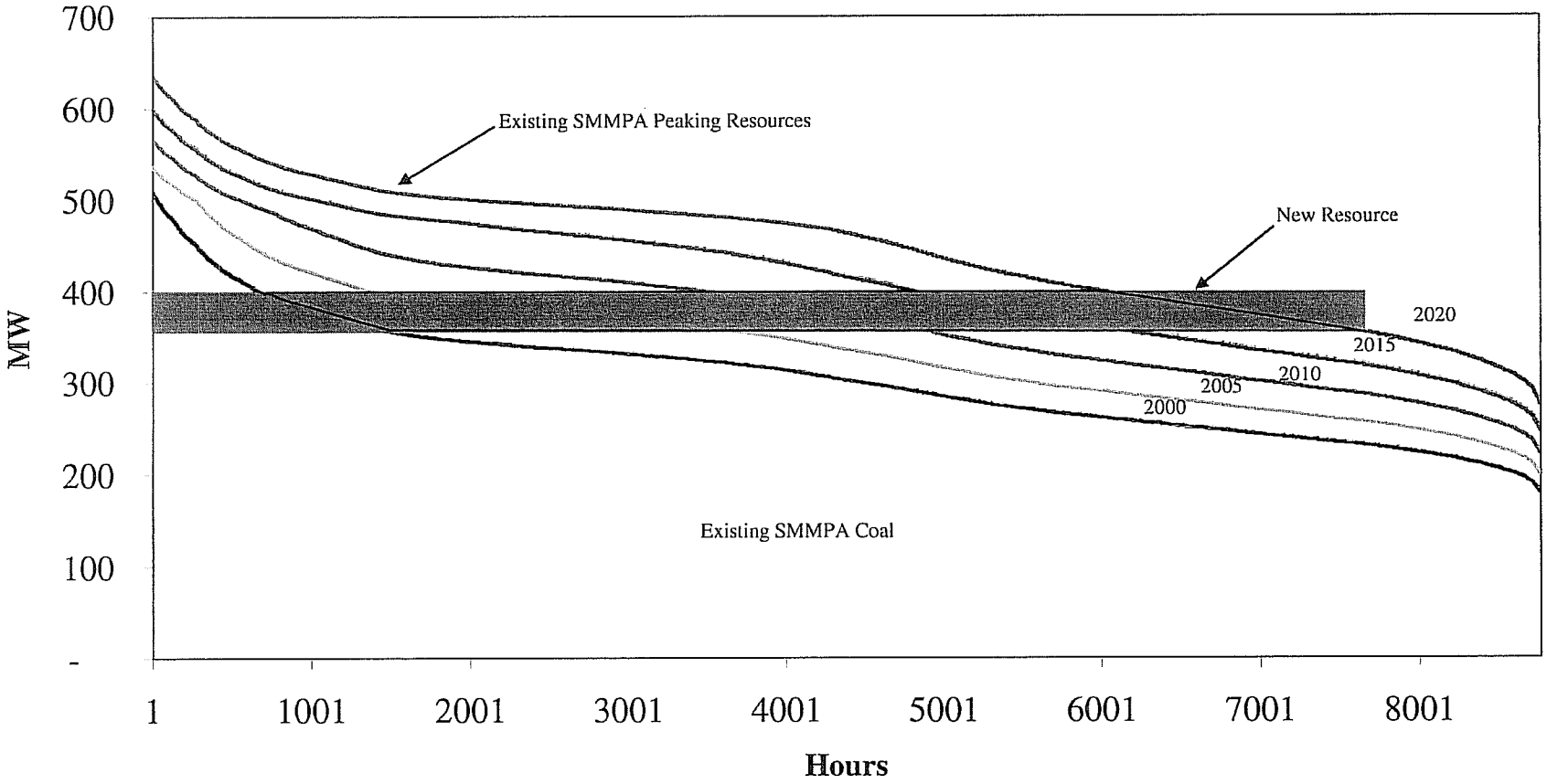
Table VII-15
Supply- and Demand-Side Integration Sensitivity Analysis Results

EGEAS Case Number	Case Description	Levelized Rate ($/MWh)	PW Costs (Million$)	DSM Programs Accepted (Y/N)				Wind Turbines (3.8 MW)	Landfill Gas (2.4 MW)	Peaking Purchases (12 MW)	Combined Cycle (53 MW)	Pulverized Coal Unit (53 MW)
				CI Other	CI Lite	Res Other	Res Lite					
Base	Base Load Forecast Low Externality Costs Base Capital Costs Base Gas Price	$22.34	$776	Y	Y	Y	Y	16	3	3	2008	2013
Case 1	Base Load Forecast High Externality Costs High Capital Costs High Gas Price	$35.54	$1,240	Y	Y	Y	N	16	3	2	2008	2013 2018
Case 2	Base Load Forecast High Externality Costs High Capital Costs Base Gas Price	$33.26	$1,160	Y	Y	Y	N	16	3	3	2008 2013	
Case 3	Base Load Forecast High Externality Costs Low Capital Costs High Gas Price	$35.04	$1,215	Y	Y	Y	Y	16	3	2		2008 2013 2018
Case 4	Base Load Forecast High Externality Costs Low Capital Costs Base Gas Price	$32.99	$1,157	Y	N	Y	N	16	3	4	2008 2013 2018	
Case 5	Base Load Forecast Low Externality Costs High Capital Costs High Gas Price	$24.15	$839	Y	Y	Y	Y	16	3	3		2008 2013
Case 6	Base Load Forecast Low Externality Costs High Capital Costs Base Gas Price	$22.50	$783	Y	Y	Y	Y	16	3	5	2008	2014
Case 7	Base Load Forecast Low Externality Costs Low Capital Costs High Gas Price	$23.59	$819	Y	Y	Y	Y	16	3	2		2008 2013 2018
Case 8	Base Load Forecast Low Externality Costs Low Capital Costs Base Gas Price	$22.13	$769	Y	Y	Y	Y	16	3	3		2008 2013
Case 9	High Load Forecast Low Externality Costs Base Capital Costs Base Gas Price	$23.51	$897	Y	Y	Y	Y	16	3	7	2008	2008 2013 2017
Case 10	Low Load Forecast Low Externality Costs Base Capital Costs Base Gas Price	$21.42	$688	Y	Y	Y	Y	16	3	0	2008	2018

Notes:

1. Two types of combustion turbines were available, but were not selected in the lowest-cost plan for any of the above cases.
2. Two types of combined cycles (53 and 60 MW) were available, but only one type (53 MW) selected in most of the above plans.

Energy Needs From Resources Increase Over Time



Southern Minnesota Municipal Power Agency

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