

**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**

**ROBERT L. DAVIS**

**SENIOR DIRECTOR**

**R. W. BECK, INC.**

**JUNE 16, 2006**



**PREFILED REBUTTAL TESTIMONY OF ROBERT L. DAVIS**

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1           **BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION**

2           **PREFILED REBUTTAL TESTIMONY OF ROBERT L. DAVIS**

3   **I.       INTRODUCTION**

4   **Q:       Please state your name and business address.**

5   A:       My name is Robert L. Davis. My business address is 1000 Legion Place, Suite 1100,  
6   Orlando, Florida 32801.

7   **Q:       Whom are you employed by and in what capacity?**

8   A:       I am a Senior Director at R. W. Beck, Inc., a nationally recognized independent  
9   engineering and utility management consulting firm with headquarters in Seattle, Washington.  
10   R. W. Beck was retained by Central Minnesota Municipal Power Agency (CMMPA) to assist  
11   CMMPA with its application for an energy conversion facility siting permit for the construction  
12   of the Big Stone Unit II project in South Dakota and with its Certificate of Need filing for the  
13   Big Stone Unit II Transmission project in the state of Minnesota. I am the lead project manager  
14   for the most recent investigations and evaluations of load forecasts and resource expansion for  
15   the CMMPA members participating in both projects.

16   **Q:       What is your educational background and professional experience?**

17   A:       A biography of my educational background and professional experience is attached to  
18   this testimony as Applicants' Exhibit 47-A.

19   **Q:       Did you previously submit testimony in this proceeding?**

20   A:       No. However, I submitted direct testimony in the related transmission certificate of need  
21   proceeding in Minnesota.

1 **Q: Have you rendered testimony on electric utility matters in other proceedings?**

2 A: Yes. I have rendered testimony and comments on issues pertaining to certificate of  
 3 needs, resource planning, demand-side management goals and plans, market power, and  
 4 Regional Transmission Organization (“RTO”) formation before the states of Texas, Florida,  
 5 South Carolina, and the Federal Energy Regulatory Commission. A summary of my curriculum  
 6 vitae is attached to this testimony as Applicants’ Exhibit 47-B.

7 **Q: Who do you represent in this proceeding?**

8 A: In this proceeding, I am testifying on behalf of CMMPA, and through CMMPA, thirteen  
 9 municipal electric systems located in the southern portion of the State of Minnesota that have  
 10 elected to participate jointly through CMMPA to acquire an undivided ownership interest in the  
 11 proposed construction and operation of Big Stone Unit II project and transmission  
 12 interconnection facilities proposed in this proceeding.

13 The twelve participating members of CMMPA in these projects are: the City of Blue  
 14 Earth, MN; the City of Delano, MN; the City of Fairfax, MN; the City of Glencoe, MN; the City  
 15 of Granite Falls, MN; the City of Janesville, MN; the City of Kasson, MN; the City of Kenyon,  
 16 MN; the City of Mountain Lake, MN; the City of Sleepy Eye, MN; the City of Springfield, MN;  
 17 and the City of Windom, MN.

18 Through CMMPA, I am also representing the City of Willmar, Minnesota, which is not a  
 19 member of CMMPA, but which is participating jointly with the other twelve members of  
 20 CMMPA to acquire an undivided ownership interest in the proposed construction and operation  
 21 of Big Stone Unit II and transmission interconnection facilities. Throughout this testimony,  
 22 I will only be addressing issues as they pertain to these thirteen municipal participants in the Big

1 Stone Unit II project. Hereafter, these thirteen municipal utilities will be referred to as the  
 2 CMMPA Members.

3 **II. PURPOSE AND SUMMARY OF TESTIMONY**

4 **Q: What is the purpose of your testimony?**

5 A: I will respond on behalf of CMMPA Members to the May 26, 2006 testimony of  
 6 Minnesota Center for Environmental Advocacy (MCEA) witnesses Schlissel and Sommers with  
 7 regard to the need for capacity and issues relating to resource planning, specifically as these  
 8 topics refer to the CMMPA Members.

9 **III. NEED FOR AND TIMING OF CAPACITY**

10 **Q: At pages 5 and 6 of their May 26 testimony, MCEA witnesses Schlissel and**  
 11 **Sommers state that CMMPA does not need additional capacity in 2011. Do you agree?**

12 A: No. As demonstrated in Applicants' Exhibit 47-C, the most recent analysis of resource  
 13 capacity and peak demand projections developed for the CMMPA Members confirms that the  
 14 CMMPA Members will need capacity additions by 2008. Capacity deficiencies in 2008 and  
 15 2009 are projected to be rather small; however, by 2011, without the addition of the Big Stone  
 16 Unit II, the reserve margin for the CMMPA Members is projected to fall below 10 percent.

17 **Q: Please briefly describe the analysis recently undertaken by you with respect to the**  
 18 **CMMPA Member load forecast and resource expansion analysis.**

19 A: Under my direct supervision, two interrelated analyses were undertaken by R. W. Beck:  
 20 first was an econometric analysis and forecast of demand and energy requirements. Second, we  
 21 performed an optimized generation resource expansion and demand-side management screening  
 22 analysis. The load forecast utilized generally-accepted electric utility industry practices to

1 develop separate projections of net energy for load, or NEL, for each of the CMMPA Members.  
 2 Historical data and forecasts of major economic indicators, such as population, gross domestic  
 3 product, retail sales, and personal income for the Minnesota counties of the members were  
 4 combined with historical heating and cooling degree-day weather indicators and projections of  
 5 normal weather conditions to develop the annual projections. These annual NEL projections  
 6 were assessed in the context of other historical information on annual peak demands and monthly  
 7 and hourly loads to develop projections of monthly energy and peak demands and a coincident  
 8 peak demand forecast for the CMMPA Members.

9 **Q: What are the major findings of the load forecast analysis?**

10 A: NEL and peak demands of the CMMPA Members are projected to grow at annual growth  
 11 rates of approximately 1.5 percent over the twenty year period from 2006 through 2025.  
 12 Primarily following the forecast trends for major economic indicators used to develop the  
 13 forecast, load growth rates for the CMMPA Members are projected to decline over time, with  
 14 growth rates of approximately 1.6 percent over the first decade of the forecast period (2006  
 15 through 2015), declining to approximately 1.4 percent over the second decade of the forecast  
 16 period (2016 through 2025). The annual coincident peak demand of the CMMPA Members is  
 17 projected to be 177 MW by the summer of 2011 (the summer immediately following the  
 18 anticipated commercial operating date for the Big Stone Unit II). A detailed discussion of the  
 19 methodology and results of the load forecast analysis can be found in the attached Applicants'  
 20 Exhibit 47-C, Resource Expansion Analysis – Big Stone Unit II Participating Members.

21 **Q: Please describe the analysis recently undertaken by you with respect to the**  
 22 **projections of resource expansion for the CMMPA Members?**

1 A: As previously mentioned, under my supervision two interrelated analyses were  
 2 undertaken by R. W. Beck. The second of these analyses, an optimized generation resource  
 3 expansion and demand-side management screening analysis, was undertaken to identify one or  
 4 more potential resource expansion plans that could satisfy the multiple objectives of meeting a  
 5 reasonable 15 percent reserve margin above the coincident peak demands forecast for the  
 6 CMMPA Members, while minimizing total costs of generation production, operation and  
 7 maintenance, and capital investments in new resources. The first task for this analysis was an  
 8 investigation of the existing and firmly planned resources of the CMMPA Members and  
 9 comparison of these resources to forecast coincident peak demands. Through this investigation,  
 10 I identified the dates when capacity additions would be required by the CMMPA Members.

11 **Q: Based on the results of the load forecast and the existing and planned resources of**  
 12 **the CMMPA Members, when will the members need to add new capacity resources?**

13 A: Assuming a 15 percent planning reserve margin is applied to the forecast of coincident  
 14 peak demands for the CMMPA Members, the members are first in need of capacity additions in  
 15 2008. Capacity deficiencies in 2008 are projected to be rather small (less than 2 MW), and  
 16 capacity needs are projected to increase only slightly in 2009 as certain purchase power contracts  
 17 are set to expire and other planned resources are scheduled to come online. However by 2011,  
 18 without the addition of the CMMPA Members' shares of Big Stone Unit II, the reserve margin  
 19 for the CMMPA Members is projected to fall below 10 percent. Capacity needs are projected to  
 20 grow by an average of 3.5 MW per year thereafter. By 2025, if no capacity other than currently  
 21 planned amounts are added, the CMMPA Members would need approximately 58 MW of  
 22 capacity additions.

1 **IV. RESOURCE PLANNING**

2 **Q: At pages 23 and 32 of their May 26 testimony, MCEA witnesses Schlissel and**  
 3 **Sommers state that CMMPA considered only fossil-fueled alternatives and did not consider**  
 4 **renewable or demand-side alternatives as potential alternatives to the Big Stone Unit II**  
 5 **Project. Do you agree?**

6 A: No. The recent resource expansion analysis conducted for the CMMPA Members  
 7 considered wind resources along with fossil-fueled resources as expansion alternatives. In  
 8 addition to the 30 MW of Big Stone Unit II capacity that the CMMPA Members are acquiring,  
 9 the resource expansion analysis considered combined-cycle and simple-cycle resources fired  
 10 with natural gas; a supercritical pulverized coal steam resource fired with sub-bituminous coal;  
 11 an integrated gasification combined-cycle resource fired on sub-bituminous coal; and a  
 12 multiple-turbine wind resource facility. Because additional quantities of the Big Stone Unit II  
 13 above the 30 MW currently secured by the CMMPA Members may become available if changes  
 14 in participant status occur in the future, an additional 30 MW of Big Stone Unit II capacity was  
 15 also evaluated for its potential cost-effective adoption by the CMMPA Members.

16 With regard to demand-side alternatives, the resource expansion analysis considered  
 17 demand-side resources in two ways. First, the load forecast for the CMMPA Members was  
 18 developed from historical levels of NEL and peak demand. Any reductions attributable to  
 19 historical implementations of demand-side programs were, therefore, included in the data used to  
 20 derive the econometric load forecast. In this way, historical levels of demand-side program  
 21 reductions and growth in such reductions are implicitly removed from the forecast demands used  
 22 to establish the future capacity need of the CMMPA Members. Second, the resource expansion



1 analysis included an evaluation of demand-side programs to determine whether demand-side  
 2 alternatives were more or less costly than the supply-side expansion alternatives.

3 **Q: At page 8 of their May 26 testimony, MCEA witnesses Schlissel and Sommers state**  
 4 **that the Big Stone II Co-Owners have not shown that the Big Stone II resource is the lowest**  
 5 **cost option as compared to portfolios of renewable and demand side alternatives. Do you**  
 6 **agree?**

7 A: No. In the recent resource expansion analysis conducted for the CMMPA Members –  
 8 potential resource expansion plans were developed using an impartial process that considered  
 9 both traditional and renewable resource alternatives. Furthermore, demand-side programs  
 10 consistent with costs and load impacts of the existing demand-side programs implemented by the  
 11 CMMPA Members were evaluated against an expansion plan that included the Big Stone Unit II  
 12 project to assess whether it would be less expensive for the CMMPA Members to implement  
 13 demand-side programs or build the Big Stone Unit II project.

14 **Q: Please briefly describe the resource expansion analysis, attached as Applicants'**  
 15 **Exhibit 47-C.**

16 A: The resource expansion analysis was performed using the generation and demand-side  
 17 planning optimization analysis software package Strategist, which R. W. Beck licenses from  
 18 New Energy Associates, a Siemens Company. Strategist employs a dynamic programming  
 19 optimization technique combined with a convolution generation dispatch process to approximate  
 20 the operation of generating resources and power purchases and sales for electric utilities.  
 21 Through the dynamic optimization process, Strategist explores all potential generation expansion  
 22 plans that can be produced from a given set of resource alternatives and identifies the best

1 candidate plans based on the planning objectives identified by the user. For this analysis, I relied  
 2 upon two primary objectives. First, the CMMPA Members must meet a minimum 15 percent  
 3 reserve margin beginning in 2011. Second, the optimum resource plans must provide for the  
 4 lowest projected utility costs of all possible alternatives over a 25-year study period from 2011  
 5 through 2035. Potential resource plans were ranked from lowest to highest cost based on a  
 6 computation of total, present value costs, including generation production costs, operating and  
 7 maintenance costs, and capital costs for the CMMPA Members over the 25-year study period.  
 8 The computation of present-value costs also included a quantification of costs beyond the study  
 9 period, commonly referred to as end effects.

10 **Q: From your analysis, which potential resource plan was found to produce to lowest**  
 11 **projected costs for the CMMPA Members?**

12 A: A resource expansion plan consisting of the planned 30 MW of the Big Stone Unit II in  
 13 2011, plus an additional 10 MW of installed wind capacity in 2011, followed by 10 MW of  
 14 supercritical pulverized coal capacity installed every two to three years beginning in 2019, was  
 15 found to be the least-cost potential resource expansion plan. A detailed discussion of the  
 16 methodology and results of the resource expansion analysis, including a collection of the lowest  
 17 cost resource plans that were evaluated, can be found in the attached Applicants' Exhibit 47-C.

18 **Q: Did you analyze resource expansion cases with significantly more renewable**  
 19 **resources than the lowest-cost plan?**

20 A: Yes. Over 400 discrete resource expansion case alternatives were evaluated as part of the  
 21 Strategist analysis. While many of these cases were subtle variations on the lowest-cost plan,  
 22 many sub-optimal plans were also evaluated. As indicated in Applicant's Exhibit 47-C, sub-

1 optimal plans that included greater quantities of wind generation resulted in higher total costs for  
 2 power supply for the CMMPA Members.

3 **Q: What were the results of your investigation to add more than the planned 30**  
 4 **megawatts of the Big Stone Unit II capacity?**

5 A: At least 30 additional megawatts of capacity from Big Stone Unit II could be cost-  
 6 effectively added by the CMMPA Members in 2011. This case is not currently contemplated as  
 7 a resource expansion alternative because all of the proposed Big Stone Unit II capacity is already  
 8 allocated to the Big Stone Unit II partners. However, should additional capacity from the Big  
 9 Stone Unit II become available, the resource expansion analysis found that additional quantities  
 10 of the Big Stone Unit II capacity would provide for lower total present value costs for the  
 11 CMMPA Members as compared with the lowest-cost plan described previously. While the  
 12 reserve margin for the CMMPA Members would obviously far exceed the 15 percent target  
 13 under this case, the lower-cost results of this case can be understood when compared to the  
 14 existing resource alternatives of the CMMPA Members. The CMMPA Members rely heavily on  
 15 market-priced non-firm and economy purchases, and generation from owned lower-efficiency  
 16 steam resources and oil-fired diesel generation to serve their loads. In contrast, savings in energy  
 17 costs the CMMPA Members could receive through low-cost energy available from the proposed  
 18 Big Stone Unit II are projected to offset the incremental fixed and capital costs associated with  
 19 the additional Big Stone Unit II capacity, resulting in lower total costs for power than what is  
 20 available from their existing resources.

1 **V. DEMAND-SIDE MANAGEMENT (DSM)**

2 **Q: At page 34 of their May 26 testimony, MCEA witnesses Schlissel and Sommers state**  
 3 **that CMMPA did not compare demand-side measures against supply-side resources. Do**  
 4 **you agree?**

5 A: No. In the most recent resource expansion analysis performed for the CMMPA  
 6 Members, demand-side programs were compared against the lowest-cost resource expansion  
 7 plan, which includes the Big Stone Unit II project, to determine whether the demand-side  
 8 programs would result in lower total costs for the CMMPA Members as compared to an  
 9 expansion plan without demand-side programs.

10 **Q: How was this analysis of demand-side programs performed and what were the**  
 11 **results?**

12 A: Demand-side programs were evaluated incrementally against the lowest cost of the  
 13 generating resource expansion cases (the addition of 30 MW of Big Stone Unit II capacity in  
 14 2011 along with 10 MW of wind capacity 2011 and future additions of coal capacity). Average  
 15 demand-side program costs and energy and demand benefits were estimated from Conservation  
 16 Improvement Program reports filed by the CMMPA Members with the Minnesota Department of  
 17 Commerce and other estimates provided by the CMMPA Members. Incremental demand-side  
 18 program costs and load reductions for the CMMPA Members were compared against the best  
 19 generating resource expansion case to determine whether incremental reductions in energy  
 20 production costs and avoided generation capacity costs attributable to the demand-side programs  
 21 would be greater than the cost of the demand-side programs.

1           The results of this analysis reveal that the average cost per demand and energy reduction  
2 resulting from the CMMPA Member demand-side programs is higher than the marginal avoided  
3 costs of generation production and capacity. These results indicate that the existing demand-side  
4 programs of the CMMPA Members cause higher total and average operating costs for the  
5 members than would otherwise occur if no demand-side programs were implemented by the  
6 members and that any increase in funding and implementation of the current demand-side  
7 programs of the members would not be cost-effective.

8   **Q:    Does this conclude your prepared testimony?**

9   **A:    Yes.**