

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 PETITION OF
NORTHERN STATES POWER COMPANY
D/B/A XCEL ENERGY FOR APPROVAL OF
COMPETITIVE RESOURCE ACQUISITION
PROPOSAL AND CERTIFICATE OF NEED

Docket No. E002/CN-12-1240
OAH Docket No. 8-2500-30760

REBUTTAL TESTIMONY OF DR. STEVE RAKOW

ON BEHALF OF

**THE DIVISION OF ENERGY RESOURCES OF
THE MINNESOTA DEPARTMENT OF COMMERCE**

OCTOBER 18, 2013

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TABLE OF CONTENTS

Section	Page
I. INTRODUCTION	1
II. PURPOSE OF REBUTTAL TESTIMONY	1
III. REBUTTAL TO XCEL’S TESTIMONY	3
A. Size of the Capacity Deficit	3
B. Top Performing Portfolios	3
C. Third Round Set-Up.....	4
1. Interruptible Natural Gas Supply	4
2. Flexible In-Service Dates.....	7
D. Third Round Results	10
E. Other Modeling Issues	12
1. Avoided Transmission and Distribution Losses	12
2. Credit for Excess Capacity.....	13
3. Treatment of Energy from 750 MW of Wind.....	14
4. Competition in Negotiation Process	15
IV. REBUTTAL TO GERONIMO’S TESTIMONY	16
V. REBUTTAL TO CALPINE’S TESTIMONY	16
A. Dispatch in Strategist	16
B. Environmental Costs	18
VI. REBUTTAL TO INVENERGY’S TESTIMONY	18
A. Strategist Modeling	18
B. Need Established by the Commission.....	20
VII. OVERALL RECOMMENDATION	20

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 on behalf**
6 **of the Minnesota Department of Commerce, Division of Energy Resources, Energy**
7 **Regulation and Planning unit (Department) in this proceeding?**

8 A. Yes.

9

10 **II. PURPOSE OF REBUTTAL TESTIMONY**

11 **Q. What is the purpose of your Rebuttal Testimony?**

12 A. First, I provide a few minor clarifications to my Direct Testimony. I provide this
13 information for the sake of clarity; none of the information changes my overall
14 recommendations. Second, I respond to certain aspects of Direct Testimony of the
15 following:

- 16 • Northern States Power, d/b/a Xcel Energy (Xcel);
- 17 • Geronimo Wind Energy, LLC d/b/a Geronimo Energy (Geronimo);
- 18 • Calpine Corporation (Calpine); and
- 19 • Invenergy Thermal Development LLC (Invenergy).

20

21 **Q. Do any of your responses to these witnesses change your overall recommendation in**
22 **this case?**

1 A. Yes, but only slightly. As discussed further below, I expand my recommendation for the
2 next phase of this proceeding to include Invenergy's project in negotiations regarding the
3 purchased power agreement (PPA), in addition to Calpine and Xcel's Black Dog project.
4 The best two projects of the three identified below should be allowed to move forward.
5

6 **Q. Do you have any clarifications or further explanations to provide regarding your**
7 **Direct Testimony?**

8 A. Yes, first, I identified an error with the links provided in my Direct Testimony. Through
9 counsel, I notified parties of this error by email on October 4, 2013. Specifically, the
10 links in the Excel sheets for the second round, contingency 27 (Manitoba Hydro PPAs do
11 not expire) were not done correctly such that they link to contingencies 25 or 26. I went
12 through those Excel sheets to produce an update. This update does not change the results
13 of my analysis; it is a correction to the presentation of the analysis; see Corrected DOC
14 Ex. ___ SR-5A (Rakow Rebuttal).

15 Second, several parties sent information requests seeking clarifications or further
16 explanations regarding certain items in my Direct Testimony. For the convenience of all
17 parties, all of my information request responses are included in DOC Ex. ___ SR-R-6
18 (Rakow Rebuttal). Note that for the response to Geronimo's Information Request No. 5
19 and Xcel's Information Request No. 1, I provided further clarifying information as a
20 follow up to the original response. This additional information also is included in DOC
21 Ex. ___ SR-R-6 (Rakow Rebuttal).

1 **III. REBUTTAL TO XCEL’S TESTIMONY**

2 **A. SIZE OF THE CAPACITY DEFICIT**

3 **Q. Mr. Alders stated at page 7 of his Direct Testimony that the Xcel’s most recent**
4 **analysis “indicates a capacity deficit of 93 MW in 2017, which grows to 307 MW by**
5 **2019.” Do you agree?**

6 **A.** Yes, the resource need estimates cited by Mr. Alders are consistent with my estimates
7 using the Mid-Continent Independent System Operator’s (MISO) non-coincident peak
8 method. See Figure 2 on page 26 of my Direct Testimony DOC Ex. ____ at 26 (Rakow
9 Direct). The non-coincident peak calculations represent the reliability method used
10 during Xcel’s most recent resource plan approved by the Minnesota Public Utilities
11 Commission (Commission) on March 5, 2013, *Order Approving Plan, Finding Need,*
12 *Establishing Filing Requirements, and Closing Docket,* (Docket No. E002/RP-10-825)
13 (Docket No. E002/RP-10-825).

14
15 **B. TOP PERFORMING PORTFOLIOS**

16 **Q. Mr. Alders stated at page 7 of his Direct Testimony that “the least cost portfolio**
17 **includes Black Dog 6 and Invenergy’s Cannon Falls Expansion proposal, while the**
18 **next least cost portfolio includes Black Dog 6 and Calpine’s Mankato Expansion**
19 **proposal.” Do you agree?**

20 **A.** I agree in that my analysis showed the two top performing packages as:
21 1. Invenergy’s Cannon Falls proposal (ICT1) with Xcel’s Black Dog unit 6
22 (BD6) and,
23 2. Calpine’s Mankato proposal (CCC1) with BD6.

1 The top three packages in my second round of analysis include the two packages listed
2 above as well as a third package that includes CCC1 on its own (without BD6); see
3 Corrected DOC Ex. __ SR-5A at 3 and 7 (Rakow Rebuttal).

4
5 *C. THIRD ROUND SET-UP*

6 **Q. Did you perform a third round of analysis in response to parties' Direct Testimony?**

7 A. Yes, as discussed in greater detail below in my Rebuttal Testimony, I performed a third
8 round of analysis that included assumptions regarding interruptible natural gas supply,
9 flexible in-service dates, and other potentially relevant factors as this process moves to
10 negotiations of PPAs.

11
12 *1. Interruptible Natural Gas Supply*

13 **Q. Mr. Wishart stated at page 23 of his Direct Testimony that “for Invenergy’s**
14 **proposals we added the estimated cost of interruptible gas supply.” Did you model**
15 **interruptible natural gas for any of the proposals?**

16 A. No, the analysis for my Direct Testimony evaluated all proposals based upon the same
17 assumption—firm natural gas supplies. I used this approach to ensure that all bids were
18 analyzed on an equal basis.

19
20 **Q. Mr. Wishart stated at page 31 of his Direct Testimony that “If the Invenergy**
21 **projects were modeled with firm gas supply as Calpine’s Mankato project and**
22 **Black Dog Unit 6 were, the cost comparison would heavily favor Calpine.” Do you**
23 **agree?**

1 A. Yes, in fact, I did model the Invenergy projects with firm gas, so Mr. Wishart's statement
2 is an accurate description of the results from the second round of my analysis which
3 assumed firm gas supplies; see Corrected DOC Ex. ___ SR-5A (Rakow Rebuttal), DOC
4 Ex. ___ SR-5B (Rakow Direct), and DOC Ex. ___ SR-5C (Rakow Direct) for the second
5 round results.

6
7 **Q. Do you have other observations about the use of interruptible or firm gas for the**
8 **Invenergy project?**

9 A. Yes, I note that, given that the Invenergy project is proposed as a peaking facility, it is
10 worth exploring the use of firm or interruptible natural gas for the project, at least to
11 allow for more discussions in PPA negotiations, especially since different types of natural
12 gas could affect the costs to be charged to ratepayers.

13
14 **Q. Could you provide an analysis that assumes interruptible natural gas supply for**
15 **Invenergy's Cannon Falls proposal (ICT1)?**

16 A. Yes, the inputs for interruptible natural gas supply at ICT1 were provided by Xcel in the
17 Xcel's August 15, 2013 supplemental response to Department Information Request No.
18 42; see DOC Ex. ___ SR-7 (Rakow Rebuttal).

1 **Q. Please list the scenarios that you ran assuming interruptible natural gas supply for**
2 **ICT1.**

3 A. Using the inputs provided by Xcel, I ran six additional Strategist scenarios; basically
4 using scenarios from second round but replacing firm gas with interruptible gas for
5 packages that include ICT1:

- 6 • Scenario 31a—ICT1 only, with CO₂ costs;
- 7 • Scenario 32a— ICT1 only, without CO₂ costs;
- 8 • Scenario 35a— ICT1 with CCC1, with CO₂ costs;
- 9 • Scenario 36a— ICT1 with CCC1, without CO₂ costs;
- 10 • Scenario 37a— ICT1 with BD618, with CO₂ costs; and
- 11 • Scenario 38a— ICT1 with BD618, without CO₂ costs.¹

12
13 These additional scenarios represent the first part of my third round of analysis. This
14 information is included in the third round results provided below.

15
16 **Q. In providing this data, are you recommending that interruptible natural gas supply**
17 **be used for ICT1?**

18 A. No. I'm providing this additional information as a factor that could be considered in PPA
19 negotiations to reduce costs for ratepayers. Finding ways to minimize costs while
20 maintaining reliability and other factors is worth exploring.

¹ Note that the codes I use in my Rebuttal Testimony are the same codes I use as in my direct testimony; see DOC Ex. ___ at 33-34 (Rakow Direct) for definitions. Through counsel, I provided parties on October 4, 2013, with a summary of the definitions of scenarios and contingencies I reference in my direct testimony. See DOC Ex. __ SR-R-6[add?] (Rakow Rebuttal).

1 **Q. Would there be a negative effect on electric reliability if interruptible gas supplies**
2 **were used at the Invenergy project?**

3 A. That is an issue that will need to be explored during negotiations. However, I obtained
4 preliminary information from Xcel. Assuming that lack of firm natural gas would be a
5 larger problem in winter than in summer, I requested additional information from Xcel
6 regarding Xcel's winter load and capability situation in Department Information Request
7 No. 67; see DOC Ex. ___ SR-R-8 (Rakow Rebuttal). This information confirms that it is
8 worth exploring the use of interruptible natural gas supplies for the Invenergy project.

9
10 *2. Flexible In-Service Dates*

11 **Q. Mr. Wishart stated at page 11 of his Direct Testimony that “we continue to**
12 **recommend status assessments in 2014 and 2015 be part of the Commission’s Order**
13 **in this proceeding.” Do you agree?**

14 A. I agree with Mr. Wishart that there are several uncertainties at this time; some of these
15 uncertainties were discussed in my Direct Testimony at page 39 such as the expected
16 MISO required capacity reserve ratio and Xcel's 125 MW power purchase agreement
17 with Manitoba Hydro, DOC Ex. ___ at 39 (Rakow Direct) along with other uncertainties
18 as discussed throughout Mr. Wishart's Testimony. One consequence of such uncertainty
19 is that the Commission should be kept up to date on the latest circumstances. Thus, a
20 Commission Order requiring Xcel to file status assessments in 2014 and 2015 would be
21 prudent.

1 **Q. Did Mr. Wishart indicate how Invenenergy's ICT1 and Calpine's CCC1 could be**
2 **adapted to address potential changes in circumstances?**

3 A. Yes, Mr. Wishart stated at page 11 of his Direct Testimony that:

4 We believe it is prudent to pursue the ability to delay or
5 cancel the proposed projects with counterparties during
6 negotiations so that we can secure contractual options that
7 can adjust implementation of any project selected in a way
8 similar to our proposal. Flexibility options may prove to be
9 an important distinguishing factor.
10

11 **Q. Could you provide an analysis that indicates how ICT1 and CCC1 could be adapted**
12 **to address potential changes in circumstances?**

13 A. Yes, Xcel obtained data regarding such flexibility options—deferrals of the in-service
14 date—in Calpine's response to Xcel Energy Information Request No. 16 and in
15 Invenenergy's response to Xcel Energy Information Request No. 29; see DOC Ex. ___ SR-
16 R-9 (Rakow Rebuttal).
17

18 **Q. Did you explore scenarios to reflect different in-service dates for Invenenergy's**
19 **Cannon Falls proposal and Calpine's Mankato Proposal?**

20 A. Yes. Using the inputs Xcel obtained, I re-ran the eight scenarios from the second round
21 of analysis that included ICT1 and CCC1, but changed the in-service dates as follows:

- 22 • ICT1—Invenenergy Cannon Falls as bid;
- 23 • ICT1a—Invenenergy Cannon Falls with 2019 in-service date;
- 24 • CCC1—Calpine Mankato as bid; and
- 25 • CCC1a—Calpine Mankato with 2019 in-service date.

1 This additional analysis results in the following eight new scenarios:

- 2 • Scenario 41—BD617 with CCC1a with CO₂ costs;
- 3 • Scenario 42—BD617 with CCC1a without CO₂ costs;
- 4 • Scenario 43—BD617 with ICT1a with CO₂ costs;
- 5 • Scenario 44—BD617 with ICT1a without CO₂ costs;
- 6 • Scenario 45—ICT1 with CCC1a with CO₂ costs;
- 7 • Scenario 46—ICT1 with CCC1a without CO₂ costs;
- 8 • Scenario 47—CCC1 with ICT1a with CO₂ costs; and
- 9 • Scenario 48—CCC1 with ICT1a without CO₂ costs.

10
11 These additional eight results represent the second part of my third round of
12 analysis in this proceeding. To keep the assumptions consistent throughout the third
13 round of analysis, my analysis for Scenarios 41 to 48 assumed interruptible natural gas
14 supplies for ICT1. In running these additional scenarios I am not judging the
15 appropriateness of flexible in-service dates in terms of fairness of the bidding process.
16 Instead, I provide this information simply for consideration when ultimately evaluating
17 the various proposals.

18
19 **Q. Did you perform any further contingency analysis regarding variations in wind**
20 **projects acquired by Xcel, as was done in the first round?**

21 A. Yes, I ran scenarios 41 to 48, but with 600 MW of wind added rather than 750 MW to
22 assess effects of uncertainties regarding the 150 MW of wind in Docket No. E002/M-13-
23 716. These are scenarios 51 to 58. In addition, I ran the base case, but with 600 MW of

1 wind added rather than 750 MW to provide a point of comparison. These are scenarios 59 and
2 60. These additional ten results represent the third part of my third round of analysis.

3
4 **Q. Mr. Alders stated at page 8 of his Direct Testimony that Xcel’s proposal includes**
5 **adjustable in-service dates and concludes that similar flexibility is important for the**
6 **PPA proposals and that such options may impact pricing. Do you agree?**

7 A. Mr. Shaw addresses the potential inclusion of flexibility in PPAs. I agree that any in-
8 service date flexibility ultimately approved by the Commission may increase or decrease
9 the overall PVSC of a package for Xcel’s ratepayers. I provide in the section below my
10 analysis of the impact of in-service date flexibility on the cost/ranking of various
11 packages.

12
13 *D. THIRD ROUND RESULTS*

14 **Q. Please provide the third round results assuming interruptible natural gas supply for**
15 **ICT1.**

16 A. Selected outputs are included in DOC Ex. ___ SR-R-10A (Rakow Rebuttal), DOC Ex.
17 ___ SR-R- 10B (Rakow Rebuttal), and DOC Ex. ___ SR-R-10C (Rakow Rebuttal).

18
19 **Q. What do you conclude from the model outputs assuming interruptible natural gas**
20 **supply for ICT1?**

21 A. The potential use of interruptible natural gas supply for ICT1 significantly reduces the
22 PVSC for ICT1 and, thus, significantly reduces the difference between packages with
23 ICT1 and the other packages—by about \$35 million PVSC.

1 **Q. Please provide your third round results assuming a deferred in-service date for**
2 **CCC1 and ICT1.**

3 A. Selected outputs are included in DOC Ex. ___ SR-R-11A (Rakow Rebuttal), DOC Ex.
4 ___ SR-R-11B (Rakow Rebuttal), and DOC Ex. ___ SR-R-11C (Rakow Rebuttal). Note
5 that DOC Ex. ___ SR-11A (Rakow Rebuttal), DOC Ex. ___ SR-11B (Rakow Rebuttal),
6 and DOC Ex. ___ SR-11C (Rakow Rebuttal) assume that all of the 750 MW of wind is
7 constructed and placed in service.

8
9 **Q. What do these analyses indicate regarding flexibility in-service dates for CCC1 and**
10 **ICT1?**

11 A. The analysis indicates that the potential for flexible in-service dates for ICT1
12 significantly reduces the difference between packages with ICT1 deferred and the
13 packages with ICT1's original in-service date—by about \$50 to \$55 million PVSC under
14 base case conditions; see DOC Ex. ___ SR-R-11A (Rakow Rebuttal).

15 The analysis also indicates that the potential for flexible in-service dates for
16 CCC1 has a small impact on the overall PVSC. The difference between packages with
17 CCC1 deferred and the packages with CCC1's original in-service date is only about \$5 to
18 \$12 million PVSC under base case conditions; see DOC Ex. ___ SR-11A (Rakow
19 Rebuttal).

1 **Q. What is the combined impact of the two issues—interruptible natural gas and**
2 **deferred in-service dates?**

3 A. The overall result is that the package with BD6 and CCC1 is still ranked first. However,
4 the gap between that package and the second and third ranked packages (CCC1 with
5 ICT1 and Xcel’s BD6 with ICT1) has decreased considerably; see DOC Ex. ___ SR-R-
6 11A (Rakow Rebuttal).

7
8 **Q. What is the impact of potentially acquiring less wind in Docket Nos. E002/M-13-603**
9 **and E002/M-13-716?**

10 A. Eliminating one wind project (the final wind project under consideration, Border wind),
11 does not materially impact the results; see DOC Ex. ___ SR-R-12 (Rakow Rebuttal).
12 For convenience, a complete list of scenarios is included in DOC Ex. ___ SR-R-13
13 (Rakow Rebuttal).

14
15 **Q. What do you conclude from these results?**

16 A. I conclude that it would be worthwhile for Xcel to pursue negotiations with both Calpine
17 and Invenergy regarding flexibility of in-service dates and use of interruptible natural gas
18 for Invenergy’s project. While there may not be much gained by adjustments to
19 Calpine’s in-service date, adjusting the date of Invenergy’s project could yield significant
20 results for ratepayers.

21
22 *E. OTHER MODELING ISSUES*

23 *1. Avoided Transmission and Distribution Losses*

1 **Q. Mr. Wishart stated at page 35 of his Direct Testimony, “For roof top solar projects**
2 **that avoid all transmission and distribution line losses we estimate the savings to be**
3 **equal to 7% of the energy and capacity benefits... even if the full 7% is applied to**
4 **the energy and capacity credit savings estimated for the Geronimo project, the**
5 **PVSC of the line loss savings would only equal an additional \$10 million, not enough**
6 **to make the project cost effective.” Do you agree?**

7 A. In general, yes. First, as indicated in my reply to Geronimo’s Information Request No.
8 14 I did not include line loss savings because it appears that Geronimo did not include
9 such data in Geronimo’s proposed Strategist inputs; see DOC Ex. ___ SR-R-6 (Rakow
10 Rebuttal). Also, Corrected DOC Ex. ___ SR-5A (Rakow Rebuttal) shows that the PVSC
11 difference between the package with Geronimo’s proposal and all other packages in the
12 second round is far greater than the potential \$10 million line loss savings.

13
14 2. *Credit for Excess Capacity*

15 **Q. Mr. Wishart stated at page 37 of his Direct Testimony, “Another critical assumption**
16 **is the capacity credit value used in the model. Because the various combinations of**
17 **bids result in different total capacity, a capacity credit is used in the model to give**
18 **additional value to larger portfolios. For 2016-2037, the levelized capacity credit is**
19 **\$6/kW-mo.” Did you include in Strategist any capacity credits for excess capacity?**

20 A. No, I did not include any credit for excess capacity. As explained in my response to
21 Geronimo Information Request No. 9, see DOC Ex. ___ SR-R-6 (Rakow Rebuttal), I was
22 concerned that Strategist may have a bias in favor of larger packages. Including such a
23 credit would only serve to reinforce a bias towards larger packages. See my response to

1 Geronimo Information Request No. 10, DOC Ex. ____ SR-R-6 (Rakow Rebuttal), for
2 information regarding the quantity of excess reserves resulting from the addition of each
3 package.

4
5 *3. Treatment of Energy from 750 MW of Wind*

6 **Q. Mr. Wishart stated at page 37 of his Direct Testimony that “To test the impact of**
7 **the additional wind, we removed the proposed 750 MW of wind and re-ran the top**
8 **20 plans identified by Strategist.” Did you perform similar analysis?**

9 A. Yes, in the first round of analysis I ran each scenario with 400 MW, 600 MW, and 800
10 MW of wind added. Also, as mentioned above in the third round I ran both 750 MW and
11 600 MW of wind. However, I did not run any scenarios with no wind added.

12
13 **Q. Mr. Wishart stated at page 38 of his Direct Testimony that the result of Xcel’s wind**
14 **contingency analysis was that “When the 750 MW of wind proposed by the**
15 **Company was removed from the Strategist model the cost effectiveness of portfolios**
16 **including Calpine Mankato improved significantly. This is because when wind is**
17 **removed from the model, natural gas units must run more often to meet customer**
18 **demand...” Did your analysis reach a similar conclusion?**

19 A. In my analysis when wind units representing the four proposals in Docket Nos. E002/M-
20 13-603 and E002/M-13-716 are added, equivalent generic wind energy is removed to
21 keep the overall quantity of wind energy for the duration of the Strategist run the same.
22 Thus, while the wind proposed by Xcel is added somewhat earlier than had been
23 previously assumed, the overall quantity of wind energy remains relatively unchanged.

1 Under my approach the overall impact of differing quantities of wind the on PVSC
2 differences across scenarios is not significant.

3
4 *4. Competition in Negotiation Process*

5 **Q. Mr. Wishart stated at page 42 of his Direct Testimony that “Maintaining**
6 **competition though the negotiation phase ensures that parties continue to negotiate**
7 **in good faith towards a contract that provides adequate protection for our rate**
8 **payers.” Do you agree?**

9 A. Yes, I agree with Mr. Wishart that maintaining competition though the negotiation phase
10 is an important consideration. It is also important to maintain competitive pressures on
11 Xcel as well to ensure that ratepayers’ interests are foremost. Therefore, I agree with Mr.
12 Wishart that it is prudent for multiple projects to proceed towards PPA negotiations but
13 only as long as the projects are reasonably close in economic performance.

14
15 **Q. Given your observations and additional analysis, what do you recommend for the**
16 **phase of this process pertaining to PPA negotiations?**

17 A. Considering the results of the third round of analysis, I recommend that the Commission
18 send both ICT1 and CCC1 to PPA negotiations. If negative issues are identified with any
19 of the top three proposals (ICT1, CCC1, and BD6), then the other two projects in that
20 group (ICT1, CCC1, or BD6), could be selected by the Commission.

1 **IV. REBUTTAL TO GERONIMO’S TESTIMONY**

2 **Q. Ms. Engleking stated at page 2 of her Direct Testimony that “These filings [updated**
3 **versions of Appendices E and F] provided updated sizes and locations of the**
4 **distributed solar facility sites, as well as the modeling related to those sites.” Given**
5 **her statement, did you change your inputs to account for this supplemental data?**

6 A. No. Geronimo’s Appendix F contains the Strategist input data. However, significant
7 portions of the Strategist analysis had already been completed. Further, after reviewing
8 the changes identified by Geronimo and discussing them with Geronimo, I concluded that
9 they were most likely too small to matter. Therefore, I did not use the supplemental data
10 provided by Geronimo.

11
12 **Q. Ms. Engleking stated at page 2 of her Direct Testimony that “I would like to correct**
13 **the estimated accredited capacity for the Project from 72 megawatts (“MW”) to 71**
14 **MW.” Is it likely that this correction would materially change the Strategist**
15 **results?**

16 A. No. Because Geronimo’s 72 MW accredited proposal was so significantly below the top
17 performing packages in terms of Strategist results, a 1 MW change in the accredited
18 capacity of the project would not result in a material difference in the Strategist results.

19
20 **V. REBUTTAL TO CALPINE’S TESTIMONY**

21 A. *DISPATCH IN STRATEGIST*

22 **Q. Mr. Hibbard stated at pages 7 and 8 of his Direct Testimony that “the Strategist**
23 **model may fail to capture operational details...as variable renewable resources**

1 **become a major contributor to generation, the dispatch model used in Strategist**
2 **may not be well-suited to understanding how units will be committed and/or**
3 **operated to manage potential variations in wind and solar output.” Do you agree?**

4 A. I agree with Mr. Hibbard and the materials from Xcel’s resource plan that he quotes
5 regarding Strategist’s approach of simplifying dispatch and certain operational details.
6 However, when considering the details of system dispatch and unit operation it should be
7 kept in mind that Xcel’s system is modeled in Strategist by Xcel and the Department in
8 isolation from the regional electric grid but generating units are not dispatched in such
9 isolation. Instead, Xcel’s generating units are dispatched by the Mid-Continent
10 Independent System Operator (MISO).

11 MISO’s dispatch includes not only Xcel’s generating units, but the generating
12 units of many utilities in Minnesota and the surrounding states. Thus, any potential needs
13 regarding load following, adjusting to the output of intermittent resources, and so forth
14 must be considered in the broader, regional context of MISO rather than Xcel’s system in
15 isolation. Stated simply, Xcel does not have a need to adapt its generation dispatch to
16 adapt to wind and solar output, but MISO may have such a need. However, such a need
17 for the larger MISO region may well be different than the need for an individual utility. I
18 do not know if such a need exists at MISO or, if it does exist, how MISO would indicate
19 such a need to its members.

20
21 **Q. What do you conclude, given these observations?**

22 A. In a sense, I agree that Strategist modeling cannot capture the precise dispatch that will
23 occur on the MISO system. However, the goal in this proceeding is to reflect how costs

1 on Xcel's system could be affected by addition of the bids in this proceeding. Given that
2 Xcel does not have a need to adapt its generation dispatch to adapt to wind and solar
3 output due to MISO's role, I conclude that attempting to adjust Strategist modeling to
4 capture expectations about changes in dispatch of Xcel's system alone would not capture
5 the bigger picture as to how MISO dispatches resources and thus would not be accurate.
6

7 *B. ENVIRONMENTAL COSTS*

8 **Q. Mr. Hibbard stated at pages 29 and 30 of his Direct Testimony that “the**
9 **Commission should consider the value of mitigating the environmental impacts of**
10 **CT capacity... failure to do so would place Mankato at a competitive disadvantage,**
11 **and would, in effect, punish Mankato for being a cleaner option.” Does the**
12 **Commission consider the value of mitigating environmental impacts?**

13 A. Yes, the Commission's externality values, CO₂ internal cost estimate, and the cost of SO_x
14 and NO_x emissions credits (collectively, Emissions Costs) all serve to reward units that
15 are more efficient in terms of environmental impact (reduced air emissions). These
16 Emissions Costs were all included in Strategist. Thus, the proposals for CT units can
17 then either have a higher cost via proposing to install the emissions control technologies
18 discussed by Mr. Hibbard or have a higher cost when Strategist applies the Emissions
19 Costs to the air emissions.
20

21 **VI. REBUTTAL TO INVENERGY'S TESTIMONY**

22 A. *STRATEGIST MODELING*

1 **Q. Mr. Ewan stated at page 15 of his Direct Testimony that since Strategist looks at an**
2 **extended time horizon, Strategist will penalize a 20-year PPA proposal by requiring**
3 **that the PPA be replaced at the end of the PPA’s term with a generic unit. Do you**
4 **agree?**

5 A. No, not as I have run Strategist for this proceeding. As discussed in my Direct Testimony
6 at page 28 I ran Strategist through 2036 to avoid the necessity of speculating regarding
7 the addition of generic units at the end of a PPA’s term.

8
9 **Q. Mr. Ewan stated at page 16 of his Direct Testimony that “it is also unclear how**
10 **Strategist can consider other important issues such as the cost-benefit impact of**
11 **including or not including dual fuel capabilities.” Can you clarify this issue?**

12 A. Strategist is not a dispatch model; it is a long term planning model. Thus, any operational
13 benefits or costs related to having dual fuel capability are unlikely to be recognized.
14 However, the long run economic trade-offs can be analyzed. For example, Strategist
15 could be run under the assumption that a particular unit has firm natural gas and the
16 resulting system costs reported. Then the economic assumptions can be changed so that
17 the same unit is priced assuming interruptible natural gas. Both Mr. Wishart in his Direct
18 Testimony and myself (see above) compared the cost of Xcel’s system assuming firm
19 natural gas for ICT1 to the same cost but with interruptible natural gas. Thus, some of
20 the potential benefits of dual-fuel capability are reflected in the analysis in this record.

1 **Q. Mr. Ewan stated at page 16 of his Direct Testimony that “since Strategist reduces**
2 **resource options to a net present value for comparison, the timing of resource**
3 **additions becomes critical.” Do you agree?**

4 A. That may or may not be the case. The flexibility analysis I provide above demonstrates
5 that the in-service date of ICT1 is indeed critical. However, the same flexibility analysis
6 indicates that the in-service date for CCC1 has a relatively minor impact on PVSC.

7
8 *B. NEED ESTABLISHED BY THE COMMISSION*

9 **Q. Mr. Ewan stated at page 22 of his Direct Testimony that “the Commission**
10 **determined ‘need for an additional 150 MW in 2017, increasing up to 500 MW in**
11 **2019.’ The Commission further determined that this need should be met by**
12 **‘peaking resources, intermediate resources, or a combination of the two.’” Do you**
13 **agree?**

14 A. Yes, I agree with Mr. Ewan that the Commission made this determination. As explained
15 in my Direct Testimony, see DOC Ex. ___ at 10 (Rakow Direct), and the reply to MCEA
16 Information Request Nos. 1, 2, and 3, see DOC Ex. ___ SR-R-6 (Rakow Rebuttal), the
17 Commission has already determined the size and timing of Xcel’s need. However, the
18 Commission left the type of resource that would best fill the need open to both peaking
19 and intermediate resources.

20
21 **VII. OVERALL RECOMMENDATION**

22 **Q. What is your overall recommendation at this time?**

1 A. I recommend that the Commission send both the ICT1 and the CCC1 proposal to PPA
2 negotiations. If significant issues are identified with any of the top three proposals
3 (ICT1, CCC1, and BD6) in future steps in this process, the other two projects can go
4 forward. If no issues arise with any of the top three proposals, the overall best package
5 remains BD6 and CCC1.

6

7 **Q. Does this conclude your Rebuttal Testimony?**

8 A. Yes.