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

FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

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

DIRECT TESTIMONY OF SACHIN SHAH

ON BEHALF OF

THE DIVISION OF ENERGY RESOURCES OF THE MINNESOTA DEPARTMENT OF COMMERCE

SEPTEMBER 27, 2013

DIRECT TESTIMONY AND ATTACHMENTS OF SACHIN SHAH
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D/B/A XCEL ENERGY FOR APPROVAL OF COMPETITIVE RESOURCE ACQUISITION
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I. INTRODUCTION

Q. Please state your name, occupation, and business address.

A. My name is Sachin Shah. I am a Public Utilities Rates Analyst with the Minnesota Department of Commerce, Division of Energy Resources, Energy Regulation and Planning (Department or DOC). My business address is 85 7th Place East, Suite 500, Saint Paul, Minnesota 55101.

Q. What is your educational and professional background?

A. A summary of my educational and professional background is presented in DOC Exhibit ___ at (SS-1) (Shah Direct).

II. PURPOSE AND SCOPE

Q. What are your responsibilities in this proceeding?

A. My responsibility in this proceeding is to assess the reasonableness of the sales forecast for Northern States Power Company, a Minnesota Corporation (Xcel) in this case, and to address any issues concerning the natural gas supply assumptions that underlie the proposals of the Bidders in this proceeding.

Q. Do you address the overall summary and recommendations or analysis of alternatives, in your testimony?

A. No. Department Witness Dr. Steve Rakow presents the overall DOC recommendations regarding the overall summary and recommendations and analysis of alternatives.

III. BIDS

Q. Who are the Bidders in this proceeding?

A. There are five Bidders:

- Calpine Corporation and its affiliate Mankato Energy Center, LLC (Calpine);
- Geronimo Wind Energy, LLC d/b/a Geronimo Energy (Geronimo);
- Great River Energy, a Minnesota cooperative corporation (GRE);
- Invenergy Thermal Development LLC (Invenergy); and
- Northern States Power Company, d/b/a Xcel Energy (Xcel) (collectively, Bidders).

Q. Did you analyze and review all of the Bidders' proposals as they pertain to natural gas?

A. No. I only reviewed and analyzed the proposals that rely on natural gas and, thus, I reviewed the relevant proposals of Calpine, Invenergy and Xcel regarding natural gas.

Q. Do you summarize all of the Bidders' proposals in your testimony?

A. No. Department Witness Dr. Steve Rakow presents the summary of all of the Bidders' proposals in his direct testimony.

Q. Was the need identified in the various Bidders' proposals developed by Xcel and approved by the Minnesota Public Utilities Commission?

A. Yes. This need was developed in Xcel's most recent 2011-2025 Integrated Resource Plan (IRP) in Docket No. E002/RP-10-825. In the Minnesota Public Utilities

Commission's (Commission) March 5, 2013 *Order Approving Plan, Finding Need, Establishing Filing Requirements, and Closing Docket, (Order)* the Commission states in relevant part the following on page 6 with respect to need:

> The current resource planning docket will have a direct bearing on Xcel's competitive bidding process. In particular, the current docket supports the finding that Xcel will need an additional 150 MW in 2017, increasing up to 500 MW by 2019. Moreover, a broad range of resources could contribute to meeting this need, justifying solicitation of a broad range of proposals. In particular, Xcel should invite proposals for meeting all of the forecasted need, or any part of it.
>
> …For purposes of Xcel's competitive bidding docket, the Commission finds it appropriate to solicit proposals for *an additional* 150 MW in 2017, increasing *up to* 500 MW by 2019. This statement does not preclude Xcel from acquiring more than 150 MW of new resources by 2017. Those choices will be made in the context of the resource acquisition docket, based on the proposals and the evidence adduced in that docket.

IV. REVIEW OF XCEL'S LOAD FORECAST OR NEED AT THIS TIME

Q. What has Xcel stated regarding its proposed load forecast?

A. Xcel stated the following on page 1-3 of its filing regarding its load forecast or need:

> … Recent demand forecasts are lower than that used in establishing the potential resource need in this docket but have varied with forecasts of economic recovery. While some indicators suggest continued slow growth, the Company is mindful of our obligation to serve our customers under all circumstances.

On page 3-1, Xcel stated the following:

> … The load forecast used to establish the need approved by the Commission was the Company's Fall 2011 forecast, presented as an update to the forecast filed in our initial Resource Plan filing.

On page 3-6, Xcel stated the following:

> … Since the Fall of 2011, when the last Resource Plan analysis was completed, the Company has updated its forecast three times. The total variation in forecasts has only been about 250 MW, or 2.6 percent, in the 2017 – 2019 timeframe.

Q. Have you reviewed and analyzed in detail the Xcel forecasts and three updates referenced above, or tried to replicate them?

A. No. I did not perform an in-depth review or attempt to replicate the various versions or vintages of forecasts referenced above. I performed a very limited review of the latest vintage of Xcel's forecast – the spring 2013 forecast – which lead to further concerns as I note later in this testimony.

Q. Please explain.

A. As mentioned above, Xcel's forecast underlying its proposal in the present docket is based on its 2011-2025 integrated resource plan in Docket No. E002/RP-10-825 (2011-2025 IRP). The Department has already analyzed Xcel's forecast as indicated in the Department's comments dated June 12, 2012 on Xcel's IRP. Specifically, the Department stated the following in relevant part on page 5 of those comments:

> The continual downward shift in Xcel's forecasts is the Department's biggest concern, since Xcel has not shown that the reductions due to the "unexpected setbacks in the country's economic recovery" are permanent. It is important to ensure that, when businesses and consumers who depend on Xcel are ready to expand, flip on switches and plug in new demand, Xcel's system is able to meet these demands. Failure to meet these demands in a reasonable manner would result in higher energy prices, thus dampening the recovery. Significant failure to meet demand could result in problems with reliability, such as

> rolling brownouts that have been experienced in other parts of the United States. As a result, the Department spent significant time checking and verifying these issues. While the Department had hoped to discover a potential resolution, there is not yet a resolution to the problem at the time of this filing. Nonetheless, the Department provides the results of its analysis to date.

In our August 13, 2012 *Reply Comments* on Xcel's 2011-2025 IRP, the Department stated the following on page 4:

> [I]n resource planning the important factor to keep in mind is that forecasts of energy and demand requirements are expected to change substantially over the next 15 years as the economy continues to recover and use of energy by industry and residential consumers increases. It would not be appropriate to assume that the lower demand due to the economic downturn will continue in the long term, nor to plan for an electrical system that is based on energy forecasts occurring during economic downturns since reliability of the electric system as a whole is critical to the health of the economy.

And in our August 13, 2012 *Reply Comments* on Xcel's 2011-2025 IRP, the Department stated the following on pages 6 and 7:

> In resource planning it is important that the median forecast be valid since decisions may be based upon it. Use of a reasonably wide forecast band helps to encompass the range of future demand and ensure reasonable planning for the future. The goal is for the preferred plan to be stable[1] across the expected range of future demand encompassed by the forecast band. This goal is summarized in the forecasting section of the Department's comments which ultimately recommended:
>
> Despite this concern about Xcel's forecasts, in the context of resource planning these issues can be addressed by using the usual ranges of forecasting in capacity expansion models. Therefore, the Department recommends approval of Xcel's energy forecast and the Department's peak demand forecast for planning purposes only. (footnote omitted)

1. The word "stable" in this context means that the recommended plan does not change radically under different contingencies.

In other words, the fundamental goal in a certificate of need (CN) and resource planning is not to establish a plan that is least cost under a single forecast. Rather, the goal is for the plan to be least cost across a wide range of forecasts.

Q. Are there additional reasons why you have not reviewed, analyzed or replicated the Xcel forecasts and three updates referenced above?

A. Yes. As mentioned above, Xcel's forecast underlying its proposal in the present docket is based on the fall 2011 update in its 2011-2025 IRP in Docket No. E002/RP-10-825. Despite a request by the Environmental Interveners that Xcel continue using updated sales forecast information in the 2011-2015 IRP proceeding, the Commission deferred the issue to Xcel's next IRP that Xcel is required to file by February 1, 2014.

Thus, in my view, given the Department's comments above in that proceeding about the goal of having resource plans in place that are robust across various forecasts, and the understandable desire to reach decisions in resource plans in a reasonably timely manner, the Commission concluded that even though the forecasts kept changing to some degree it would not have been reasonable to delay the process and spend even more resources to analyze various versions or vintages of Xcel's forecasts.

In any case, the Commission's Order speaks for itself. In its March 5, 2013 *Order Approving Plan, Finding Need, Establishing Filing Requirements, and Closing Docket, (Order)* the Commission states the following on pages 5and 6:

> Parties from varying perspectives have now had sufficient opportunity to scrutinize and challenge the data and analysis underlying Xcel's resource plan, and have had the opportunity to share their comments with this Commission. Having reviewed these comments along with the rest of the record, the Commission concludes that Xcel's plan is reliable for planning purposes. Consequently, the Commission will approve it, and will close this docket.
>
> The Environmental Intervenors ask the Commission to refrain from approving the plan until Xcel has further refined it by, for example, considering more recent forecast data. And they argue that approval of Xcel's overall resource plan should not relieve Xcel of the duty to justify the acquisition of any specific resource.
>
> The Commission finds that Xcel has fulfilled the requirements of Minn. Stat. § 216B.2422 and Minn. R. Chap. 7843 governing resource planning. Moreover, Xcel filed revised forecasting data less than three months ago. Rather that attempting to address the Environmental Intervenors' concerns by ordering a further revision of forecasting data, the Commission will refer these concerns to Xcel's next resource plan that Xcel is due to file in the next 11 months.

As a result, I did not perform an in-depth review and replication of the various vintages of forecasts referenced above. However, I did perform a very limited review of the latest vintage of Xcel's forecast -- the spring 2013 forecast -- that lead to further concerns as I discuss below. Since these sales forecasts were submitted about a year and a half apart from each other, it is reasonable to expect the forecasts to be fairly similar or, if not, that Xcel would explain any significant differences.

Q. Please explain the two different forecasts: the fall 2011 update and the spring 2013 forecast.

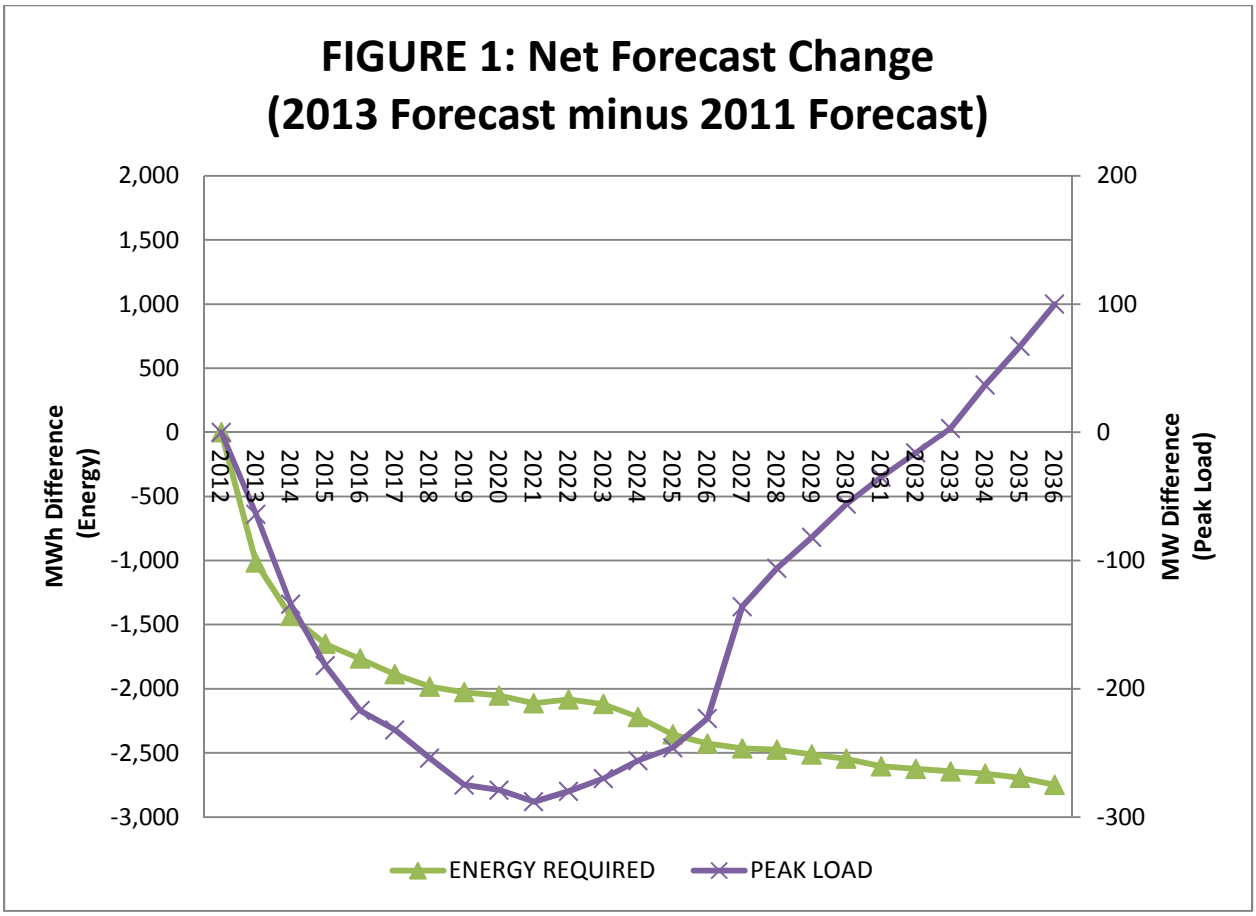
A. The term "base forecast" refers to the fall 2011 update in the most recent resource plan (Docket No. E002/RP-10-825) while "spring 2013 forecast" means the forecast presented in Xcel's petition in Docket No. E002/RP-13-368.

Data for the spring 2013 forecast was obtained from Xcel's response to Department of Commerce Information Request No. 1 in Docket No. E002/RP-13-368. A comparison of the peak demand and energy forecasts is shown in Figure 1 below. In Figure 1, a positive number means the spring 2013 forecast estimates a higher need than indicated by the fall 2011 update; a negative number means the spring 2013 forecast is for a lower need.

Q. What are your observations about the forecasts?

A. I note that, overall, the spring 2013 forecast predicts a lower energy need than the fall 2011 forecast and a lower peak load than the fall 2011 forecast, net of conservation.[1] However, the difference in peak load between the spring 2013 forecast and the fall 2011 forecast is large in the early years ranging from a 64 MW difference in 2013 to a high of 288 MW difference in 2021 and gradually declines to a difference of 223 MW by 2023; it is 136 MW or less from 2027 and on.

[1] Note that direct load control is treated separately from conservation in Strategist as constructed by Xcel. The amount of direct load control input to Strategist is lower in the 2013 model than in the 2011 model by between 20 and 105 MW. Generally, the difference is large in the early years and declines; it is 25 MW or less from 2022 and on.



Thus, one of my concerns is the different patterns in these two vintages of forecast as presented by Xcel. In particular:

- Why the differences in the two forecasts of peak demand that Xcel prepared a year and a half apart – from fall 2011 to spring 2013 – follows a U-shaped pattern over the forecasted period?
- Why Xcel's spring 2013 forecast predicts that energy sales will be consistently lower over the forecast period, while Xcel's spring 2013 forecast predicts that peak load will decline and then grow to be slightly higher than estimated in the fall 2011 forecast.

- These changes in peak and energy forecasts, together, mean that Xcel predicts a significant change in the overall load factor of its system.[2] Specifically, Xcel's prediction that customers will use less energy overall while making higher demands on Xcel's peak means that Xcel predicts that its load factor will decrease significantly over time, with customers demanding ever more from Xcel's peak while using less energy overall. What is the basis for this prediction?

Q. What information did Xcel provide about the changes in its sales forecast?

A. The Company's response to Department Information Request No. 9 provides detailed information on the various changes in methodology, models and the data Xcel used in the various vintages of its forecasts. This response is included as DOC Exhibit ___ at (SS-2) (Shah Direct).

Q. What does Xcel's response tell you about the changes to the Company's sales forecast from fall 2011 to spring 2013?

A. Some of the changes are interesting. For example, the Company stated the following in its response:

> Prices
>
> The Fall 2011 forecast included an electric price forecast for Minnesota and North Dakota based on the U.S. Wholesale Price Index for electricity.

[2] The load factor measures how much customers use a utility's system over the course of a year relative to the size of the system; the higher the load factor, the more customers use a utility's system throughout the year, whereas a low load factor means that customers make less use of a utility's system over the year. For example, industrial customers tend to have a higher load factor than a residential customer since, unlike residential customers, industrial customers tend to use about the same amount of energy throughout a day and throughout the year.

> The Spring 2012 forecast included an electric price forecast for North Dakota based on the U.S. Wholesale Price Index for electricity and an electric price forecast for Minnesota based on the Company's Strategist model.
>
> The Fall 2012 and Spring 2013 forecasts included an electric price forecast for Minnesota and North Dakota based on the Company's Strategist model.

Q. Please explain the significance of the excerpt above.

A. The spring 2013 forecast uses Strategist outputs to create the electric price variable. However, to produce outputs, Strategist needs a demand and energy forecast input. Thus, Xcel would presumably use an old vintage of forecast as an input into Strategist, run Strategist and get the price variable output, then in turn, put these price outputs into the new forecast inputs and create a new demand and energy forecast and put that new forecast into Strategist to run for the IRP.

Overall, this approach seems rather odd. In any case, below I discuss my overall conclusions about the forecasts used in this proceeding.

Q. Do you have any additional observations to address concerns that may arise regarding the latest vintage of Xcel's forecast, namely the spring 2013 forecast?

A. Yes I have one additional set of observations. Figures 2 and 3 below compare the spring 2013 forecast to the fall 2011 forecast, along with contingencies of 2.5 percent and 5 percent that Dr. Rakow uses in his analysis.

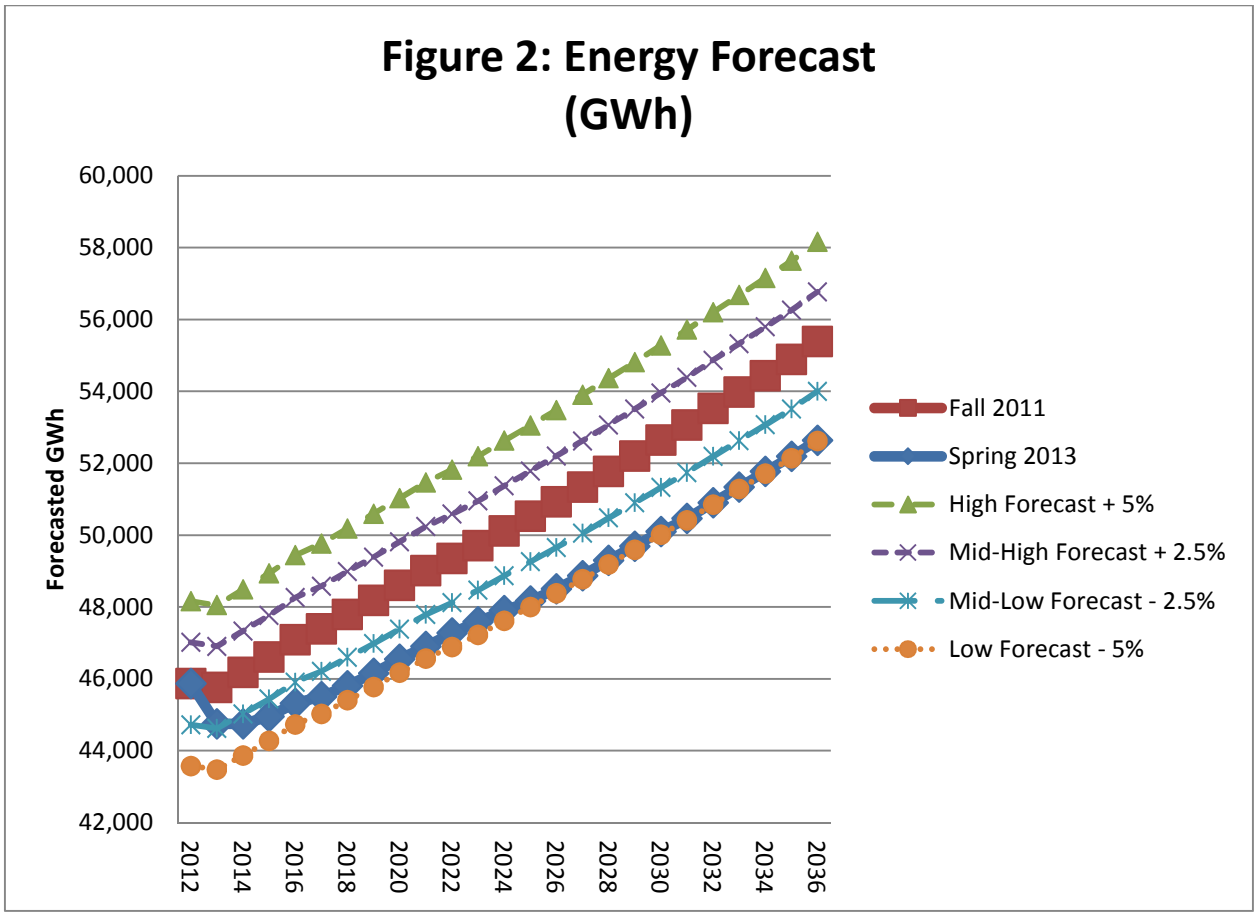
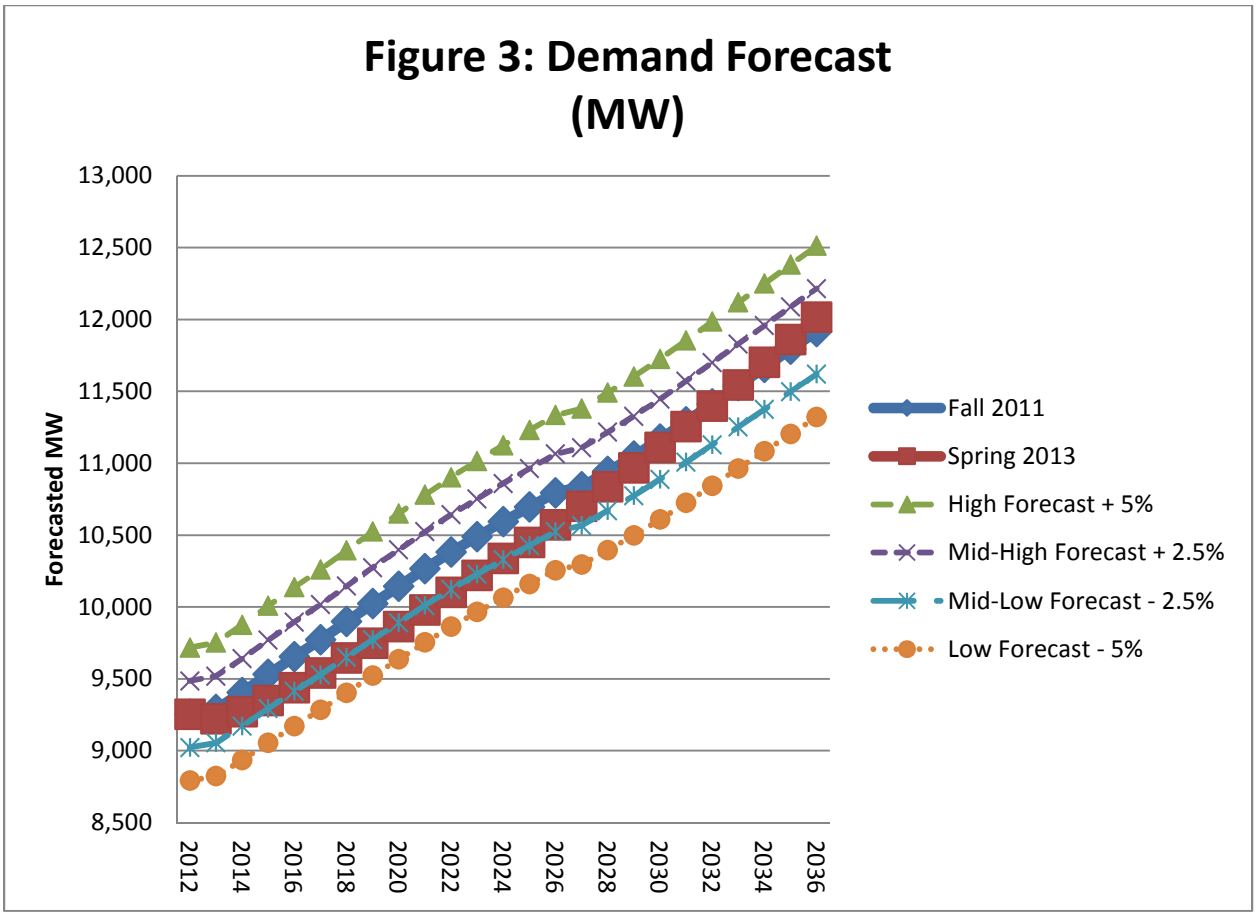


Figure 2: Energy Forecast (GWh)
Forecasted GWh
60,000
58,000
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
Fall 2011
Spring 2013
High Forecast + 5%
Mid-High Forecast + 2.5%
Mid-Low Forecast - 2.5%
Low Forecast - 5%

1



Q. What do you observe from Figures 2 and 3?

A. While the energy portion of the spring 2013 forecast is barely within the range indicated by the low forecast (-5 percent contingency) for the period of approximately 2015 to 2036, demand for this same period is within the mid-low forecast (-2.5 percent contingency) and very close to the fall 2011 forecast in the later years (i.e., approximately equal to the fall 2011 forecast in later years. Nonetheless, these Figures show that, overall, the 2013 spring forecasts (both demand and energy) are within the various contingencies modeled by Department Witness Dr. Steve Rakow, based on the fall 2011 forecast.

Q. Based on this information, what do you conclude?

A. As mentioned above, the fundamental goal in certificate of need and resource planning proceedings is not to establish a plan that is least cost under a single forecast but for the plan to be least cost across a wide range of forecasts. Given this goal, the concerns I discuss above, the Commission's decision not to require continual updating of forecasts in the 2010 IRP (i.e. that the need was based on using the fall 2011 forecast), and the fact that the spring 2013 forecast is within the 5 percent contingency modeled, I conclude that Department Witness Dr. Steve Rakow's use of the fall 2011 forecast as a starting point to begin his analysis of assessing the bids is reasonable.

V. NATURAL GAS SUPPLY, DELIVERY AND COSTS

Q. Please identify Xcel Energy's proposal.

A. Xcel's proposal consists of three 215 MW combustion turbine (CT) peaking units with one unit proposed to be placed at the Company's existing Black Dog plant in Burnsville, Minnesota and the other two units at a site in the Red River Valley near Hankinson, North Dakota. The Company on page 1-11 of its Application and Proposal states the following with respect to the CT unit proposed to be placed at the Black Dog site:

> The unit will be fueled entirely by natural gas. Center Point Energy currently serves the Plant site. We plan to secure additional natural gas supply through a competitive process beginning in early 2014. We anticipate that the successful bidder may need to replace the existing pipeline serving the plant with a new higher pressure natural gas line from the Cedar Town Border station to the plant.

Q. Please identify how Xcel proposes to deliver natural gas to its existing Black Dog plant referenced above.

A. Xcel proposes that natural gas be delivered to the Black Dog facility via the Northern Natural Gas (NNG or Northern) interstate pipeline system. In its response to Department Information Request Nos. 11 and 12 (which are included as DOC Exhibit ___ at (SS-3) (Shah Direct)), Xcel stated the following:

> Northern Natural Gas (NNG) has 16″ and 26″ pipelines that deliver gas to the Cedar Town Border Station (TBS). These pipelines deliver gas to the NSP St. Paul local distribution system and to the High Bridge power plant with a 650 psi delivery pressure guarantee from NNG. NNG also delivers gas to a CenterPoint gas line that serves Black Dog. Current pressure for that delivery is roughly 400 psi, but the delivery pressure may be increased with adequate notice.
>
> The new generation proposed at the Black Dog site may require the construction of new pipeline facilities as described in NSP's response to DOC-011. If that is the case, the Company plans to issue a Request for Proposal for gas transportation services from the NNG Cedar Town Border Station to the Black Dog power plant. The specifications in the RFP will include the 650 psi pressure guarantee from NNG at the Cedar Town Border Station, the required regulated delivery pressure of 525 psi pressure at the inlet to the Black Dog plant, the required date for the first delivery of gas and the flow rate required to operate the new power plant. The proposals will be evaluated to ensure that the bidder has the appropriate financial backing, technical experience, and that it meets the RFP specifications. Once these preliminary requirements are met, then the bids will be evaluated for price over the term of the agreement.

Q. How do you respond to this information?

A. The Northern pipeline originates in the Permian region of Texas, traverses up the Midwest, and runs just east of the Metro area (where it interconnects with Viking Gas Transmission Company's interstate pipeline near North Branch, Minnesota) to its terminus at Carlton, Minnesota. Northern is the major interstate pipeline that serves Minnesota customers, and is the primary transporter for metro area customers. Thus, I agree that Northern would be the closest interstate pipeline to the above proposed facility at the Black Dog site. I also agree that it is appropriate to use an RFP to firm up the costs of delivering natural gas to this site.

Q. Please identify how Xcel proposes to deliver natural gas to its proposed Red River Valley Units referenced above.

A. Xcel states that the Red River Valley units would be located close to a major interstate natural gas pipeline. On page 4-9 of its Application and Proposal, Xcel stated the following:

> The combustion turbines will utilize natural gas as its fuel. The layout of the facility allows for addition of distillate oil storage and handling if a future need develops to have oil as the backup fuel. The Hankinson siting area is near the Alliance interstate gas pipeline. Multiple parties utilize this line to transport gas, and indicated a willingness and ability to provide gas service. We anticipate securing the necessary natural gas supply through a competitive process beginning in 2014. Water supply will either be from an on-site well or provided by truck.

In addition, in its reply to Department Information Request No. 15, and included as DOC Exhibit ___ at (SS-4) (Shah Direct), Xcel stated the following:

> The combustion turbines will utilize natural gas as its fuel. The layout of the facility allows for addition of distillate oil storage and handling if a future need develops to have oil as the backup fuel. The Hankinson siting area is near the Alliance interstate gas pipeline. Multiple parties utilize this line to transport gas, and indicated a willingness and ability to provide gas service. We anticipate securing the necessary natural gas supply through a competitive process beginning in 2014. Water supply will either be from an on-site well or provided by truck.

Q. What do you conclude from this information?

A. I conclude that Xcel appears to have the capability of securing the natural gas supplies for the three proposed facilities identified in its proposals.

Q. What natural gas prices did Xcel use in preparing its Application and Proposal?

A. According to Xcel, it used the Ventura, Iowa hub as a basis for gas prices. On page 5-2 of its Application and Proposal, Xcel stated the following:

> … The peaking resources were modeled as dispatchable units with heat rate curves that reflect the units' efficiency at various generation levels. Each unit's maximum capacity was modeled as approximately 230 MW in the winter, and 215 MW in the summer. The fuel costs are based on the forecasted costs of natural gas at the Ventura hub, with transportation cost adders included to reflect the expected cost at each of the sites.

Q. How do you respond to this information?

A. I generally agree that the market for natural gas supplies is competitive at this time; further, Xcel's use of gas prices based on the Ventura hub is reasonable.

Q. Has Xcel secured the natural gas supply and pipeline infrastructure for its Application and Proposal?

A. No. As mentioned above, Xcel plans to secure the natural gas supply and pipeline infrastructure for the proposed facilities at Black Dog, and the Red River Valley units.

Q. How does Xcel's bid address its statement that "The new generation proposed at the Black Dog site may require the construction of new pipelines facilities as described in NSP's response to DOC-011"?

A. Xcel in its response to Department Information Request No. 17, included as DOC Exhibit ___ at (SS-7) (Shah Direct), stated the following:

> Our estimate of gas supply costs for Black Dog Unit 6 is presented on page C-12. We anticipate the gas supplier will pass any pipeline upgrades costs to Xcel Energy in the form of an annual, fixed demand charge as part of a gas supply contract. The demand charge allows the gas pipeline firm to recover the capital cost of line upgrades over the supply period and is included in the financial analysis of the proposed project. After consulting with gas suppliers, we included the demand charge found on page C-12.

Thus, Xcel did include the capital costs for the Black Dog Plant as indicated in its strategist template form referenced above.

Q. Please identify Invenergy's proposal.

A. Invenergy's proposal is for a new site in Hampton, Minnesota. Invenergy's proposed project would be interconnected to the existing natural gas pipeline of Greater Minnesota Gas Inc., which runs less than one-half mile from the proposed project site. Invenergy

states on page 12 of its application that its proposed units would have natural gas as the primary fuel with dual fuel capability. Specifically, on page 17 of the *Hampton Energy Center Bid,* Invenergy stated the following:

> Natural gas will be supplied to the Hampton Energy Center by a 16" diameter lateral pipeline that is owned and operated by Greater Minnesota Gas ("GMG") that connects to Northern Natural Gas transmission pipelines approximately 3.5 miles northwest of the project site. We have been in contact with GMT and they have indicated that the existing pipeline should be capable of serving both the new facility with only minor upgrades or operational changes.
>
> … It is assumed that gas compression will not be required to meet the plant's 550 psig gas pressure requirement when connected to nearby natural gas transmission pipelines.

Q. Does Invenergy have any additional proposals?

A. Yes. Similar to its Project above, Invenergy is proposing an expansion at its existing Cannon Falls Facility, and is similarly interconnected to an existing natural gas pipeline of Greater Minnesota Gas Inc. and will also use natural gas as the primary fuel with dual fuel capability. Specifically, on page 18 of its *Cannon Falls Peaking Expansion Bid*, Invenergy stated the following:

> Natural gas is supplied to the existing Cannon Falls Facility by a 16" diameter lateral pipeline that is owned and operated by Greater Minnesota Gas (GMG) that connects to Northern Natural Gas transmission pipelines approximately 13.5 miles northwest of the project site. We have been in contact with GMT and they have indicated that the existing pipeline should be capable of serving both the new unit and the existing units with only minor upgrades or operational changes.

> … It is assumed that gas compression will not be required to meet the plant's 550 psig gas pressure requirement when connected to nearby natural gas transmission pipelines

Q. Has Invenergy secured the natural gas supply and pipeline infrastructure for its Proposal?

A. No. On page 4 of the *Cannon Falls Peaking Expansion Bid* Invenergy stated the following:

> ... Invenergy proposes to develop the Cannon Falls Peaking Expansion and sell the capacity and energy to NSP with terms and conditions substantially similar to the existing Power Purchase Agreement between Cannon Falls and NSP dated April 1, 2005.

On page 4 of the *Hampton Energy Center Bid* Invenergy stated the following:

> ... Invenergy proposes to develop the Hampton Energy Center with a design and configuration that is very similar to Invenergy's existing Cannon Falls Facility this is located in Goodhue County. Furthermore, Invenergy proposes to sell the capacity and energy to NSP with terms and conditions substantially similar to the existing Power Purchase Agreement between Cannon Falls and NSP dated April 1, 2005.

Thus, Invenergy assumes that Xcel would pay all of the fuel costs of purchasing and delivering natural gas to its proposed Cannon Falls and Hampton facilities. Please see responses to Department Information Request Nos. 39, 41, and 42 included as DOC Exhibit ___ at (SS-5) (Shah Direct).

Q. Please identify Calpine's proposal.

A. Calpine's proposal is to supply approximately 345 MW of the forecasted need determined in Xcel's 2010 IRP. On page 2 of its Proposal, Calpine stated the following:

> Calpine proposes to supply 345 megawatts of the estimated 500 megawatts of Xcel Energy's forecasted capacity and energy needs for the 2017 to 2019 timeframe (the "Proposal"). The Proposal involves expansion of the Mankato Energy Center (the "Mankato Expansion") through the addition of one natural gas-fired combustion turbine generator ("CTG"), an additional heat recovery steam generator ("HRSG"), and related ancillary equipment. The Mankato Expansion would increase the plant's output by adding 290 megawatts of intermediate combined-cycle capacity and 55 megawatts of peaking capacity.[1] (footnote omitted)

On page 4 of its Proposal Calpine stated the following:

> The Mankato Energy Center was constructed so as to accommodate future installation of an additional power train (CTG and HRSG) and already includes a steam turbine generator and gas pipeline lateral that are sufficiently sized for the Mankato Expansion.

On page 2 of Appendix A Calpine stated the following:

> The existing 20" gas lateral is capable of delivering the requisite gas for both MEC and MEC expansion.

Q. Please identify the gas pipeline lateral referenced in Calpine's Appendix A above.

A. In its response to Department Information Request No. 32 and included as DOC Exhibit ___ at (SS-6) (Shah Direct), Calpine stated the following:

> Northern Natural Gas Co. (Northern) is the interstate pipeline directly upstream of Calpine's 20" diameter lateral. Northern delivers to the 20" lateral via its existing 16" diameter mainline. Northern's existing 16" diameter mainline is served from an interconnect with Northern

> Border Pipeline Co. (NBPL) at Welcome, MN. The Mankato Energy meter station is owned by Calpine with Northern owning the electronic flow measurement (EFM) at the station. In addition to the EFM, Northern owns approximately 60 feet of 16" diameter pipeline connecting the meter station to Northern's mainline. Currently, the meter station has a guaranteed pressure of at least 550 psig.

Thus, the lateral pipeline referenced above is on Northern's system.

Q. Has Calpine secured the natural gas supply and pipeline infrastructure for its Proposal?

A. No. In Appendix A, on page 3 of the *Calpine's Mankato Energy Center Expansion Proposal* Calpine stated the following:

> Calpine intends to follow the PPA structure used in the Purchased Power Agreement between MEC and Northern States Power Company executed on March 11, 2004 ("MEC PPA") for expediency, cost effectiveness and negotiating efficiency.

Thus, Calpine assumes that Xcel would pay all of the fuel costs of purchasing and delivering natural gas to the Mankato Energy Center facilities. Please see responses to Department Information Request Nos. 39, 41, and 42 included as DOC Exhibit ___ at (SS-5) (Shah Direct).

Q. What is your assessment of the natural gas prices used in the proposals of Xcel, Invenergy, and Calpine?

A. Based on what Invenergy and Calpine have stated, namely that Xcel would be responsible for all fuel supply and delivery costs under their respective proposals, the Department sought from Xcel its view of the relevant fuel supply and delivery cost

information to be used in comparing all of the bids (i.e., the relevant bids pertaining to natural gas) from all relevant Bidders. Please see responses to Department Information Request Nos. 39, 41, and 42 included as DOC Exhibit ___ at (SS-5) (Shah Direct).

In its response to Department Information Request No. 42, and included as DOC Exhibit ___ at (SS-5) (Shah Direct), Xcel stated the following:

> 1. Yes, the bidders are proposing that Xcel be responsible for the costs of fuel purchasing and delivery for these projects and we are currently developing estimates of those costs. However, the bidder is responsible for installing and maintaining the incremental back-up fuel oil facilities.
>
> 2. No, it would not be appropriate to use the costs currently contained in Xcel's strategist base case to evaluate the *Bids* and *Proposal* of Invenergy and Calpine. The cost contained in the Strategist base case are natural gas commodity costs, plus the variable transport costs to deliver gas to the existing facilities based on the existing transport agreements. Although the natural gas commodity costs are likely to be representative of the supply cost, it is likely that the variable transport charges will be different. In addition, the Strategist base case does not include the annual fixed charges associated with fuel delivery at those sites. Both variable transport cost and annual fixed charges for fuel supply will be dependent on whether or not firm or interruptible fuel supply will be used at the facility. We are currently developing these estimates and propose to provide these costs in a supplemental response in approximately three weeks (Aug 9th). If the estimates are completed sooner than expected we will supply them as soon as they are available.
>
> 3. NSP uses a combination of firm and interruptible upstream transportation service to deliver firm gas supplies to Cannon Falls and Mankato, in addition to the back-up fuel oil. Gas supply is purchased at Ventura, Iowa on Northern Natural Gas (NNG) and then transported by NNG to the plants. Mankato is directly connected to NNG via a plant line. Cannon Falls is served from NNG via Greater Minnesota Gas.

Xcel supplemented its response to Department Information Request No. 42 on August 16th, 2013. Xcel used the Ventura Hub for the bids referenced above and thus the natural gas prices used in the reference case are consistent between the relevant bids. However, there may be some differences in fixed gas costs, including Xcel's statement that "The new generation proposed at the Black Dog site may require the construction of new pipeline facilities as described in NSP's response to DOC-011." Moreover, regardless of the prices used, natural gas prices will change in the future. Thus, Department Witness Dr. Steve Rakow uses a range of natural gas prices in his analysis of the bids.

Q. Based on the above discussion do you have any concerns?

A. Yes. In its supplemental response to Department Information Request No. 42, and included as DOC Exhibit ___ at (SS-5) (Shah Direct), Xcel stated the following:

> 5. Please see Attachment B for details regarding the estimated upstream pipeline transportation costs to provide fuel to the Mankato, Hampton, and Cannon Falls plants. All three plants would be sited in an area where the interstate natural gas pipeline is essentially fully subscribed, requiring construction of additional pipeline facilities to make the plants' fuel supply highly reliable. Mankato would be served by transportation service from Northern Natural Gas. Since Mankato is proposed as a combined cycle, intermediate load facility, it will require firm gas transportation on a year-round basis.
>
> Hampton and Cannon Falls would be served by transportation from Northern Natural Gas and Greater Minnesota Transmission. Attachment B shows estimated costs to provide firm year-round transportation service to Hampton and Cannon Falls to make the plants' fuel supply highly reliable. In the alternative, if the Commission elects less reliable service for these two plants, Attachment B separately shows costs for interruptible transportation service to the plants. Using interruptible service, the

Commission should expect the plants to have regular fuel supply in the summer months (April through October) except during periods of pipeline maintenance and emergency operations. However, in the winter months (November through March), the Commission should expect the plants to be unable to operate on most cold winter days due to interruption of gas transportation services on Northern Natural Gas. The interruptible service option is cheaper for low-load factor peaker plants; however, the plants will not be available on many winter days.

6. There are no local distribution charges for Mankato in NSP's Strategist base case; however, Cannon Falls and Hampton rely on Greater Minnesota Transmission as described in (3) above. The Greater Minnesota Transmission system, which is considered an intrastate facility, would also be used to serve the Hampton and Cannon Falls plants. Those costs are detailed in Attachment B to Response 5 above. There are no other distribution charges anticipated for these plants

My concern is that Xcel appears to indicate that Northern is "capacity constrained." Thus, there appears to be the potential for inadequate capacity on Northern's interstate pipeline system to any of the three natural-gas-fired plants.

Q. What do you mean by "capacity constrained"?

A. An interstate pipeline is designed and constructed to carry and deliver a specific amount of gas. When the amount of designed capacity is fully contracted, it is considered to be capacity constrained. That is, there is no more available space on the pipe to transport gas. However, when the amount of designed capacity is not fully contracted, there will be unused (or excess) capacity available.

Q. Based on the above discussion do you have any observations?

A. Yes. In various places throughout its application as well as in its response to Department Information Request No. 42 and included as DOC Exhibit ___ at (SS-5) (Shah Direct), Xcel discussed the supply of natural gas in the context of the supply being either firm or interruptible. Invenergy and Calpine both indicated that Xcel would be responsible for all fuel supply and delivery costs under their respective proposals, but did not differentiate between firm or interruptible supply.

Q. Does the Department have any concerns regarding the Bidders' proposed delivery by Northern of natural gas service to the Bidders' respective facilities?

A. Yes and no. Yes, it would be necessary for the plants in the bids to have firm natural gas service if the plants are counted on to run during winter months, when the natural gas system is likely to peak.

On the other hand, if there are firm supplies to the plants, the Department would not be concerned about delivery of the gas on NNG's system. Northern is a federally regulated interstate pipeline and is obliged to refrain from entering into a transportation agreement unless the capacity necessary to fulfill its contracted obligation is currently available or it was prepared to expand the pipeline capacity accordingly.

Q. Please define what you mean by "firm natural gas."

A. "Firm" natural gas service means that, except under some unforeseen occurrence (Force Majeure), a firm natural gas customer will be supplied with natural gas. "Interruptible" natural gas service, on the other hand, means that a customer can be told by its natural

gas provider to discontinue use of natural gas, which usually occurs on very cold days when the provider's system is at peak use and it cannot provide natural gas for all of its firm as well as its interruptible customers.

Q. Do you have any additional concerns?

A. Yes. Since Xcel would be responsible for all fuel supply and delivery costs under the other Bidders' respective proposals, Xcel would be responsible not only for interstate pipeline transportation costs of supplying the natural gas but also for the costs of natural gas and for securing such natural gas services. The Midcontinent Independent System operator (MISO) would be responsible for dispatching the Bidders' plants. Thus, it is possible that the plants could be curtailed or "interrupted" because of natural gas supply issues or for economic reasons related to the generation unit as well.

In addition, other issues such as whether the plants have dual fuel capability and plant outages (foreseen or unforeseen) on Xcel's system also will affect how these particular plants (any of the Bidders' proposals) would be dispatched in practice.

Q. How do you propose that the issue of firm vs. interruptible gas supplies be addressed in this proceeding?

A. Minnesota Statute §216B.04 requires that service to retail customers must be "safe, adequate, efficient, and reasonable." Thus, to ensure that the results of this process meets this requirement, Xcel should provide an in-depth review and analysis, in its Rebuttal testimony, of the benefits and costs of firm versus interruptible natural gas supply, how it intends to use its current interstate pipeline contracts or acquire new contracts and

services for natural gas supply or upgrades to the natural gas system in relation to all of the Bidders' proposals. Xcel should also provide the associated operational impacts of all such decisions and how, overall, Xcel will ensure that its obligations to provide "safe, adequate, efficient, and reasonable" service to retail customers pursuant to the requirements of Minnesota Statute §216B.04 are met.

Q. Based on the above information, what do you conclude?

A. I conclude that the natural gas prices associated with Northern that Department Witness Dr. Steve Rakow uses in his reference case in evaluating the bids were provided by Xcel, where all prices use similar natural gas costs, and are priced at the same market hub, are reasonably consistent for analyzing the bids in this case, based on the information available at this time.

However, to ensure a more detailed record upon which the Commission may base its decision in this matter, I conclude that Xcel needs to provide an in-depth review and analysis, in its Rebuttal testimony, of the benefits and costs of firm versus interruptible natural gas supply, how it intends to use its current interstate pipeline contracts or acquire new contracts and services for natural gas supply in relation to all of the Bidders' proposals, and the associated operational impacts of all such decisions and how, overall, Xcel will ensure that its obligation to provide "safe, adequate, efficient, and reasonable" service to retail customers pursuant the requirements of Minnesota Statute §216B.04 is met.

IV. CONCLUSIONS AND RECOMMENDATIONS

Q. Please provide your conclusion and recommendation at this time.

A. From my limited review, as explained above, I conclude, first, that Xcel's spring 2013 forecast is within the range of forecasts that Department Witness Dr. Steve Rakow uses in his analysis. Second, I conclude that Dr. Rakow's use of the Company's fall 2011 forecast provided in Xcel's 2010 IRP that was relevant to the Commission's determination of need in this present docket is the appropriate forecast to use to evaluate the bids provided in this proceeding for all of the reasons discussed above. Third, I conclude that the prices associated with Northern that Department Witness Dr. Steve Rakow uses in his reference case in evaluating the bids are reasonable.

Finally, I recommend that Xcel provide an in-depth review and analysis in its Rebuttal testimony of the benefits and costs of firm versus interruptible natural gas supply, how it intends to use its current interstate pipeline contracts or acquire new contracts and services for natural gas supply in relation to all of the Bidders' proposals, and the associated operational impacts of all such decisions and how overall Xcel will ensure that its obligation to provide "safe, adequate, efficient, and reasonable" service to retail customers pursuant to the requirements of Minnesota Statute §216B.04 is met.

Q. Does this conclude your Direct Testimony?

A. Yes.