

BEFORE THE MINNESOTA OFFICE OF ADMINISTRATIVE HEARINGS
600 North Robert Street
St. Paul, MN 55101

FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION
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IN THE MATTER OF THE APPLICATION
FOR CERTIFICATES OF NEED FOR
THREE 345 kV TRANSMISSION LINE
PROJECTS WITH ASSOCIATED
SYSTEM CONNECTIONS

Docket No. ET2,E002, et al./CN-06-1115

SURREBUTTAL TESTIMONY OF DR. STEVE RAKOW
ON BEHALF
OF THE MINNESOTA OFFICE OF ENERGY SECURITY

JULY 3, 2008

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1 **I. INTRODUCTION**

2 **Q. Please state your name.**

3 A. My name is Dr. Steve Rakow.

4
5 **Q. Are you the same Dr. Rakow who previously submitted direct testimony and**
6 **rebuttal testimony on behalf of the Minnesota Office of Energy Security (OES) in**
7 **this proceeding?**

8 A. Yes.

9
10 **Q. What is the purpose of your surrebuttal testimony?**

11 A. I am offering surrebuttal testimony to the following parties' witnesses:

- 12 • Wind on the Wires, Fresh Energy, Izaak Walton League of America –
13 Midwest Office, and Minnesota Center for Environmental Advocacy (jointly,
14 Joint Intervenors) witness:
15 ○ Mr. Robert E. Gramlich;
- 16 • Northern States Power Company, a Minnesota Corporation and wholly-
17 owned subsidiary of Xcel Energy Inc. and Great River Energy, a Minnesota
18 Cooperative Corporation (jointly, the Applicants) witnesses:
19 ○ Mr. Walter T. Grivna;
20 ○ Ms. Amanda King;
21 ○ Mr. Daniel Kline;
22 ○ Mr. Kevin Lennon;
23 ○ Ms. Pamela J. Rasmussen;

- Mr. Timothy J. Rogelstad; and
- Mr. Grant Stevenson;
- North American Water Office and Institute for Local Self-Reliance (jointly, NAWO-ILSR) witness:
- Mr. Michael Michaud.

II. SURREBUTTAL TESTIMONY

A. RESPONSE TO JOINT INTERVENORS

Q. What is the purpose of your offering surrebuttal to the Joint Intervenors' rebuttal testimony?

A. I wish to respond the Joint Intervenors' analysis of the impact of the proposed transmission lines on CO₂.

Q. What does Joint Intervenors' witness Mr. Gramlich state regarding Mr. Michaud's CO₂ analysis?

A. As noted in the *Rebuttal Testimony of Robert E. Gramlich* (Gramlich Rebuttal) beginning on page 1, Mr. Michaud filed testimony suggesting a possibility that the CO₂ increase due to building the transmission line would never be offset over the life of the transmission line by loss savings. The Gramlich Rebuttal correctly points out that the assumptions in the California report cited by Mr. Michaud are important to consider in deciding whether the California report has any relevance in this proceeding. However, Mr. Gramlich's analysis of CO₂ savings does not provide an accurate picture. Regarding Mr. Michaud's CO₂ assertion, the Gramlich Rebuttal states at page 3:

1 Because this wind capacity would not be installed without
2 the CapX transmission lines, the emissions savings of this
3 wind energy would not be realized without the plan.
4

5 Mr. Gramlich then goes on to calculate the avoided CO₂ emissions due to the wind
6 energy expected to be interconnected via the proposed transmission lines.
7

8 **Q. Do you agree with Mr. Gramlich's avoided CO₂ emissions analysis?**

9 A. No, this analysis is incorrect. As I explained in prior testimony, the proper analysis takes
10 the generation system as a given and analyzes the transmission from that perspective.

11 This approach is reflected on page 9 where the Gramlich Rebuttal states:

12 ... at this juncture it is infeasible to precisely analyze the
13 impact a particularly [sic] transmission line will have on
14 future generation.
15

16 Therefore, the correct analysis holds the overall quantity of wind generation
17 (which will be determined in resource planning and acquisition proceedings) constant
18 and analyzes the net impact of the transmission lines on CO₂. An example of such
19 analysis is contained in my rebuttal testimony beginning on page 32.
20

21 *B. RESPONSE TO THE APPLICANTS*

22 **Q. What is the purpose of your offering surrebuttal to the Applicants' rebuttal**
23 **testimony?**

24 A. I wish to respond to the Applicants' new information regarding the 'upsizing' proposal
25 for the 345 kV transmission lines. I also wish to respond to the Applicants' new (or
26 more clearly stated) proposal to defer determination of the eastern end point of the Twin

1 Cities—La Crosse, WI 345 kV transmission line to future proceedings. Finally, I wish to
2 respond to information provided by the Applicants regarding certain smaller issues:

- 3 • the voltage and configuration of the Hazel Creek—Minnesota Valley segment
4 of the Brookings, SD—Twin Cities transmission line;
- 5 • the generation alternative to the proposed Fargo, ND—Twin Cities
6 transmission line; and
- 7 • the generation outlet capability created by the proposed facilities.

8
9 *I. Upsize to Double-circuit Capability*

10 *a. Summary of Applicants' Proposal*

11 **Q. What does Applicants' witness Mr. Grivna state regarding upsizing the proposed**
12 **transmission lines?**

13 A. Regarding the upsizing proposals of Joint Intervenors' witness Mr. Schedin and myself
14 the June 16, 2008 *Rebuttal Testimony of Walter T. Grivna* (Grivna Rebuttal) states at
15 pages 9-10:

16 Taking that longer view, the best-available option is to
17 construct a double circuit compatible 345 kV configuration.
18 Applicants essentially agree with Mr. Schedin that double-
19 circuit 345 kV configuration is a better long-term "next
20 step" than single-circuit 500 kV.

21
22 Because of the cost associated with double-circuiting and
23 the fact that most of the benefits of the second circuit
24 cannot be realized until other future transmission projects
25 occur, the second circuit should not be immediately
26 constructed but should rather await further system
27 developments that will allow the additional thermal
28 capacity offered by the second circuit to be utilized... We
29 propose that upsizing be applied to all three transmission
30 projects

1 **Q. Do you interpret this as the Applicants adding an alternative to their petition?**

2 A. Yes, at this time the Applicants have offered two comprehensive alternatives to the
3 Commission. The Grivna Rebuttal states at page 10:

4 If the Commission decides that Applicants should upsize
5 any of the projects, then the Commission should order
6 sections of all three projects upsized.

7
8 Thus, one alternative is the initial petition's recommended alternative which is the
9 three single-circuit built and installed 345 kV lines. The second alternative is to upsize
10 all of the 345 kV projects. The Grivna Rebuttal states at page 43: "it is my
11 recommendation that all three of the transmission line projects that are subject to this
12 proceeding be upsized using the double-circuit compatible configuration described in my
13 testimony." Thus, the Applicants recommend that the Commission approve upsizing the
14 three 345 kV projects. The double-circuit compatible build, single-circuit installed
15 proposal represents a second alternative, which the Applicants now recommend.
16 Therefore, under Minnesota Rules 7849.0120 B an alternative proposed by another party
17 would have to be shown to be better than the Applicants' proposal to install a single 345
18 kV circuit on structures capable of supporting a double-circuit configuration.

19
20 **Q. What segments are proposed to be built as double-circuit capable but with a single**
21 **circuit installed at this time?**

22 A. The Applicants propose to build the entire Fargo, ND—Twin Cities 345 kV transmission
23 line as double-circuit capable but with a single-circuit installed at this time. The
24 Applicants propose to build the Brookings, SD—Twin Cities project, where not already
25 proposed as double-circuit, as double-circuit capable but with a single circuit installed at

1 this time. The only exception is for the Lyon County—Hazel Creek spur where the
2 Applicants do not express a preference for ordering double-circuit capability now or
3 awaiting further developments and reserving the issue for the subsequent routing
4 proceeding. Specifically, the Grivna Rebuttal states at pages 38-39:

5 The Commission could order this segment to be constructed
6 at 345 kV, operated at 230 kV. By the time the routing
7 proceeding for this segment is advanced, we may have a
8 better understanding of whether the Commission grants us
9 authority to upgrade the Minnesota Valley – Blue Lake line
10 from 230 kV to double-circuit 345 kV. If so, then during
11 the routing proceeding, the Commission could order us to
12 double-circuit the Lyon County – Hazel Creek segment.
13 Alternatively the Commission could order now that this
14 segment be configured with the double-circuit compatible
15 approach.
16

17 For the Twin Cities—La Crosse, WI transmission line the Applicants’ proposal is
18 somewhat more complicated. The Grivna Rebuttal states, by segment:

- 19 • Hampton Corner – North Rochester: “In all circumstances we are suggesting
20 the double-circuit capable configuration;” (Grivna Rebuttal page 41)
- 21 • From North Rochester there are two potential Wisconsin destinations, for the
22 Alma river crossing/North La Crosse substation:
 - 23 ○ North Rochester to Alma, Wisconsin: “we propose that the double-circuit
24 345 kV be constructed throughout;” (Grivna Rebuttal page 42)
 - 25 ○ Alma, Wisconsin to proposed North La Crosse Substation: “Applicants do
26 not recommend double-circuit;” (Grivna Rebuttal page 42)
- 27 • for the La Crescent river crossing/La Crosse substation: “we do recommend
28 double-circuit compatible structures with one circuit installed.” (Grivna
29 Rebuttal page 43)

1 **Q. How did the Applicants arrive at their upsizing recommendation?**

2 A. The Grivna Rebuttal at page 15 indicates that the Applicants performed a screening
3 analysis of six alternatives: “we conducted some high-level analyses and we checked key
4 components to determine whether there were fatal flaws or obvious benefits/detriments
5 to particular options.” The six alternatives that were screened are:

- 6 a. 345 kV single-circuit with larger conductors than currently proposed;
- 7 b. 345 kV double-circuit with both circuits deployed immediately;
- 8 c. 345 kV single-circuit installed, double-circuit capable;
- 9 d. 500 kV single-circuit;
- 10 e. 500 kV double-circuit; and
- 11 f. 345 kV and 500 kV double-circuit using common structures.

12 This is a reasonable set of alternatives and includes all of the alternatives fully
13 developed in testimony to date.

14
15 **Q. What was the result of the Applicants’ screening analysis?**

16 A. While constructing a double-circuit 345 kV line or a single-circuit 500 kV line is
17 possible, there are several factors that lead the Applicants to conclude that a 345 kV
18 double-circuit capable, single-circuit installed alternative (also referred to as “upsized”)
19 for all three 345 kV transmission lines is the best choice.

20
21 **Q. How did you analyze the Applicants’ upsize proposal?**

22 A. I examined the costs and benefits of upsizing each 345 kV line versus the alternatives
23 separately for each of the three transmission lines.

1 *b. Analysis of Upsizing the Brookings, SD—Twin Cities Line*

2 **Q. Please outline your analysis of the Applicants' upsizing proposal for the Brookings,**
3 **SD—Twin Cities line.**

4 A. The *Rebuttal Testimony of Kevin Lennon* (Lennon Rebuttal) states at page 4 that the
5 upsizing proposal would affect about 100 to 110 miles of transmission lines. The
6 incremental cost of the upsizing proposal is estimated by the Lennon Rebuttal to be
7 between \$50 and \$55 million. Using the conversion factor for the total project
8 determined in my direct testimony (See OES Exhibit No. ____ (SRR-9)), this amount
9 represents a cost of \$74.0 million to \$81.4 million in present value of revenue
10 requirements (PVRR).

11 Considering the range of renewable energy needs documented by Mr. Ham and
12 Ms. Peirce in their direct testimonies, the quantity of generation in the MISO queue in
13 the area of these lines (between 7,460 MW and 15,940 MW; see the *Direct Testimony of*
14 *Jeffrey R. Webb* at page 33), the lack of cost-effective alternatives to the Applicants'
15 proposal (see the economic analysis in my direct testimony), and the need to plan for a
16 long term horizon in this docket, I consider the proposal for double-circuit capability to
17 be reasonable. I did not pursue further quantitative analysis.

18
19 *c. Analysis of Upsizing the Twin Cities—La Crosse, WI Line*

20 **Q. Please provide your analysis of the Applicants' upsizing proposal for the Twin**
21 **Cities—La Crosse, WI line.**

22 A. The *Rebuttal Testimony of Grant Stevenson* (Stevenson Rebuttal) at page 4 provides
23 incremental cost estimates for all of the segments. The first segment is common to all

1 three viable configurations (see below for further details). The Stevenson Rebuttal states
2 at page 4 that the cost of upsizing the Hampton Corner to North Rochester segment is
3 estimated to be between \$10 million and \$27 million.

4 The remaining incremental cost depends upon the exact configuration selected.
5 As I explain later in this testimony, for the Alma Mississippi River crossing
6 configuration the incremental cost is estimated to be \$20 million. So, the total
7 incremental cost for the Alma configuration should be \$30 million to \$47 million. Using
8 the conversion factor for the total project determined in my direct testimony (See OES
9 Exhibit No. ____ (SRR-9)), this proposal represents a cost of \$44.4 million to \$69.6
10 million PVRR.

11 Alternatively, for the La Crescent or Winona Mississippi River crossing
12 configurations the incremental cost is estimated to be \$53 million. Thus, the total
13 incremental cost for the La Crescent or Winona configurations should be \$63 million to
14 \$80 million. Using the conversion factor for the total project determined in my direct
15 testimony (See OES Exhibit No. ____ (SRR-9)), this proposal represents a cost of \$93.2
16 million to \$118.4 million PVRR.

17 Considering the same factors as I considered for the Brookings, SD—Twin Cities
18 line and the fact that the Alma crossing appears at this time with this record to be the
19 configuration with the least cost/least environmental impact (i.e., the relevant costs are
20 \$44.4 million to \$69.6 million PVRR), I consider the proposal for double-circuit
21 capability to be reasonable.¹ I did not pursue further quantitative analysis.

¹ Note that the *Rebuttal Testimony of Amanda King* states that “there are approximately 12,000 MW of projects seeking to interconnect in southeastern Minnesota;” a number in the same range as provided by Mr. Webb for the Brookings, SD—Twin Cities line.

1 *d. Analysis of Upsizing the Fargo, ND—Twin Cities Line*

2 *i. Overview*

3 **Q. Please list the alternatives that you considered in your analysis of the Applicants’**
4 **upsizing proposal for the Fargo, ND—Twin Cities line.**

5 A. For the Applicants’ proposal to upsize the Fargo, ND—Twin Cities line, there are three
6 alternatives that have been developed in the record to the point where a cost comparison
7 can be done:

- 8 • 345 kV double-circuit capable, single-circuit installed proposal;
- 9 • 345 kV double-circuit alternative; and
- 10 • 500 kV single circuit alternative.

11 Therefore, unlike the case for the Brookings, SD—Twin Cities and Twin Cities—
12 La Crosse, WI lines, further quantitative analysis is warranted to choose among these
13 options.

14
15 **Q. Please list the scenarios that you used to compare the three alternatives.**

16 A. The Applicants state that one advantage of the upsizing proposal is the ability to better
17 time the installation of the second 345 kV circuit with the actual need for additional
18 power transfers.² Therefore, I calculated the costs in five main scenarios that
19 experimented with different timing of higher transfers with and without a potential
20 Winnipeg to Fargo, ND transmission line. Note that in each case the costs of the second
21 circuit of the Applicants’ upsized alternative are timed to coincide with the higher
22 transfers. The five main scenarios are:

² See the discussion in the Grivna Rebuttal at pages 27 to 29.

1

Scenario	Description
1	no increased transfers and no 500 kV line from Winnipeg to Fargo ND;
2	increased transfers 20 years in the future but no 500 kV line from Winnipeg to Fargo ND;
3	increased transfers and a 500 kV line from Winnipeg to Fargo ND 20 years in the future;
4	increased transfers 10 years in the future but no 500 kV line from Winnipeg to Fargo ND; and
5	increased transfers and a 500 kV line from Winnipeg to Fargo ND 10 years in the future.

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Obviously further combinations of timing are possible, but the above scenarios provide a reasonable understanding of the influence timing will have on the economics of the alternatives. Finally, for each main scenario I calculated 4 different sub-scenarios:

1. low capital costs and low energy costs;
2. low capital costs and high energy costs;
3. high capital costs and low energy costs; and
4. high capital costs and high energy costs.

The range of capital costs is based upon the Applicants' estimates. The range of energy costs is based upon the cost range developed in my direct testimony (see OES Exhibit No. ____ (SRR-11)).

Q. Please list the inputs you used for your analysis of the alternatives to the Applicants' upsizing proposal for the Fargo, ND—Twin Cities line.

A. The capital cost inputs for the calculations are taken from the Stevenson Rebuttal and are summarized in Table 1 below.

Table 1: Capital Cost Inputs (million dollars)

Item	345 Upsized		345 Double-circuit		500 Single-circuit		Source
	Low	High	Low	High	Low	High	
Base Cost	\$ 500.00	\$ 640.00	\$ 570.00	\$ 710.00	\$ 560.00	\$ 680.00	Stevenson pg 5
Other Upgrades	\$ 125.00	\$ 250.00	\$ 125.00	\$ 250.00	\$ 145.00	\$ 275.00	Stevenson pg 6
Cost High Transfer	\$ 80.00	\$ 100.00	\$ -	\$ -	\$ -	\$ -	Stevenson pg 5

The line loss inputs for the calculations are taken from the Grivna Rebuttal and are summarized in Table 2 below.

Table 2: Line Loss Inputs (MW)

<i>No Dorsey-Maple River</i>	345 kV	345 kV Double	500 kV	Source
	Upsized	Circuit		
Losses 0 MW Transfer	-	(17)	(20)	Grivna Schedule 4
Losses 1,000 MW Transfer	(57)	(57)	(63)	Grivna Schedule 4
<i>With Dorsey-Maple River</i>	345 kV	345 kV Double	500 kV	Source
	Upsized	Circuit		
Losses 0 MW Transfer	-	(27)	(36)	Grivna Schedule 4
Losses 1,250 MW Transfer	(72)	(72)	(90)	Grivna Schedule 4

The economic inputs are summarized in Table 3 below. Note that the final figures to translate losses and capital costs into PVRR values that I used in my Direct testimony could not be used at this time since my direct testimony assumed that the losses and capital costs were the same for the entire 35-year analysis period. Therefore, I used intermediate figures from the appropriate exhibit.

Table 3: Economic Inputs

Input	Value	Source
Nominal Discount Rate	7.00%	Direct Exh. 9
Real Discount Rate	4.00%	Direct Exh. 11
Annual Capital Cost per million dollars	0.112	Direct Exh. 7
Annual Demand Cost per MW	0.114	Direct Exh. 9
Annual Energy Cost per MW (low)	0.218	Direct pg 53
Annual Energy Cost per MW (high)	0.297	Direct pg 53

ii. *Results of Economic Analysis*

Q. Please provide the results of your analysis of the Applicants' upsizing proposal for the Fargo, ND—Twin Cities line.

A. I used as a base case the scenario with no increased transfers and no 500 kV line from Winnipeg to Fargo, ND (scenario 1 above). The results for the base case (including all four sub-scenarios) are provided in Table 4 below.

Table 4: Base Case Results (Million Dollars PVRR)

Assumptions	Low Energy, Low Capital		Low Energy, High Capital		High Energy, Low Capital		High Energy, High Capital	
	Total Cost	Diff. from Upsize	Total Cost	Diff. from Upsize	Total Cost	Diff. from Upsize	Total Cost	Diff. from Upsize
345 kV Upsize	\$906	\$ -	\$1,291	\$ -	\$ 906	\$ -	\$1,291	\$ -
345 kV Double Circuit	\$914	\$ 7	\$1,298	\$ 7	\$ 889	\$ (18)	\$1,273	\$ (18)
500 kV Single Circuit	\$911	\$ 5	\$1,180	\$ (110)	\$ 876	\$ (30)	\$1,244	\$ (46)

Considering all three alternatives, Table 4 demonstrates that the 500 kV alternative is the least cost choice under three of the four scenarios. The Applicants' proposal is the least cost choice only under the low energy cost, low capital cost assumptions. Comparing the two 345 kV alternatives, the double-circuit alternative is least cost under both high energy cost scenarios and the Applicants' proposal is least cost under both low energy cost scenarios. Thus, under Scenario 1 (base case), I conclude that the 500 kV alternative is the optimal choice of the three options.

With the base case established I then proceeded to analyze the impact of increased transfers in the future, as discussed in the Grivna Rebuttal. The results for the scenarios with higher transfers beginning 20 years after the initial in-service date of the

transmission facilities (with and without a line from Winnipeg to Fargo, ND) are provided in Table 5 below.

Table 5: High Transfers in 20 Years Results (Million Dollars PVRR)

No Winnipeg-Fargo 500 kV, but high transfers starting in year 20								
Assumptions	Low Energy, Low Capital		Low Energy, High Capital		High Energy, Low Capital		High Energy, High Capital	
	Diff.		Diff.		Diff.		Diff.	
	Total	from	Total	from	Total	from	Total	from
	Cost	Upsize	Cost	Upsize	Cost	Upsize	Cost	Upsize
345 kV Upsize	\$858	\$ -	\$1,252	\$ -	\$833	\$ -	\$1,227	\$ -
345 kV Double Circuit	\$853	\$ (5)	\$1,238	\$ (14)	\$811	\$ (22)	\$1,195	\$ (32)
500 kV Single Circuit	\$847	\$ (11)	\$1,116	\$ (136)	\$793	\$ (40)	\$1,161	\$ (66)
With Winnipeg-Fargo 500 kV and high transfers starting in year 20								
Assumptions	Low Energy, Low Capital		Low Energy, High Capital		High Energy, Low Capital		High Energy, High Capital	
	Diff.		Diff.		Diff.		Diff.	
	Total	from	Total	from	Total	from	Total	from
	Cost	Upsize	Cost	Upsize	Cost	Upsize	Cost	Upsize
345 kV Upsize	\$835	\$ -	\$1,229	\$ -	\$804	\$ -	\$1,198	\$ -
345 kV Double Circuit	\$831	\$ (5)	\$1,215	\$ (14)	\$782	\$ (22)	\$1,166	\$ (32)
500 kV Single Circuit	\$806	\$ (29)	\$1,169	\$ (60)	\$746	\$ (58)	\$1,109	\$ (89)

The results for high transfers starting 20 years after the lines are in-service clearly ranks the 500 kV alternative first, the 345 kV double-circuit second, and the 345 kV upsize third. I also experimented with higher transfers in the nearer term—10 years after the lines are in-service.

The results for the scenarios with higher transfers beginning 10 years after the initial in-service date of the transmission facilities (with and without a line from Winnipeg to Fargo, ND) are provided in Table 6 below.

Table 6: High Transfers in 10 Years Results (Million Dollars PVRR)

No Winnipeg-Fargo 500 kV, but high transfers starting in year 10								
Assumptions	Low Energy, Low Capital		Low Energy, High Capital		High Energy, Low Capital		High Energy, High Capital	
	Diff.		Diff.		Diff.		Diff.	
	Total	from	Total	from	Total	from	Total	from
	Cost	Upsize	Cost	Upsize	Cost	Upsize	Cost	Upsize
345 kV Upsize	\$797	\$ -	\$1,199	\$ -	\$746	\$ -	\$1,149	\$ -
345 kV Double								
Circuit	\$786	\$ (11)	\$1,171	\$ (29)	\$726	\$ (21)	\$1,110	\$ (39)
500 kV Single								
Circuit	\$775	\$ (22)	\$1,044	\$ (156)	\$701	\$ (45)	\$1,070	\$ (79)
With Winnipeg-Fargo 500 kV and high transfers starting in year 10								
Assumptions	Low Energy, Low Capital		Low Energy, High Capital		High Energy, Low Capital		High Energy, High Capital	
	Diff.		Diff.		Diff.		Diff.	
	Total	from	Total	from	Total	from	Total	from
	Cost	Upsize	Cost	Upsize	Cost	Upsize	Cost	Upsize
345 kV Upsize	\$749	\$ -	\$1,152	\$ -	\$685	\$ -	\$1,088	\$ -
345 kV Double								
Circuit	\$739	\$ (11)	\$1,123	\$ (29)	\$665	\$ (21)	\$1,049	\$ (39)
500 kV Single								
Circuit	\$689	\$ (61)	\$1,051	\$ (100)	\$597	\$ (88)	\$ 960	\$ (128)

The results for high transfers starting 10 years after the lines are in-service are the same as the results for the 20 year case. Thus, the lesson is that, if higher transfers are expected, then it is more cost effective to accelerate the capital costs and avoided losses of the second circuit, as Mr. Schedin proposed. That is, energy costs matter more than the capital costs in the economic analysis.

In summary, Tables 4, 5, and 6 demonstrate that the comparison between the two 345 kV options (the Applicants' 345 kV upsize proposal and the 345 kV double-circuit alternative) are close but that the double circuit alternative has a lower cost.

1 Tables 4, 5, and 6 also demonstrate that the comparison of the proposed 345
2 kV upsize alternative and the 500 kV single-circuit alternative is more clear. The
3 500 kV line is economically superior. This result is similar to the conclusion
4 regarding a 500 kV line in my direct testimony at page 74.

5 Since I have demonstrated that a 500 kV alternative and a 345 kV double
6 circuit alternative both are economically preferred to the Applicants' proposal due
7 to their energy conservation benefits, it is necessary to review the engineering
8 information in the record to date in order to arrive at a fully informed conclusion.

9
10 *iii. Review of Engineering Analysis*

11 **Q. Please explain your review of the engineering analysis of a 500 kV alternative.**

12 A. The Applicants raise several potential issues regarding a 500 kV alternative. In
13 reviewing the information provided in the Grivna Rebuttal, most of these issues are
14 not articulated such that they appear to me to be significant at this time. Among
15 such issues in the Grivna Rebuttal are (in an issue summary—with my brief
16 response format) that a 500 kV alternative:

- 17 • Has more expensive transformation (page 17)—such costs should be
18 included in the overall cost estimate for the 500 kV alternative provided
19 by the Applicants and thus should have already been considered.
- 20 • Has a higher impact on the underlying system (page 17)—a higher
21 impact will necessitate more fixes. The costs for such fixes should be
22 included in the overall cost estimate for the 500 kV alternative provided
23 by the Applicants and thus should have already been considered.

- Has a greater right-of-way requirement (page 17)—the costs of the greater right of way should be included in the overall cost estimate for the 500 kV alternative provided by the Applicants and thus should have already been considered.
- Does not provide significant transfer benefit on its own (page 19)—While desirable, it is not necessary for an alternative to provide transfer benefit on its own at this time since all alternatives should be analyzed at a common level of achievement. We are trying to prepare the system for higher transfers in the future, but not necessarily achieve them at this time.
- It appears that MISO agrees that 345 kV voltage better matches the potential for a 765 kV overlay (page 22)—Mr. Webb’s direct testimony at pages 10 to 11 (Mr. Grivna’s citation) does not indicate that MISO concludes that a 345 kV line is better than a 500 kV line, only that “the longer term plans are not sufficiently developed at this state to dictate definitively that the proposed projects should be altered.” Thus, Mr. Webb is merely observing that MISO does not have evidence supporting or refuting a 500 kV alternative as superior to the Applicants’ proposal (which is required under Minnesota Rules 7849.0120 B).
- If a 500 kV line is added in Minnesota and 765 kV lines are added in the region, then more transformations would have to be added (page 22)—It is correct that 500 kV lines added in Minnesota would require transformation to interconnect with a regional 765 kV line, but 345 kV

1 lines also would require transformation to interconnect with a regional
2 765 kV line. It has not been demonstrated that 500 kV/765 kV
3 transformations are significantly more expensive than 345 kV/765 kV
4 transformations nor what the probability of such transformation
5 occurring is so that an expected value could be calculated and added to
6 the overall cost analysis. This is an uncertainty that has not been shown
7 to benefit or hinder either alternative.

- 8 • Mr. Webb testifies that it is currently premature to prejudge the
9 configuration of the superhighway. Ordering 500 kV may conflict with
10 long-term planning (page 22)—First, while ordering 500 kV may
11 conflict, since the configuration of the superhighway is unknown,
12 ordering 345 kV may also later conflict with long-term planning even
13 though MISO is not aware of such conflicts at this time. Second, Mr.
14 Webb observes at page 11 of his direct that the underlying 345 kV
15 system will need to be robust enough to handle N-1 situations (i.e.,
16 outage of a 765 kV line). It has not been shown that a 500 kV line is
17 inferior to the Applicants' 345 kV proposal in terms of its ability to
18 handle N-1 situations.
- 19 • Would require additional right-of-way and may require a reassessment
20 of the route options under consideration (page 26)—the Applicants have
21 not to my knowledge filed their routing petition so it should not be too
22 late for a draft document to be reassessed. In fact, my observations of

1 other proceedings include the route options being reassessed, by other
2 parties, after the route petition is filed with the Commission.

- 3 • Would increase landowner concerns and be inconsistent with landowner
4 expectations (page 26)—Although landowner concerns are usually more
5 fully addressed in the not-yet filed route docket, most landowners have
6 received notice of this proceeding, the 500 kV alternative was proposed
7 prior to the start of this case’s public hearings, and landowners can
8 participate to make their concerns and expectations known in the
9 Commission’s process and have been encouraged to do so.

10
11 **Q. From the discussion above, you cite points by Messrs. Grivna and Webb that**
12 **may be concerns but do not appear significant. What issues with a 500 kV line**
13 **do you conclude are significant?**

14 A. The Grivna Rebuttal discusses stability impacts at pages 23 to 24. The Grivna
15 Rebuttal states:

16 Moving to 500 kV and the higher transfer levels has the
17 potential to result in additional presently unknown
18 impacts on regional stability that would have to be
19 mitigated to obtain maximum transfer capability.

20
21 The Grivna Rebuttal further clarifies that the Applicants’ proposal avoids
22 the stability issue:

23 **Q. Won’t those impacts exist with a double-circuit**
24 **345 kV line?**

25 A. They have that potential. However, the strength
26 of Applicants’ proposal in this regard is that not
27 stringing the second circuit until future
28 circumstances warrant will allow a more thorough
29 review to be completed so regional utilities will

1 more fully be able to address these impacts and
2 maximize regional transfer benefit.

3
4 Thus, the 500 kV alternative and the 345 kV double circuit alternative are
5 both faced with an unknown cost for stability which has an unknown probability of
6 occurrence. Without data defining the scope of the cost and the probability of
7 occurrence for the stability issues, I cannot conclude that either the 500 kV
8 alternative or the 345 kV double-circuit alternative is preferred to the Applicants'
9 upsizing proposal.

10
11 **Q. Why do you conclude that stability is so important that it trumps the presence**
12 **of two alternatives that are otherwise clearly superior to the Applicants'**
13 **upsizing proposal on the economic and energy conservation impacts?**

14 A. It is not only the Applicants' Mr. Grivna who claim that stability issues need to be
15 addressed prior to making a final recommendation regarding alternatives. The
16 *Rebuttal Testimony of Michael Michaud* (Michaud Rebuttal) states at page 2:

17 Normally transmission studies would continue to analyze
18 off peak steady state conditions and dynamic analysis such
19 as stability and short circuit analysis. This work was not
20 done in this study and would have to be completed before
21 the scenario that was examined could be completely relied
22 upon for policy decision purposes.

23
24 Also, the *Direct Testimony of Larry L. Schedin PE* at page 5 commented
25 upon the importance of stability analysis:

26 At this time, I recommend approval with only one caveat,
27 which is further audit of critical powerflow and dynamic
28 stability runs upon which many of the conclusions were
29 based.

1 Thus, while the engineering witnesses in this proceeding disagree on many
2 things, it appears that the one thing they do agree upon is the importance of stability
3 analysis for the decision regarding alternatives.

4
5 *iv. Conclusion*

6 **Q. What is your conclusion based upon the analysis of the Applicants' proposal to**
7 **upsized the Fargo, ND—Twin Cities line?**

8 A. I conclude that, due to lack of stability analysis, a more reasonable and prudent
9 alternative to the proposed facility (the “upsized” proposal) has not been
10 demonstrated at this time by a preponderance of the evidence in the record.

11
12 2. *Defer Determination of End Point*

13 **Q. What is the Applicants' proposal regarding deferring the determination of an end**
14 **point for the Twin Cities—La Crosse, WI 345 kV project?**

15 A. The Rebuttal Testimony of Amanda King, at page 6, states:

16 Applicants believe that the river crossing should be decided
17 in the Minnesota routing and Wisconsin Certificate of
18 Convenience and Public Necessity (“CPCN”) proceedings
19 by the Minnesota Commission and the Wisconsin Public
20 Service Commission. Consequently, Applicants request
21 that the Commission issue a Certificate of Need granting
22 Applicants the flexibility to terminate the 345 kV line
23 either at La Crosse or North La Crosse.
24

25 **Q. What are the potential river crossings for the Twin Cities—La Crosse, WI 345 kV**
26 **project at this time?**

27 A. The application lists three Mississippi River crossings, or configurations that are viable
28 at this time:

- Alma;
- La Crescent; and
- Winona.

Q. How did you analyze the three alternative system configurations for the proposed Twin Cities—La Crosse, WI transmission line?

A. The Rebuttal Testimony of Amanda King at page 6 states:

Electrically, the three crossings are indistinguishable. The losses profile of the line is similar regardless of the river crossing location and regardless of whether the line connects at the North La Crosse Substation or the La Crosse Substation. And, regardless of the crossing and end point location, the line will provide approximately the same load serving capability for the Winona/La Crosse area.

Thus, the electric performance, system loss, and load serving capability for the Winona/La Crosse area, are similar for all three alternative configurations. Therefore, the issue is the trade off between capital costs and environmental impact. Essentially, the Applicants' position is that the information regarding environmental impact is too uncertain at this time for a final configuration decision to be made and the capital cost differential is too small to matter. Therefore, of the Applicants' points, two claims may be tested in this record (small capital cost differential and significant uncertainties in environmental information).

To test the claim regarding capital costs I assembled cost data on all three configurations. OES Information Request No. 31 requested comparative data on the original, 345 kV single circuit proposal for the La Crescent and Winona crossings. I clarified with the Applicants the base cost of using the Alma crossing. The *Rebuttal*

1 *Testimony of Grant Stevenson* provided incremental costs for the Applicants' upsized
2 proposal for all three configurations (La Crescent, Winona, and Alma crossings). The
3 cost data regarding the three potential configurations is summarized in Table 7 below.
4 Note that the incremental cost data excludes the incremental costs that will be the same
5 for the various configurations. Also, operations and maintenance costs are ignored since
6 my direct testimony demonstrated that they are relatively too small to matter.

7 **Table 7: Twin Cities—La Crosse, WI Cost Data**
8 **(Million Dollars)**

Configuration	Base Cost	Double Circuit	Total Cost	Differential Cost
Winona Crossing	\$340	\$ 53	\$ 393	\$ 13
Alma Crossing	\$360	\$ 20	\$ 380	\$ -
La Crescent Crossing	\$330	\$ 53	\$ 383	\$ 3

9
10 Table 7 shows that the Winona crossing has an incremental cost of \$13 million
11 (over the Alma Crossing) while the La Crescent crossing has an incremental cost of \$3
12 million. Using the cost range of between \$1.19 million and \$1.55 million with \$1.45 for
13 the mid-point results in the PVRR range represented in Table 8 below.

14 **Table 8: Cost of Twin Cities—La Crosse, WI Configurations**
15 **(incremental PVRR in million dollars)**

Configuration	Low	Median	High
Winona Crossing	\$15.47	\$18.85	\$20.15
La Crescent Crossing	\$ 3.57	\$ 4.35	\$ 4.65
Alma Crossing	\$ -	\$ -	\$ -

16
17 Table 8 demonstrates that the La Crescent crossing and Alma crossing alternative
18 configurations have essentially the same cost (less than \$5 million PVRR difference).
19 The Winona crossing costs substantially more than the Alma crossing (by about \$15 to
20 \$20 million PVRR). Thus, I conclude that 1) the Alma crossing is the least cost choice;
21 but 2) the La Crescent and Alma crossings are similar in capital costs.

1 To test the claim regarding environmental information for the Alma and La
2 Crescent configurations, I reviewed the *Rebuttal Testimony of Pamela J. Rasmussen*
3 (Rasmussen Rebuttal) for information on these two configurations. The Rasmussen
4 Rebuttal states:

- 5 • on socioeconomics: “Applicants have not identified any differentiating
6 socioeconomic impacts” (page 3);
- 7 • on corridor sharing:
 - 8 ○ “Alma crossing on the north would provide for the most corridor sharing
9 with existing transmission facilities” (page 3);
 - 10 ○ “La Crescent/La Crosse crossings on the south would generally require
11 new corridors” (page 3);
- 12 • on substation expansion:
 - 13 ○ “the La Crosse Substation [which may be preferable for a La Crescent
14 crossing³] will pose more construction challenges because it is located in
15 an area of the City of La Crosse densely populated with retail and
16 manufacturing buildings and a prevalence of wetlands” (page 3); and
 - 17 ○ the North La Crosse Substation [Alma crossing] has “land available for
18 the expansion of the substation” (Rasmussen page 3).

19 Further pertinent information from the United States Fish and Wildlife Service
20 (USFWS) was provided by the Rasmussen Rebuttal. USFWS states that it believes the
21 Alma crossing may pose the least environmental impact:

- 22 • “this route [Alma] may need no further right of way permit from the U. S.
23 Fish and Wildlife Service;” (Schedule 1) and

³ See the King Rebuttal at page 5.

- “this route is also least likely to impact migratory birds since it is some distance from known bird concentration points.” (Schedule 1)

By contrast, the La Crosse crossing is USFWS’s second choice:

- “this route is of concern due to its proximity to an active eagle nest and great blue heron colony;” (Schedule 1)
- “there is also a bike/pedestrian trail proposed within the existing right-of-way;” (Schedule 1) and
- “there is also concern that larger towers and more lines may come into conflict with the La Crosse Airport and Federal Aviation Administration guidelines.” (Schedule 1)

Finally, I note that the USFWS also concludes that the Winona crossing should not be considered further: “we do not believe the proposed Winona or Trempealeau crossings are worthy of further consideration.” (Schedule 1)

In summary, the best information available at this time indicates that the Alma crossing appears to have both the least cost and the least environmental impact.

Therefore, the Commission should order the Alma crossing in this proceeding.

However, it is also true that at this time in this record the impacts are close and the Commission could deem either endpoint reasonable as to the need case and leave the final decision for the Commission’s future routing docket which will contain further information and record development and refinement.

3. Other Issues

i. Fargo, ND—Twin Cities Generation Alternative

1 **Q. What is the issue regarding the analysis of a generation alternative to the Fargo,**
2 **ND—Twin Cities 345 kV line?**

3 A. On page 27 of my direct testimony I noted that the engineering study underlying the
4 Fargo, ND—Twin Cities 345 kV project did not include a discussion of new generation
5 as an alternative. In response, the *Rebuttal Testimony of Daniel Kline* (Kline Rebuttal)
6 states, at page 2:

7 For generation to provide load serving support, it must be
8 dispatchable and located near the load. In the southern zone
9 of the Red River Valley, this would mean that multiple
10 generation units would need to be placed in multiple
11 locations to provide the necessary support. This inefficient
12 and costly alternative was eliminated from consideration
13 early in the study process. Rather, the south zone of the
14 Red River Valley is in need of additional transmission
15 infrastructure to transmit the existing abundant generation
16 resources from central North Dakota on the west and from
17 power plants on the east.

18 The Kline Rebuttal then goes on to describe a generation alternative for the
19 Alexandria and St. Cloud regions, for the Community Service need, but did not address
20 the remaining needs. Given the issues of cost, efficiency, and generation export, it is
21 reasonable to screen out new generation as an alternative. Therefore, I did not perform a
22 more detailed analysis. I also note that the parties potentially supporting distributed
23 generation (DG) as an alternative to the Applicants' proposal were unable to produce and
24 justify a reviewable and rebuttable DG alternative sufficiently to withstand, or even
25 undergo, testing in this proceeding.
26

1 ii. *Voltage and Configuration of the Hazel Creek—Minnesota Valley segment*

2 **Q. What is the issue regarding the voltage and configuration of the Hazel Creek—**
3 **Minnesota Valley segment of the Brookings, SD—Twin Cities project?**

4 A. The Kline Rebuttal states at page 4:

5
6 Building the Hazel Creek to Minnesota Valley segment at
7 345 kV (but operating at 230 kV) connects the 345 kV
8 paths. As pointed out in Mr. Grivna's Rebuttal Testimony,
9 this line segment could be ordered constructed with double-
10 circuit capable structures now (as Mr. Grivna proposes for
11 the rest of the line) or that decision could be deferred until
12 further developments with the Minnesota Valley – Blue
13 Lake line upgrade.

14
15 I recommend that the Commission order the Hazel Creek–Minnesota Valley
16 segment be constructed with double-circuit capable structures at this time. It is not
17 known when the Minnesota Valley–Blue Lake line upgrade analysis will be complete
18 and a certificate of need petition filed. Ordering construction of the structures to double-
19 circuit capability now will ensure that the Hazel Creek–Minnesota Valley segment will
20 not need to be rebuilt later if a decision on the Minnesota Valley–Blue Lake line upgrade
21 is delayed until after construction begins on the Hazel Creek–Minnesota Valley segment.

22
23 iii. *Generation Outlet Capability*

24 **Q. What is the issue regarding generation outlet capability?**

25 A. My direct testimony, at page 18 discusses the generation export capability created by the
26 proposed projects and states:

27 ... using the values reported by the Applicants the proposed
28 lines would allow for an increase of about 1,050 MW to
29 1,250 MW in additional generation export capability. If
30 there is a more appropriate measure of the added generation
31 export capability created by the proposed transmission

1 facilities, it would be useful for the Applicants to provide
2 that measure in rebuttal testimony.

3
4 In response, the Rebuttal Testimony of Timothy J. Rogelstad (Rogelstad
5 Rebuttal) states:

6 I think it is appropriate to state that together, the three 345
7 kV Projects will achieve approximately 1,050 MW in
8 increased transfer capability.
9

10 However, the Rogelstad Rebuttal also cautions:

11
12 We have done enough evaluation to determine a rough
13 magnitude of export capability. As the projects progress
14 and get closer to being placed in-service, detailed
15 operational studies will be conducted to determine the
16 actual export capability that is attainable.
17

18 This information from the Rogelstad Rebuttal provides the clarification that I
19 requested and will consider the correct increase to generation export capability from this
20 project to be 1,050 MW.
21

22 C. *RESPONSE TO NAWO-ILSR*

23 **Q. What is the purpose of your offering surrebuttal to NAWO-ILSR's rebuttal**
24 **testimony?**

25 A. There is not enough time to respond to detail to all of the statements of concern.

26 However, I will address six issues raised in the Michaud Rebuttal. The issues are:

- 27 1. scope of the need;
- 28 2. statements regarding ownership;
- 29 3. mixing need adjustments into the alternatives analysis;
- 30 4. unjustified alternatives;
- 31 5. economic rationality; and
- 32 6. references to DRG Study.

1 *1. Scope of the Need*

2 **Q. What issue do you have regarding scope of the claimed need?**

3 A. At page 30, the Michaud Rebuttal states:

4 ... the Application, on page 1.4, clearly states that the three
5 areas of claimed need, community service reliability,
6 system wide growth, and generation outlet support are
7 focused primarily on Minnesota issues.
8

9 While the needs may or may not be ‘focused primarily on Minnesota issues,’ it is
10 important to keep in mind that the proposed projects are attempting to address regional
11 issues within all three need claims. For example, on page 1.4 the community service
12 reliability need includes the Red River Valley (which includes North Dakota) and the La
13 Crosse, WI area. The system wide growth need includes “demand for power anticipated
14 in Minnesota and parts of surrounding states” (Petition at page 1.4). The generation
15 outlet support provided by the Applicants’ proposed facilities is for generation “in
16 Minnesota and the surrounding region” (Petition at page 1.4). Furthermore, all three
17 proposed 345 kV lines end in neighboring states and the forecasting data in Appendix C
18 of the Petition includes data on Interstate Power and Light, a company that is not in the
19 potential ownership structure of Figure 1-11 of the Petition. Finally, the OES’s need
20 analysis recognized the importance of the regional nature of electricity; for example, see
21 the *Direct Testimony and Exhibits of Hwikwon Ham* at page 4 and in OES Exhibit No.
22 ____ (HKH-6). While it is true that Minnesota is an important part of the picture, the
23 scope of the proposed needs and solutions are regional.
24

25 *2. Statements Regarding Ownership*

26 **Q. What issue do you have regarding statements regarding ownership?**

1 A. At page 30, the Michaud Rebuttal states:

2 Dr. Rakow takes a position that whether or not the
3 applicants end up owning these lines or not does not matter
4 “because the Applicants do not claim need based upon their
5 own systems.” This is clearly wrong based on page 1.4 of
6 the Application and perhaps Dr. Rakow could explain his
7 statement. Also, Dr. Rakow admits that ownership matters
8 at least somewhat because “changes in ownership can
9 affect the analysis of alternatives by changing the cost of
10 capital.”
11

12 The explanation is that the discussion in my direct testimony regarded the
13 Applicants’ proposal to leave the final determination of ownership until after the
14 certificate of need (CN) was determined. There are two main portions to the OES’s
15 analysis in any particular CN—determination of the need and project alternatives
16 capable of fulfilling the proposed need. The first part of the statement explains that the
17 need case was regional in nature, the need analysis would not change based upon
18 ownership structure. So, changes in ownership would not impact the OES’s analysis of
19 the claimed need.

20 The second part of the statement explains that changes in ownership do impact
21 the cost of capital, which is an input to the analysis of alternatives. Thus, changes in
22 ownership most definitely can impact the OES’s analysis of alternatives. However, the
23 OES’s analysis of alternatives followed an approach that was flexible enough to cover
24 any potential ownership outcome.

25 I offer these explanations to help Mr. Michaud understand the distinction between
26 the aspects and impacts of unknown ownership on proper analysis of need versus the
27 aspects and impacts of unknown ownership on proper analysis of costs of alternatives.

1 3. *Mixing Need Adjustments and Alternatives*

2 **Q. What issue do you have regarding mixing need and alternatives?**

3 A. Beginning on page 32, line 11, the Michaud Rebuttal; takes issue with my using the need
4 amount as proposed in the application without adjusting it for changes in either or
5 projected load growth or projected new energy sources. As I explained in my direct
6 testimony, OES Witness Mr. Ham addresses any needed adjustments to the
7 Application's load and supply forecasts. I, on the other hand, only review alternatives to
8 the proposed project. Since I am comparing the proposed project, I need to use the
9 proposed need forecasts/deficits to which the project addresses. Making adjustments
10 such as those described by Mr. Michaud would essentially nullify any "apples to apples"
11 comparison.

12 Finally, it is entirely proper to compare the demand requirements to the new
13 supply enabled by these lines because supply must equal demand. It is true, as the
14 Rogelstad Rebuttal states at page 3, that the proposed projects are not designed to
15 achieve all of the needed capacity. I recognized this fact in my direct testimony, for
16 example, at page 20 where I note that the proper forum for meeting the entire renewable
17 need is the RES Report. Again, it is important that we take advantage of the opportunity
18 present today to permit a system that meets the Applicants' claimed needs but also
19 permit a system that is flexible enough to meet a variety of potential futures in a cost-
20 effective and reliable manner.

21
22 4. *Unjustified Alternatives*

23 **Q. What is the issue you have regarding unjustified alternatives?**

1 A. Also, in that same Q&A the Michaud Rebuttal goes on to make strong statements such as
2 “There are many places on the grid where new generation could be added without
3 building new transmission facilities.” (cite page 32, lines 22-23) Except for mentioning
4 a “partial analysis” not entered into this record, the Michaud Rebuttal offers no evidence
5 or basis as foundation for such sweeping statements. Further, such generation would
6 only be an alternative if it addressed all of the Applicants’ claimed needs.
7

8 5. *Economic Rationality*

9 **Q. What issue do you have regarding economic rationality?**

10 A. At page 39, the Michaud Rebuttal states:

11 Dr. Rakow’s calculations do not include consideration of
12 the parameters of economic rationality put forward by Dr.
13 Kildegaard in his testimony. To apply Dr. Kildegaard’s
14 philosophy to OES and Dr. Rakow, they have not
15 “provided an integrated cost analysis of transmission and
16 generation expansion ...
17

18 While in Dr. Kildegaard’s view I may be irrational, as I explained in my rebuttal
19 testimony at pages 16 to 21 Minnesota Statutes and Minnesota Rules establish separate
20 planning and permitting process for generation and transmission. Further, there is no
21 tool which is capable of simultaneously optimizing transmission and generation. Thus,
22 as I explained in my rebuttal testimony, irrationality is the only viable approach. My
23 analysis recognizes state processes and does not require cost analysis for which current
24 computer models do not exist.
25

26 **Q. Does the Michaud Rebuttal attempt to demonstrate the reasonableness of an**
27 **alternative to Applicants’ proposal?**

1 A. No, the Michaud Rebuttal offers no alternative.

2
3 6. *Reference to DRG Study*

4 **Q. Mr. Michaud mentions that you cite the DRG Study in your direct testimony. How**
5 **do you respond?**

6 A. The Michaud Rebuttal at page 35, lines 16-17, states, “Dr. Rakow mentions the
7 Dispersed Renewable Generation Study examination of locations ...” in relation to a
8 general observation that I made in my direct testimony that there is “no guarantee that
9 such locations would be able to be configured to be right next to the load that the DG is
10 to serve” To be clear, my statement was a general observation on the ability of any
11 distributed or dispersed generation (DG) to be sited close to its intended load. I used DG
12 only because DG is usually smaller than baseload or intermediate central station
13 generation and, as such, has a greater likelihood of siting closer to load. However, no
14 matter what size or type of generation, there is no guarantee or location. Finally, my
15 discussion in the paragraph cited by Mr. Michaud does not mention the specific type of
16 DG. Rather, it is a discussion of DG generally. It is not clear to me how Mr. Michaud
17 could confuse a discussion of generation outlet generally with wind-specific generation
18 outlet.

19 As for the DRG Study, I explain at the end of my direct testimony that I had not
20 been involved in or know the results of the DRG Study prior to its filing on June 16,
21 2008, which was the same day as my rebuttal testimony was filed.

1 **III. RECOMMENDATIONS**

2 **Q. Please provide a complete list of your recommendations at this time.**

3 A. Based upon all of my testimony, the recommendations I have at this time are:

4 I recommend that the Commission determine that the Petition, as modified by
5 subsequent testimony, meets the criterion of the following Minnesota Rules:

- 6 • 7849.0120 A (3);
- 7 • 7849.0120 A (4);
- 8 • 7849.0120 B (1);
- 9 • 7849.0120 B (2);
- 10 • 7849.0120 B (3); and
- 11 • 7849.0120 D.

12 I also recommend that the Commission determine that the Petition, as modified
13 by subsequent testimony, meets the criterion established by the following
14 Minnesota Statutes:

- 15 • 216B.1694, subd. 2;
- 16 • 216B.2422, subd. 4;
- 17 • 216B.2426;
- 18 • 216B.243, subd. 3. (10);
- 19 • 216B.243, subd. 3. (12); and
- 20 • 216B.243, subd. 3a.

21
22 These are all of the provisions on which I sponsor testimony. I recommend that
23 the Commission approve CNs as proposed or modified for the following facilities:

- A 345 kV transmission line between a new Hampton Corner substation in the southeast corner of the Twin Cities and the North La Crosse substation, crossing the Wisconsin-Minnesota border near Alma indicated in the maps included in the CN notice materials. (The North La Crosse substation and Alma crossing option was chosen based on the information and record to date. Alternatively, as discussed above, the Commission could name either the North La Crosse Sub/Alma Crossing or the La Crosse Sub/LaCrescent Crossing options as reasonable, since this record to date shows similar impacts and make the final crossing choice in the upcoming route proceeding.) This line should be built to a double-circuit configuration, with a new 345 kV single circuit installed. Note that a 161 kV line would also be installed on the towers for certain segments, see page 2 of schedule 2 of the Grivna Rebuttal for details.
- A 345 kV transmission line between the Monticello substation and the Maple River substation, crossing the North Dakota-Minnesota border as indicated in the maps included in the CN notice materials. This line should be built to a double-circuit configuration, with a new 345 kV single-circuit installed. See page 1 of schedule 2 of the Grivna Rebuttal for details.
- a 345 kV transmission line between a new Hampton Corner substation in the southeast corner of the Twin Cities and the Brookings County substation, crossing the South Dakota-Minnesota border as indicated in the maps included in the CN notice materials. This line should be built to a double-circuit configuration, with a new 345 kV single-circuit or double-circuit

1 installed as proposed by the Applicants. See page 1 of schedule 2 of the
2 Grivna Rebuttal for details. The in-service dates are 2012 (Lyon County—
3 Helena segment) and 2013 (Brookings County—Lyon County and Helena—
4 Hampton Corner segments); see the rebuttal testimony of Ms. McCarten and
5 Mr. Lennon.

- 6 • A 345 kV transmission line from the Lyon County substation to the new
7 Hazel Creek substation in the Granite Falls area. This line should be built to a
8 double-circuit configuration, with a new 345 kV single-circuit installed. See
9 page 1 of schedule 2 of the Grivna Rebuttal for details.
- 10 • A 345 kV transmission line operated at 230 kV from the new Hazel Creek
11 substation to the Minnesota Valley substation. This line should be built to a
12 double-circuit configuration, with a single-circuit installed.

13
14 **Q. Do you recommend that the Commission adopt the conditions proposed by Mr.**
15 **Ellison and Mr. Michaud?**

16 A. No. As I explained previously, these conditions are without merit in that they:

- 17 • do not recognize the overall need case;
- 18 • it is too late for the conditions to be effective;
- 19 • the target of the conditions is in error; and
- 20 • mix resource planning and resource acquisition.

21
22 **Q. Do you have any corrections to prior testimony?**

1 A. Yes, in my rebuttal testimony at page 13, line 2 “Minn Valley—Blue Lake” should be
2 “Hazel Creek—Minnesota Valley.”
3

4 **Q Does the OES have an overall recommendation at this time?**

5 A. No. The OES continues to review all information offered into the record of this case. At
6 the time that all of the information has been entered by parties, OES will present its
7 overall recommendation based on its review of the record at that time.
8

9 **Q. Does this conclude your surrebuttal testimony?**

10 A. Yes.