STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS
FOR THE
MINNESOTA PUBLIC UTILITIES COMMISSION

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**

INITIAL POST-HEARING BRIEF

OF THE

MINNESOTA DEPARTMENT OF COMMERCE,

DIVISION OF ENERGY RESOURCES

November 22, 2013

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The Minnesota Department of Commerce, Division of Energy Resources, Energy Regulation and Planning (Department or DOC-DER) respectfully submits this Initial Post-Hearing Brief to provide the Administrative Law Judge (ALJ) and the Minnesota Public Utilities Commission (Commission) with an analysis of facts and law supporting its position in the above-entitled matter.

SUMMARY

The docket represents the first time the Commission will select and approve resources in a Commission-established bidding process.[1] The Commission determined the size, type and timing of need in the most recent resource plan[2] of Northern States Power Company d/b/a Xcel Energy (Xcel). Specifically, the Commission determined, based on extensive evidence, that Xcel needs 150 MW to 500 MW of accredited capacity of peaking or intermediate resources within the 2017-2019 time frame.[3] This competitive resource acquisition proceeding is focused on addressing that need. DOC-DER reviewed the various proposals of parties, conducted analysis of over 150 combinations of bids under various sets of facts that resulted in thousands of computer runs[4] with a screening analysis for the first step, and detailed cost analysis for the second step.[5] The Department's final analysis showed that three proposed projects are superior: Calpine Corporation's Mankato project, Invenergy Thermal Development's Cannon Falls

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[1] DOC-DER Ex. 102 at 1 (Rakow Opening Statement); Tr.V.2 at 49 (Rakow).
[2] The Commission's March 13, 2013, *Order Approving Plan, Finding Need, Establishing Filing Requirements, and Closing Docket* (Docket No. E-002/RP-10-825) (2010 IRP Order).
[3] DOC-DER Ex. 102 at 1 (Rakow Opening Statement); Tr.V.2 at 49 (Rakow).
[4] DOC-DER Ex. 83 at 4 (Rakow Direct). DOC-DER's computer analysis employed the capacity expansion software called "Strategist" which determines the set of resources that are the least cost method to meet demand in the future. DOC-DER Ex. 83 at 14 (Rakow Direct).
[5] DOC-DER Ex. 102 (Rakow Opening Statement); Tr.V.2 at 49 (Rakow). Other items such as duel fuel capability also may be negotiated. Tr.V. 2 at 35 (Shah).

project, and Xcel's Black Dog Unit 6 project.[6] Although the Commission-determined need does not require all of these three projects, the Department recommends that all three proceed to power purchase agreement (PPA) negotiations with Xcel such that ratepayers may benefit from parties' incentives to provide favorable terms in this stage of the acquisition process.[7] For example, issues regarding use of firm versus interruptible natural gas supply and in-service dates should be addressed in PPA negotiations.[8] Following review of the negotiated PPAs, the Department recommends that the Commission select "the best two out of the three" projects.[9] Absent differences negotiated in the PPAs, the Department concluded from its analysis that the best combination is the Black Dog and Calpine projects.[10] Finally, the Department recommends that the Commission consider requiring Xcel to issue an all-solar request for proposals (RFP) in the context of Xcel's 2014 integrated resource plan (IRP).[11]

PROCEDURAL BACKGROUND

The Commission's June 21, 2013, *Notice and Order for Hearing* in this matter provided the following procedural history:

> On March 15, 2011, Northern States Power Company d/b/a Xcel Energy (Xcel) filed a petition for a Certificate of Need to renovate and increase the capacity of its Black Dog Generating Plant. Xcel justified its proposal by arguing that the demand for power in its service area would exceed Xcel's capacities by 2014. Consistent with Commission orders, Xcel proposed soliciting proposals from

[6] Tr.V. 2 at 49-50 (Rakow).
[7] DOC-DER Ex. 102 (Rakow Opening Statement); Tr.V.2 at 52 (Rakow). The Department strongly recommends that ratepayers not be at risk for costs that are higher than bid or for benefits assumed in bids that do not materialize. Further, if negotiated PPAs result in costs that are lower than bid, all bidders including Xcel should be allowed to keep those savings. DOC-DER Ex. 101 (Shaw Opening Statement). The Department does not expect PPA negotiations to increase or shift risks to ratepayers. *See* Tr.V. 2 at 43 (Shaw).
[8] DOC-DER Ex. 100 (Shah Opening Statement).
[9] DOC-DER Ex. 102 at 1 (Rakow Opening Statement); Tr.V.2 at 49-50 (Rakow).
[10] DOC-DER Ex. 102 at 1 (Rakow Opening Statement); Tr.V.2 at 50 (Rakow).
[11] DOC-DER Ex. 83 at 43 (Rakow Direct).

project developers for alternative means to meet Xcel's anticipated power needs. The Commission assigned the matter to Docket No. E-002/CN-11-184.[12]

On December 7, 2012, Xcel asked to withdraw its Certificate of Need application, arguing that recent events and new data demonstrated that no new generating capacity would be needed by 2014.[13] Xcel continued to argue that it would need new capacity eventually, and continued to propose soliciting proposals from project developers. But given the significant changes in the record, Xcel argued that the Commission should re-establish the amount of power to be acquired, and the schedule for acquiring it.[14]

On November 21, 2012, the Commission issued an order largely adopting Xcel's proposal. The Commission agreed with the need to cancel the Black Dog project, and the need to solicit proposals from project developers based on a revised assessment of Xcel's power needs. Given the degree of change, however, the Commission elected to re-start this solicitation process within the context of a new docket. Consequently the Commission initiated the current docket, but took administrative notice of the record in Docket No. E-002/CN-11-184.[15] And the Commission established a procedural schedule, including the expectation that if the Commission referred this matter to the Office of Administrative Hearings for contested case proceedings, that office would return a report and recommendation by October 2013.

On January 30, 2013, the Commission issued its Order Approving Notice Plan, directing Xcel to begin soliciting new proposals from developers.

On March 5, 2013, in a separate docket, the Commission issued an order declaring that Xcel had demonstrated the need for an additional 150 megawatts (MW) by 2017, increasing up to 500 MW by 2019.[16] And in the current docket, the Commission issued an order designating April 15, 2013, as the deadline for developers to file proposals to meet some or all of Xcel's need.[17]

On April 15, 2013, the Commission received proposals from --

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[12] *In the Matter of the Application of Northern States Power Company d/b/a Xcel Energy for a Certificate of Need for Approximately 450MW of Incremental Capacity for the Black Dog Generating Plant Repowering Project*, Docket No. E-002/CN-11-184, Xcel Petition (March 15, 2011).

[13] *Id.*, Xcel Motion to Withdraw Application (December 7, 2011).

[14] *Id.*, Xcel Reply Comments (September 6, 2012).

[15] This docket and Docket No. E-002/CN-11-184, *Order Closing Docket, Establishing New Docket, and Schedule for Competitive Resource Acquisition Process* (November 21, 2012).

[16] *See* In the Matter of Xcel Energy's 2011-2025 Integrated Resource Plan, Docket No. E-002/RP-10-825, *Order Approving Plan, Finding Need, Establishing Filing Requirements, and Closing Docket* (March 5, 2013).

[17] This docket, *Order Extending Bidding Deadline and Refining Procedural Framework* (March 5, 2013).

- Calpine Corporation (Calpine),
- Geronimo Energy, LLC (Geronimo),
- Great River Energy (GRE),
- Invenergy Thermal Development, LLC (Invenergy), and
- Xcel.

By May 28, 2013, the Commission had received comments and supplemental filings from –

- project developers,
- the Izaak Walton League -- Midwest Office, Fresh Energy, the Sierra Club, and the Minnesota Center of Environmental Advocacy (collectively, the Environmental Intervenors), and
- the Minnesota Department of Commerce (the Department).

On June 3, 2013, Ecos Energy, LLC (Ecos Energy), petitioned for permission to submit a generation proposal, notwithstanding the passage of the April 15 deadline.

On June 5, 2013, the Department proposed procedures to facilitate environmental review of the various proposals consistent with a timeline compressed to ensure that any project(s) selected by the Commission could begin operations by 2017. The Department noted that adopting these procedures would require varying the Commission's rules.

On June 6, 2013, the Commission met to consider the matter. At that time the Commission received comments from all parties.

Also in its June 21, 2013 *Notice and Order for Hearing,* the Commission referred this matter to the Office of Administrative Hearings for a contested case proceeding, and took the following action:

1. Denied the request of Ecos Energy for permission to submit a generation proposal more than two months after the deadline for project submissions;

2. Found that the developer of project chosen through this Commission-approved competitive resource acquisition process is exempt from securing a certificate of need under Minn. Stat. § 216B.243 prior to construction;

3. Found that each proposal filed by Calpine, Geronimo, GRE, Invenergy, and Xcel was substantially complete.

4. Regarding the Environmental Report to be prepared by the Department of Commerce's Energy Facilities Permitting Unit (now the Energy Environmental Review and Analysis, or EERA) the Commission:

a. Granted the EERA's rule variance request and authorized the Department to focus its analysis on the substantially complete alternatives, and on a no-build alternative for each of these alternatives;

b. Requested that the Department prepare an Environmental Report sufficient to meet the requirements outline in Minn. R. 7849, as varied, for all of the substantially complete alternatives;

c. Requested that the Department review Geronimo's solar proposal(s) cumulatively for the up to 31 sites; and

d. Requested that the Department treat the GRE capacity credit proposal as capacity only.

5. Designated the following entities as parties to the contested case proceeding: Calpine, Geronimo, GRE, Invenergy, Xcel, DOC-DER and the Environmental Intervenors.

On July 1, 2013, ALJ Eric L. Lipman convened a prehearing conference, and established the following schedule for this proceeding:[18]

August 2, 2013	Intervention
September 27, 2013	Direct Testimony
October 15-18, 2013	Public Hearings
October 18, 2013	Rebuttal Testimony
October 21, 2013	Close of Discovery Period for Non-Government Parties
October 21-25, 2013	Evidentiary Hearing
November 1, 2013	Close of Public Comment Period
November 22, 2013	Initial Briefs
December 6, 2013	Reply Briefs
December 31, 2013	ALJ Report

[18] *Second Pre-Hearing Order*, July 17, 2013.

On June 7, 2013, and July 10, 2013, Ecos Energy filed a Petition to Intervene and a Verified Petition to Intervene, respectively.

On July 31, 2013, the North Dakota Public Service Commission Advocacy Staff filed a Petition to Intervene.

On August 5, 2013, the Commission denied the reconsideration motion of Ecos Energy to submit a proposal out of time.[19]

On August 21, 2013, having considered objections, the ALJ denied Ecos Energy's Petition to Intervene; the ALJ granted the unopposed Petition to Intervene of the North Dakota Advocacy Staff.[20]

On September 5, 2013, Ecos Energy filed with the ALJ a Motion for Reconsideration or, in the alternative, a Motion for Certification regarding its Petition to Intervene.

On September 27, 2013, the following parties filed Direct Testimony: Calpine, Geronimo, GRE, Invenergy, Xcel, North Dakota Advocacy Staff and DOC-DER.

On October 1, 2013, having considered objections, the ALJ denied Ecos Energy's Motion for Reconsideration and its alternative Motion for Certification.[21]

On October 4, 2013, the Commission determined that Xcel's plans to acquire 750 MW of wind generation constituted a changed circumstance under resource planning rules, and ordered Xcel to file a Notice of Changed Circumstances in dockets including the present docket, E-002/CN-12-1240.[22]

On October 8, 2008, the Xcel Large Industrials (XLI) filed a Petition to Intervene.

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[19] *Order Denying Intervention,* August 5, 2013.
[20] *Third Pre-Hearing Order,* August 21, 2013.
[21] *Fourth Pre-Hearing Order,* October 1, 2013.
[22] *Order Requiring Notice of Changed Circumstances and Granting Intervention,* October 4, 2013, Dockets E-002/RP-10-825, E-002/CN-12-1240, E-002/M-13-603, E-002/M-13-716.

On October 10, 2013, following a prehearing status and scheduling conference, the ALJ: ordered that on October 11, 2013, parties seeking access to trade secret materials in Docket No. 12-1240 and highly-sensitive trade secret materials in Docket No. 13-606 shall furnish protective order "Exhibit A" affidavits to Xcel; modified the Second Pre-Hearing Oder such that motions to strike must be filed by noon on October 21st, and set trial to begin on Tuesday, October 22, 2013.[23]

On October 14, 2013, the Department of Commerce, EERA issued the Environmental Report.

On October 15, 2013, ALJ Steve Mihalchick convened a public hearing in morning at the State Office Building, Basement Conference Room, in St. Paul, Minnesota.

On October 21, 2013, having considered objections, ALJ Lipman denied XLI's Petition to Intervene; the ALJ extended the public comment period by 21 days, from a deadline of November 1 to November 22, 2013.[24]

On October 18, 2013, the following parties filed Rebuttal Testimony: Calpine, Geronimo, GRE, Invenergy, Xcel, and DOC-DER.

On November 22, 2013, parties filed Initial Post-Hearing Briefs.

STATEMENT OF ISSUES

The Commission identified the issues to be addressed and the process to be used in this matter, as follows:[25]

> The ultimate issue in this case is the identification of resource proposal or proposals that will provide the most reasonable and prudent strategy for Xcel to

[23] *Amended Seventh Pre-Hearing Order,* October 10, 2013.
[24] *Eighth Pre-Hearing Order,* October 21, 2013.
[25] *Notice and Order for Hearing,* at 5.

meet the needs of its service area. That issue depends, in turn, on numerous sub-issues that can be best developed in formal evidentiary proceedings. The parties may also raise and address other issues relevant to that determination.

As noted above, a developer of a selected project need not obtain a Certificate of Need before beginning construction. But when Xcel seeks to offer its own proposal into the competitive resource acquisition process, this process tracks the framework of the Certificate of Need process under Minn. Stat. § 216B.243. [Footnote omitted].

ANALYSIS

I. BIDDERS, BIDS AND CRITERIA

A. Five Bidders Proposed Projects to Meet the Commission-Identified Need

Five companies proposed projects in this matter to meet Xcel's capacity need, as follows:

- 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).

DOC-DER Ex. 83 at 2 (Rakow Direct).

Department Witness Christopher Shaw evaluated the qualifications of the Bidders and determined that each is qualified to provide capacity, as requested in Xcel's RFP. DOC-DER Ex. 79 6 (Shaw Direct). Xcel had existing business relationships with Calpine, Invenergy and Geronimo, and either reported no problems with them or that the parties have worked collaboratively to resolve issues. *Id.* at 5-6. Moreover, GRE provides electric service to its member cooperatives in Minnesota, and also is a qualified bidder. *Id.* at 6.

B. Description of the Eight Proposed Projects

The Bidders proposed the following projects:

- Calpine: expand the existing natural-gas-fired Mankato Energy Center combine cycle turbine (CC) by 290 MW of intermediate capacity and 55 MW of peaking capacity (also referred as CCCI);
- Geronimo: build 100 MW of solar generation using photovoltaic panels, located on up to 31 sites adjacent to substations, ranging from 2 to 10 MW per site;
- GRE: two capacity credit proposals to sell Xcel Midcontinent Independent System Operator (MISO) Zone 1 Resource Credits (ZRCs);[26]
- Invenergy: two peaking proposals for gas-fired combustion turbines (CT):
  - expand the existing Cannon Falls facility with one CT unit, and
  - build a new, Hampton Energy Center with two CT units;
- Xcel: two peaking proposals for gas-fired combustion turbines
  - build one 215 MW CT unit at the existing Black Dog generating station (Black Dog unit 6); and
  - build two 215 MW CT units at a new site near Hankinson, North Dakota (North Dakota units 1 and 2).

DOC-DER Ex. 83 at 2-3 (Rakow Direct). At the public hearing, Xcel Witness Mr. Alders explained differences between combined cycle and combustion turbines:

[26] A ZRC is a credit for resources that count towards MISO's resource adequacy requirements. By selling ZRCs GRE would provide Xcel resources that would count for reliability purposes. However, GRE's proposal would not provide Xcel energy production rights. DOC-DER Ex. 83 at 2 (Rakow Direct).

> It's a large combustion turbine fired with natural gas. Peaking units tend to operate very few hours during the year, only when the demand for electricity is at its highest in the summer. The proposal by Calpine, and they can speak to this in more detail, is called a combined cycling unit, and it is a combustion turbine where the flue gas from that combustion turbine then is used to heat water and create steam in a second cycle to produce more electricity. The economics of those sorts of facilities are such that they're often used more often during the year in an intermediate role in our system.

Public Hr. Tr. 11-12 at (Alders). Calpine's Mr. Flumerfelt added:

> It's a combustion gas turbine. But instead of releasing the exhaust heat directly into the atmosphere, we capture that exhaust heat, turn it into steam, and are able to generate additional power.

Public H. Tr. 14 (Flumerfelt).

The proposed projects do not require a certificate of need (CN) in order to be selected by the Commission or to be constructed. Minn. Stat. § 216B.2422, subd. 5 (b) states in relevant part: "[I]f an electric power generating plant, as described in section 216B.2421, subdivision 2, clause (1), is selected in a bidding process approved or established by the Commission, a certificate of need proceeding under section 216B.243 is not required." The Commission's May 31, 2006 *Order Establishing Resource Acquisition Process, Establishing Bidding Process under Minn. Stat. § 216B.2422, subd. 5, and Requiring Compliance Filing* (Docket No. E002/RP-04-1752) approved the bidding process used in this proceeding. Therefore, the Commission-approved bidding process is being used to select proposal(s) that could meet the need identified in Xcel's last resource plan (Docket No. E002/RP-10-825). DOC-DER Ex. 83 at 3 (Rakow Direct).

C. Demand Forecast

The Department determined that its Strategist analysis should use as a starting point Xcel's fall 2011 sales forecast. DOC-DER Ex. 76 at 14 (Shah Direct). Xcel's capacity need that was determined by the Commission for this proceeding is based on Xcel's fall 2011 update in its

2011-2025 IRP in Docket No. E002/RP-10-825 (2010 IRP). Since that time, Xcel has produced additional forecasts, including its spring 2013 forecast that it uses for its base or starting point for its Strategist analysis. *See* DOC-DER Ex. 76 at 3-7 (Shah Direct). Only the fall 2011 forecast has been reviewed in detail by the Department and approved by the Commission. The Department has not verified the accuracy of Xcel's spring 2013 sales forecast. Tr.V. 2 at 29-30 (Shah). However, as described below, DOC-DER's analysis examined the proposals at sales levels even lower than Xcel's spring 2013 sales forecast.

Based on its spring 2013 forecast, Xcel predicts that its customers will use less energy and capacity in the initial years compared to the fall 2011 forecast. In future years, the spring 2013 forecast predicts that customers will continue to use less energy while making higher demands on Xcel's peak compared to the fall 2011 forecast. DOC-DER Ex. 76 at 8-10 (Shah Direct). The combination of these two predictions means that Xcel predicts a significant change (decrease) in the overall load factor of its system. DOC-DER Ex. 76 at 10 (Shah Direct).

Department Witness Sachin Shah identified concerns based on his limited review of the spring 2013 forecast, DOC-DER Ex. 76 at 7-13 (Shah Direct), but Xcel did not provide a reasonable basis or explanation for the predicted changes in that forecast. *Id.* at 9-11 (Shah Direct); Tr.V. 2 at 32-33 (Shah). Further, Mr. Shah determined that Xcel's 2013 spring demand and energy forecasts are within the various contingencies modeled in this matter by Dr. Rakow.

Thus, Mr. Shah concluded for the following reasons that it was reasonable for Dr. Rakow to use Xcel's fall 2011 forecast as the base for the Department's Strategist analysis:

> 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.

DOC-DER Ex. 76 at 14 (Shah Direct). Mr. Shah also testified that, for these same reasons, it was not reasonable for Xcel to use its spring 2013 forecast for its base or starting point for Xcel's Strategist analysis. DOC-DER Ex. 78 at 4 (Shah Rebuttal).

D. Natural Gas Supply

Three Bidders proposed projects fueled by natural gas: Xcel, Calpine and Invenergy. The Department reviewed the natural gas supply, delivery and cost assumptions of those Bidders' proposals. DOC-DER Ex. 76 at 14-28 (Shah Direct). Calpine and Invenergy indicated that Xcel would be responsible for all fuel supply and delivery costs under their respective bids, without differentiating between reliability and cost associated with firm versus interruptible gas supply. DOC-DER Ex. 76 at 26 (Shah Direct); Tr.V. 2 at 30 (Shah). Xcel, on the other hand, discussed firm versus interruptible supplies such as potential interruption at times of peak gas demand (winter), possible constraints on pipelines delivering gas and potential pipe construction. DOC-DER Ex. 76 at 7-26 (Shah Direct).

A key issue regarding cost assumptions in this matter is whether to assume firm or interruptible gas supply. If it would be necessary for the proposed plants to be counted on to run during winter months, when the gas system is likely to peak, then firm gas service would be important. DOC-DER Ex. 76 at 26 (Shah Direct). Mr. Shah identified various concerns, as follows:

> 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.

DOC-DER Ex. 76 at 27 (Shah Direct).

The Department requested that Xcel, in its rebuttal testimony, provide an in-depth review and analysis of the benefits and costs of firm versus interruptible gas supply, how Xcel intends to use its current interstate pipeline contracts or acquire new contracts and services for gas supply or upgrades to the gas system in relations to the Bidders' proposals. Mr. Shah noted that Xcel has the obligation under Minnesota law to provide "safe, adequate, efficient, and reasonable" service to retail customers. Minn. Stat. § 216B.04. DOC-DER Ex. 76 at 27-28 (Shah).

Xcel Witness Wishart provided the requested analysis in his Rebuttal Testimony. Xcel Ex. 48 at 3 and 18-24 (Wishart Rebuttal). Based on Xcel's rebuttal testimony, the Department concludes that issues regarding firm versus interruptible natural gas supply and associated terms and costs, as well as alternative storage capability and associated costs of the dual fuel (natural gas and fuel oil) aspect of Invenergy's proposal, are appropriate issues for negotiated PPAs. Tr.V.2 at 31 (Shah).

Mr. Shah confirmed that the Department's Strategist analysis included reasonable natural gas price assumptions:

> 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.

DOC-DER Ex. 76 at 28 (Shah Direct). Regardless of the prices used, natural gas prices will change in the future; thus it is reasonable that the Department used a range of natural gas prices in Strategist analysis of the bids. DOC-DER Ex. 76 at 24 (Shah Direct).

E. Transmission Interconnection Costs

To ensure that Bidders included all interconnection costs that may be borne by ratepayers or that such costs otherwise were properly considered in the Department's Strategist analysis, Department Witness Christopher Shaw reviewed "the costs associated with interconnecting the proposed projects to the transmission system, including the potential for curtailment or congestion charges." Tr.V. 2 at 39 (Shaw). Based on this analysis, Mr. Shaw concluded that all interconnection costs were included in Dr. Rakow's Strategist analysis. *Id.* at 45.

Bidders proposed to treat interconnection costs including potential network upgrade costs in different ways which initially made comparisons of the proposals challenging. DOC-DER Ex. 79 at 2-3 (Shaw Direct). Assuming that Bidders included all potential interconnection costs in their bids, the Department notified them that, as far as the Department is concerned, ratepayers should not be at risk for interconnection costs beyond those bid. Specifically, Mr. Shaw stated in a letter to Bidders, "Parties should not expect that ratepayers will pay for any additional costs that are specific to a particular project beyond those included in each bid." This approach best ensures the integrity of the competitive process. DOC-DER Ex. 79 at 3-4 (Shaw Direct).

While the Department received no objections to its letter notification, Calpine responded that its bid did not include MISO's estimated cost of necessary upgrades for its Mankato bid of $650,000 to $1,500,000 with "a final cost to be confirmed upon completion of the facilities study." DOC-DER Ex. 79 at 4 (Shaw Direct). Mr. Shaw advised Dr. Rakow to include in the

Strategist analysis for Calpine's Mankato proposal these additional costs. *Id.* Dr. Rakow did so. DOC-DER Ex. 83 at 7.

Xcel, in response to Department discovery, stated that it does expect any of the bid proposals to have significant congestion charges and, thus, Mr. Shaw did not suggest that the Department add congestion charges to its Strategist analysis. DOC-DER Ex. 79 at 5 (Shaw Direct).

As a result of his review, Mr. Shaw expressed concern that Xcel and Invenergy expected ratepayers to be responsible for costs that were not included in their underlying bids. DOC-DER Ex. 82 at 1 (Shaw Rebuttal). Xcel proposed to be allowed to pass extra costs to ratepayers by establishment of a rider similar to the rider that the Commission approved in Xcel's Minnesota Metro Emissions Reduction Project (MERP), Docket No. E002/M-02-633, which did not involve a competitive acquisition process. *Id.* at 2. Xcel, however, did not demonstrate the reasonableness of shifting costs to ratepayers in a competitive bidding process, either as a matter of fairness to other Bidders or to ratepayers. *Id.* at 2-3.

Invenergy included $7 million for interconnection costs in its Cannon Falls proposal, but identified a formula to calculate increases or decreases to that amount. DOC-DER Ex. 79 at 3 (Shaw Direct). Like Xcel, Invenergy failed to show the reasonableness of its suggestion that unknown costs be shifted to ratepayers following the Commission's selection of proposals. The integrity of the competitive process requires that Bidders are responsible for the costs of their proposals and, in the event that actual costs are lower than bid, the Bidders – including Xcel – should be allowed to retain any such savings. *Id.* at 3-4. As Mr. Shaw explained:

> While such an outcome is unlikely given past experience, Xcel should be able to retain any savings if their actual costs are lower than the costs they have bid into this process, just as any other bidder would be able to do.

DOC-DER Ex. 82 at 3 (Shaw Rebuttal).

The Department's recommendations regarding the PPA process in this regard are provided near the end of this Initial Brief.

F. Wind Acquisition

During the course of this proceeding, Xcel filed with the Commission two requests for approval to add additional wind resources in Docket Nos. E002/M-13-603 and E002/M-13-716. Mr. Shaw provided the Department's analysis of those dockets and recommended approval of Xcel's total request for an additional 750 MW of wind generation in 2015. DOC-DER Ex. 79 at 6-7 (Shaw Direct). Accordingly, Mr. Shaw advised Dr. Rakow to include the additional wind resources in the Department's Strategist analysis. *Id.* at 7. Dr. Rakow did so. DOC-DER Ex. 83 at 21-22 (Rakow Direct).

II. DEPARTMENT'S ANALYTICAL PROCESS OF BID EVALATION

A. The Analytical Process

Department Witness Dr. Steve Rakow outlined the analytical process used to analyze the cost of Bidders' proposals. He explained his process, as follows:

> I used the following process:
> 1. put data on each proposal into draft Strategist inputs;
> 2. ran Strategist on the draft proposals to de-bug the inputs;
> 3. sent the Bidders:
>   a. a file with Strategist inputs representing their proposal(s);
>   b. a file with Strategist outputs for the proposal showing unit(s) operational and cost data at different levels of output.
>   c. a request to obtain feedback (proposed changes or confirmation that proposal is represented correctly).
> 4. updated the Department's Strategist database;
> 5. sorted bids into packages to be analyzed;
> 6. wrote commands to run the proposal packages through Strategist;
> 7. ran Strategist on the proposal packages and reviewed the outputs;
> 8. selected a "short list" of packages/bids from the initial runs;
> 9. put the short list through Strategist contingency analysis (high gas cost, low coal cost, etc.);
> 10. selected the "winner(s).

DOC-DER Ex. 83 at 4-5 (Rakow Direct).

Dr. Rakow conducted a "first round" and "second round" of analysis. In the first round, he analyzed through Strategist[27] computer runs all possible bid packages that were less than 700 MW in size from which he created a "short list" of the bids or packages that warranted further analysis in a second round of Strategist runs. The criteria he used to develop the short list were bid packages that were least cost under a variety of circumstances including circumstances that may be of interest to the Commission such as meeting State statutory renewable energy goals. From his short list, Dr. Rakow identified "winners" which meant bids or packages that warranted detailed economic analysis in a "second round." DOC-DER Ex. 83 at 5 (Rakow Direct).

B. Proposal Data Development for Strategist Runs

The Department, with the assistance of the Bidders, used Bidders' data regarding their proposed projects that were stated in a form that the Strategist computer software could evaluate. Specifically, each Bidder completed the Strategist template data form available on Xcel's website as identified in the Department's May 3, 2013 completeness comments. Dr. Rakow either input this data directly into Strategist or calculated the required inputs from the Strategist template data. He then ran Strategist several times to remove any obvious errors in the inputs. DOC-DER Ex. 83 at 5 (Rakow Direct).

Once the proposals appeared to be in the correct form, Dr. Rakow ran most of the proposals through Strategist under several different system assumptions (the proposals themselves remained the same). From each run he downloaded data regarding how the

[27] Strategist is a "capacity expansion model," meaning it determines the set of resources that are the least cost method to meet increases in demand in the future. DOC-DER Ex. 83 at 14 n.4 (Rakow Direct).

proposal's unit(s) performed. He then sent each Bidder the data for each of their proposals. This data allowed the Bidders to see how their unit(s) performed in terms of cost, fuel consumption, pollutants emitted, etc. under a variety of capacity factors. Dr. Rakow noted that Geronimo's solar unit and GRE's ZRC (capacity credits) offer are not dispatchable and will always perform the same in Strategist. Therefore, he sent only one set of outputs to Geronimo and GRE. The Bidders then responded with proposed corrections to inputs the Department intended to use for evaluation of their bids. DOC-DER Ex. 83 at 5-6 (Rakow Direct).

1. Proposed Corrections to Inputs for Calpine's CC Bid

Calpine suggested no corrections to Dr. Rakow's inputs, but did suggest separate treatment for fixed operations and maintenance costs and start charges. Although this suggestion was helpful, Dr. Rakow explained that after some experimentation he could not find a way to adequately model start changes as a variable cost. Thus, Dr. Rakow determined that he would retain the inputs as initially presented by Calpine. DOC-DER Ex. 83 at 6 (Rakow Direct). The Department did make other changes to the inputs for Calpine's bid due to Dr. Rakow noticing that he had not included in the inputs a summer-time decrease in capacity for the Calpine unit. Calpine's proposal contains an estimate of the (lower) summer and (higher) winter capacity. A summer-time capacity de-rating had been included in the inputs for all of the other Bidders' thermal unit bids. DOC-DER Ex. 83 at 6 (Rakow Direct).

It is reasonable to include in the inputs a summer-time decrease in capacity because many natural gas-fired units have a lower capacity in summer than in winter for accreditation and energy production purposes. For this reason, Dr, Rakow added a deration pattern for the proposed Calpine unit. This pattern was based upon Calpine's reported deration amount and the deration patterns used by Xcel for other recently-added units, including Blue Lake 7 and 8,

Angus Anson 4, and Calpine's existing unit at the Mankato Energy Center. DOC-DER Ex. 83 at 7 (Rakow Direct).

In addition, Calpine's response to discovery included an updated cost estimate for facilities upgrades that would be necessary in the event that Calpine's proposal were selected and constructed. Specifically, it stated, "MISO has estimated the cost of necessary upgrades at $650,000 to $1,500,000 with a final cost to be confirmed upon completion of the facilities study." As noted above, Department Witness Mr. Shaw recommended that Dr. Rakow include these costs in his analysis. Therefore, to ensure that Calpine's bid included this cost, Dr. Rakow levelized the $1.5 million cost using the 12.17 percent levelized annual revenue requirement (LARR) input used by Xcel in Docket No. E002/CN-12-113.[28] He then calculated a present value of about $1.55 million using the discount rate and decision year used by Strategist.[29] The $1.55 million cost is included in a post-model Present Value Rate of Return (PVRR) adjustment for all scenarios and contingencies evaluating Calpine's proposal. DOC-DER Ex. 83 at 7 (Rakow Direct).

It is reasonable to include the additional $1.55 million in costs when evaluating Calpine's proposal because doing so ensures that the bid reflects costs as accurately as possible. The inclusion of such costs does not introduce a bias against Calpine's proposal. Further, by evaluating the total costs of bids, the approach is transparent and fair to all parties. DOC-DER Ex. 83 at 7-8 (Rakow Direct). Evaluating bids based on total costs that include interconnection costs, and expecting that ratepayers will not be responsible for costs that exceed the costs of the

[28] A LARR is a figure that turns an up-front capital cost into a stream of level, annual payments that are financially equivalent to the up-front cost. The 12.17 percent LARR is the most recent estimate available. DOC Ex. 83 at 7 (Rakow Direct).

[29] The decision year is the year that all dollars are discounted to by Strategist. *Id.*

bids, allows a fair comparison of bids and ensures the integrity of the competitive acquisition process. As the Department stated in its July 29, 2013 letter in response to Bidders' varying proposals regarding costs:

> While the Department is aware that some costs, particularly costs related to the facilities necessary to interconnect to the transmission system, can be difficult to estimate, bidders are in the best position to estimate those costs. Further, the competitive bidding is most fair to all bidders and ratepayers if each bid is evaluated based on the total costs that ratepayers will pay. The treatment of interconnection costs noted above proposed by the bidders in the details of their submittals make a fair comparison difficult.
>
> Therefore, consistent with past practices, the Department intends to hold each of the bidders to the prices used to evaluate the bids. This letter is intended to put all parties on notice of the Department's intentions. Parties should not expect that ratepayers will pay for any additional costs that are specific to a particular project beyond those included in each bid. This approach best ensures the integrity of the competitive process. [Footnote omitted]

DOC-DER Ex. 83 at 8 (Rakow Direct).

2. Proposed Corrections to Inputs for Geronimo's Solar Bid

Geronimo's response to Department discovery suggested corrections to the costs reported by Strategist. These corrections were based upon future equipment degradation. Similar inputs were not available for the other Bidders' proposals. Therefore, rather than put the equipment degradation into Strategist in the base inputs for Geronimo's proposal alone, Dr. Rakow created a separate package that added only Geronimo's proposal with the degraded inputs. This separate package with degradation allowed comparison to the case with Geronimo's proposal without degradation which, in turn, allowed Dr. Rakow to estimate the overall impact of degradation. Dr. Rakow concluded that the results of adding degradation (specifically, for Scenario 9) are that:

- the expansion plans are identical,
- energy production from Geronimo's unit is decreased, and

- the present value of societal costs (PVSC) increases by about $3.9 million.

That is, there is no change in the expansion plan whether Geronimo's degradation factors are included or not; there is a small impact on cost, and no effect on the selection results. DOC-DER Ex. 83 at 8-9 (Rakow Direct).

3. Evaluating Geronimo's Solar Bid as part of Minnesota's Solar Energy Standard

The Department considered evaluating Geronimo's solar bid as a part of Minnesota's new Solar Energy Standard (SES), Minn. Stat. § 216B.1691, subd. 2f, and as a proposal separate from the SES. Dr. Rakow explained that to consider the bid as part of the SES, using the most recent solar cost data available, namely Geronimo's proposal, he would: 1) add Geronimo's proposal and 2) subtract an equivalent amount of capacity (MW), energy (MWh), and cost from the SES units. The two changes would offset each other and leave the system unchanged. This approach would result in Xcel's system being priced using only the cost of the generic expansion units since Geronimo's proposal is added and subtracted from Strategist. DOC-DER Ex. 83 at 9 (Rakow Direct).

To consider Geronimo's bid separate from SES would require leaving the SES units as is and make the Geronimo proposal an addition to Xcel's system beyond the SES. This approach is how the Department treated all other (non-Geronimo) proposals in this case. Under this non-SES approach Xcel's system is evaluated using the cost of Geronimo's proposal as an addition to the cost of generic units at a lower level than if Geronimo's proposal were considered as part of the SES since Xcel's system needs less energy and capacity due to the fact that the SES units are not reduced to reflect the addition of Geronimo. That is, Geronimo's bid would not be used to meet the SES. Dr. Rakow decided that the second approach was superior for several reasons. DOC-DER Ex. 83 at 8-9 (Rakow Direct).

The main reason to consider Geronimo's bid separate from the SES is that this approach is consistent with Xcel's RFP, which the Commission approved. The RFP did not mention obtaining resources for the SES; instead, it stated:

> The Minnesota Public Utilities Commission has opened a Competitive Resource Acquisition proceeding to select new generation resource capacity to meet Xcel Energy's electrical power requirements in the Company's Upper Midwest service area…
>
> The Commission intends to make findings in February 2013 regarding the size, type and timing of the generation resource needed for the Company's Upper Midwest system.

DOC-DER Ex. 83 at 10 (Rakow Direct).

Subsequently, the Commission's March 13, 2013, *Order Approving Plan, Finding Need, Establishing Filing Requirements, and Closing Docket* (Docket No. E-002/RP-10-825, IRP Order), set forth the Commission's determination of Xcel's capacity need in terms of the size, type and timing findings, as follows:

> 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. Xcel should invite proposals for adding peaking resource[s], intermediate resources, or a combination of the two. Xcel should invite proposals that rely on building new generators, as well as proposals that rely on existing generators.

DOC-DER Ex. 83 at 10-11 (Rakow Direct).

Proposed solar projects were not precluded by Xcel's RFP, and the Department evaluated Geronimo's solar bid in this proceeding in the same way as it did the other bids. Analyzing Geronimo's solar bid under the SES was problematic for several reasons, such as the fact that there is no way to determine whether Geronimo's proposal is a cost effective means of meeting

the SES since there are no other proposals to provide solar energy to which the Geronimo bid could be compared.

Dr. Rakow explained that it was reasonable that responses to the RFP included several proposals for the peaking and intermediate identified by the Commission but did not include solar proposals other than Geronimo's, as follows:

> That result is not surprising since: 1) the RFP did not mention solar resources, 2) solar resources are currently not as commercially developed as wind proposals, and 3) concurrent with the timing of the decisions noted above, the Minnesota Legislature was discussing what is now the Minnesota SES. Thus, there was a fairly high level of uncertainty about what Minnesota law would become and what the regulatory structure for solar projects would be.

DOC-DER Ex. 83 at 11 (Rakow Direct).

The Commission's IRP Order referenced solar in ordering paragraph 4a, in which it required Xcel to file a report regarding solar generation as follows:

> Solar Energy: Xcel shall report on the expected amount of solar energy on its system, barriers it sees to further solar deployment, and how solar development could contribute to peak demand management, economic development in Minnesota, and meeting Minnesota's renewable energy and environmental mandates and goals.

The Commission's ordering language, above, highlights the difference in commercial maturity of solar and other projects at this time. DOC-DER Ex. 83 at 11-12 (Rakow Direct).

The Department suggested ways for the Commission to address the new Minnesota SES apart from this proceeding.[30] For purposes of the present docket, however, Geronimo's

[30] Dr. Rakow stated:

> Given the difference in the commercial maturity of solar projects compared to other projects, it seems that a more reasonable approach to assess the cost-effectiveness of solar projects would be to direct Xcel to issue a subsequent RFP for solar projects only (an All-Solar RFP, similar to All-Wind RFPs that have been used), at a size and time to be determined in Xcel's next resource plan, which is to be filed in February, 2014. This would allow the RFP to be issued after the solar Effective Load Carrying Capability (ELCC) study is completed,

(Footnote Continued on Next Page)

proposal would not be a reasonable choice, on a cost basis, for meeting the intermediate and peaking capacity need specified by the Commission, based on information available at this time. Because Geronimo's solar proposal performs poorly for the identified need, Dr. Rakow concluded that it would be unreasonable to award a contract for that proposal based simply on the rationale that the solar proposal might fill a need not specified in the original RFP. DOC-DER Ex. 83 at 12-13 (Rakow Direct).

Nonetheless, the Commission could choose to evaluate Geronimo's solar bid as a project that could count towards the SES. Specifically, Dr. Rakow recommended that the Commission direct Xcel to establish an RFP for solar projects to meet the SES. At that time, Geronimo certainly could submit another bid. DOC-DER Ex. 83 at 13 (Rakow Direct). In addition, while certain information is not yet available such as Xcel's solar Effective Load Carrying Capability (ELCC) study, and with the addition of solar integration costs, data generated by the Department in Dr. Rakow's scenarios 1 through 24, discussed in a later section of this Initial Brief, would allow evaluation of Geronimo's proposal for purposes of the SES -- in particular, to look at the results for the package that contains no bids—the base case. DOC-DER Ex. 83 at 13 (Rakow Direct).

(Footnote Continued from Previous Page)

> which would give better information regarding the production of solar power compared to Xcel's load. Using this approach would provide better information about Geronimo's bid than is available at this time and would allow Geronimo's bid to be compared on more of an apples-to-apples basis with other solar projects. Finally, this approach would mean that other potential solar bidders would be more widely noticed, allowing better information to be gathered about solar costs and help ensure that the best solar projects are added to Xcel's system.

DOC-DER Ex. 83 at 12 (Rakow Direct).

4. Proposed Corrections to Inputs for GRE's Bid

GRE reported that the Department's Strategist outputs contained an error in cost. Dr. Rakow compared the costs of the GRE proposal reported by Strategist to the cost contained in GRE's original proposal, and agreed there was an error that was caused by faulty inputs. The Department worked with GRE to correct the cost inputs. DOC-DER Ex. 83 at 14 (Rakow Direct).

5. Corrections to Inputs for Invenergy's Bid

Invenergy suggested three corrections, two of which the Department determined were necessary corrections. First, the company noted that its Hampton Corners proposal price was incorrect on the input spreadsheet; the Department agreed and corrected this input. DOC-DER Ex. 83 at 14 (Rakow Direct).

Second, Invenergy stated that the data sent by the Department was created assuming a $4/MMBtu natural gas price which was incorrect because Invenergy's calculations suggested that the actual natural gas costs used in the Strategist runs were above $6. Dr. Rakow reviewed the files sent to Invenergy and concluded that Invenergy was correct; he had not used the indicated ($4/MMBtu) natural gas price. However, the Department's assumption did not require any corrections to the Invenergy proposal since the price of natural gas was a background assumption to enable analysis of the inputs and outputs of all Bidders' proposals rather than as an input to Invenergy's specific proposal.

Third, Invenergy was unable to replicate the emissions values, although Invenergy's calculations were within the same magnitude as the amounts identified in Department

discovery. Following further review[31] Dr. Rakow determined that the differences were very close such that he reasonably concluded that Strategist accurately reflected the inputs provided by the bidders. DOC-DER Ex. 83 at 14-15 (Rakow Direct).

6. Proposed Corrections to Inputs for Xcel's Bid

Xcel's initial response to Department discovery was that Dr. Rakow's proposed inputs needed no correction. Later, however, Xcel provided a spreadsheet (CAP BASE YEAR REVENUE REQUIREMENT CALCS - 6-20-13.xls) that corrected the base year revenue requirements (capital cost) inputs for its proposals. Dr. Rakow revised Xcel's calculations for Black Dog unit 6 assuming a 2018 in-service date as well as Black Dog unit 6 assuming a 2019 in-service date. He then used the revised results for the base year revenue requirements for Black Dog unit 6 and North Dakota units 1 and 2. DOC-DER Ex. 83 at 15 (Rakow Direct).

C. Bid Package Development for Purposes of Strategist Runs

Dr. Rakow analyzed the proposals separately as well as in packages with multiple proposals added together. He did so by requiring Strategist to add the bids to Xcel's system on their own and by forcing Strategist to add the proposals in packages. To analyze all possibilities that reasonably might meet the Commission's identified need, the Department attempted to include all packages in its Strategist computer runs that resulted in less than 700 MW of nameplate capacity being added to Xcel's system. Again, that need was identified in the Commission's *Order Approving Plan, Finding Need, Establishing Filing Requirements,*

[31] Dr. Rakow reviewed the inputs for SO_2, NO_x, CO, and PM_{10} emissions for Invenergy's bids. He divided the emissions input provided for Xcel's Black Dog unit 6 by the emissions input provided by Xcel in its Strategist input worksheet (in lbs/MMBtu) provided by Invenergy's proposals (both Hampton and Cannon Falls proposals) provided in its Strategist input worksheet. He then compared the ratios to similar ratios derived from the Strategist outputs. The result was that the ratios were very close. For SO_2, the difference (ratio of bidder provided inputs to ratio of Strategist outputs) was about three percent; for NOx, PM_{10}, and CO the difference was about one percent. DOC-DER Ex. 83 at 14-15 (Rakow Direct).

and Closing Docket (Docket No. E-002/RP-10-825), dated March 5, 2013, such that Xcel had demonstrated the need for an additional 500 MW by 2019. Since several of the units in the bids add 200 MW or more, Dr. Rakow concluded that a cut off greater than 500 MW was warranted. For example, the three units in Xcel's proposal could not be included in a single package if a 500 MW cut off were used. Also, Calpine's unit could not be combined with any of the combustion turbine proposals if a 500 MW cut off were used. DOC-DER Ex. 83 at 16 (Rakow Direct).

Moreover, at the time it established the criteria for selecting packages to be analyzed the Department did not know whether changes to the model, if any, would increase, decrease, or leave unchanged the analysis underlying the Commission's determination of a 500 MW capacity need. For this reason, Dr. Rakow concluded that it was reasonable to err on the side of using a cutoff greater than 500 MW since it would be simple to ignore results from packages that turned out to be not needed while it would be difficult to go back and increase the number of packages to be analyzed at a later date if more capacity was warranted. DOC-DER Ex. 83 at 16 (Rakow Direct).

Dr. Rakow also developed the following three packages regarding Geronimo's solar bid:

- a package that analyzed the alternative pricing provided by Geronimo;
- a package that analyzed degradation of performance for Geronimo; and
- a package that analyzed both degradation and alternative pricing for Geronimo.

Overall the Department's review resulted in a total of 153 packages to be analyzed; including the base case as a "no build" alternative. DOC-DER Ex. 83 at 17 (Rakow Direct).

D. Strategist Base Case Development

To develop a "no build" or base case for Strategist the Department updated its most recent Strategist analysis of Xcel's system. Specifically, a file from the December 18, 2012 comments in Docket No. E002/RP-10-825—Scenario 1 (No "Prairie Island uprate" which means no expansion of the Prairie Island nuclear generation units) in general, as follows:

1. Re-established Xcel's CT and combined cycle (CC) optional expansion units in the years 2027 and beyond.
2. Eliminated the optional wind expansion units.
3. Re-established Xcel's "hard wired" or "forced" wind expansion units for the years 2012 and beyond to ensure that the existing renewable energy standard (RES) is met in Strategist.[32]
4. Established the new fuel and associated inflation rates required for Xcel's proposed North Dakota units.
5. Removed the Goodhue Wind unit from Xcel's generation portfolio because the wind farm will not be built.[33]
6. Updated the inputs for the LS Power (Cottage Grove) combined cycle unit per Xcel's 2013 database.[34]

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[32] Xcel's 2011 and 2013 databases have the same number of wind expansion units through 2019, after which the 2013 database has one or two additional wind expansion units each year (except in 2022, when the difference is three units). Given how far in the future this small difference begins, Dr. Rakow concluded that it was too small to pursue further for purposes of this analysis. DOC-DER Ex. 83 at 17-18 (Rakow Direct).

[33] *See* the Commission's July 26, 2013 *Order Declining to Extend Certificate of Need, Finding Statutory Violation, Requiring Further Filings, and Giving Notice of Intent to Revoke Site Permit* in Docket Nos. IP6701/CN-09-1186, IP6701/WS-08-1233, IP6701/M-09-1349, and IP6701/M-09-1350. DOC-DER Ex. 83 at 18 (Rakow Direct).

[34] The Department referred to Xcel's response to DOC Information Request No. 1 as "Xcel's 2013 database."

7. Updated the inputs for Xcel's Prairie Island units, largely removing the capacity attributable to the extended power uprate (Docket No. E002/CN-08-509) per Xcel's 2013 database.
8. Updated the wholesale market price inputs per Xcel's 2013 database.
9. Updated the retirement dates for Xcel's Black Dog units 3 and 4 and French Island unit 3 per Xcel's 2013 database.
10. Updated the in-service (repair) date for Xcel's French Island unit 3 per Xcel's 2013 database.
11. Added about 290 MW nameplate capacity, 200 MW accredited capacity, and 490 GWh of solar energy by 2020 to meet the SES. See DOC-DER Ex. 84 SR-2 (Rakow Direct Attachments) for the calculation of the SES.[35]
12. Updated the externality values per the Commission's June 5, 2013 *Notice of Updated Environmental Externality Values* (Docket Nos. E999/CI-93-583 and E999/CI-00-1636).
13. Updated the heat rates for the nuclear and generic units per Xcel's 2013 database.
14. Updated the coal, nuclear, biomass, natural gas fuel costs for the existing units per Xcel's 2013 database.
15. Updated the natural gas fuel costs for generic expansion units per Xcel's 2013 database.
16. Updated the monthly pattern for natural gas per Xcel's 2013 database.

[35] For Dr. Rakow's modeling assumptions for solar capacity to calculate the SES, *see* DOC-DER Ex. 83 at 19 (Rakow Direct).

17. Updated the variable operations and maintenance costs for certain existing units per Xcel's 2013 database.

18. Updated the wholesale energy market costs per Xcel's 2013 database.

DOC-DER Ex. 83 at 17-19 (Rakow Direct).

III. ANALYSIS OF BID PACKAGES (DIRECT TESTIMONY)

A. First Round (Screening) Set-Up.

In its first round of analysis, the Department ran each of the 153 bid packages through 24 scenarios for a total of 3,672 runs. The 24 scenarios are defined in DOC-DER Ex. 84 SR-3 (Rakow Direct). DOC-DER Ex. 83 at 20 (Rakow Direct). Dr. Rakow explained particular considerations for the first round set up assumptions regarding solar capacity accreditation, wind capacity levels based on Xcel's wind dockets, reliability in the form of reserve ratios for capacity, the Strategist end date, the relationship between the cost of capacity of generic units and the size or amount of capacity in bid packages, and varying levels of cost inputs. DOC-DER Ex. 83 at 20-33 (Rakow Direct). These considerations are described below.

1. Solar Constructs: Two Different Capacity Accreditation Assumptions

MISO accredits generation units according to the amount of capacity that reasonably can be expected from such units. The two different solar constructs used by Dr. Rakow relate to a 72 percent and a 50 percent solar accreditation by MISO. The phrase "72 percent solar accreditation" means the solar units—the pre-existing units, the capacity added to meet the SES, and Geronimo's solar proposal—are accredited by MISO at about 72 percent of

nameplate capacity for purposes of calculating the reserve margin.[36] The phrase "50 percent solar accreditation" means all solar units are accredited at about 50 percent for purposes of calculating the reserve margin. A twenty percentage point reduction in accreditation equals about 60 MW of lost capacity accreditation assuming 300 MW nameplate capacity of solar units. DOC-DER Ex. 83 at 20-21 (Rakow Direct).

2. Wind Capacity Levels and the Tie to Xcel and Utility Wind Dockets

The Department used three different levels of wind capacity for its first-round Strategist runs: 400 MW, 600 MW and 800 MW of wind.[37] The term "400 MW of wind" assumed that two 200 MW wind projects, Courtenay and Odell wind units, are approved by the Commission and required to be added in 2015-16 (data on these units was obtained from Xcel in Docket No. E002/M-13-603). Also, generic wind units were removed so that the overall quantity of wind energy added remained relatively constant.[38]

The term "600 MW of wind" assumed that the Courtenay, Odell, and Pleasant Valley wind units are required to be added in 2015-16. The assumption is that all three projects (600 MW) will be approved by the Commission in Docket No. E002/M-13-603. Also, generic wind units were removed so that the overall quantity of wind energy added remained relatively constant.[39]

[36] The reserve margin is a quantity of supply, above the level of the demand forecast, that MISO concludes is necessary to maintain a reliable electrical system. DOC-DER Ex. 83 at 20 n.8 (Rakow Direct).
[37] Dr. Rakow eliminated from each of these three different levels capacity additions attributed to the withdrawn Goodhue Wind project. DOC-DER Ex. 83 at 21 (Rakow Direct). For greater detail on additions and subtractions of capacity, see DOC-DER Ex. 83 at 21-22 (Rakow Direct).
[38] DOC-DER Ex. 83 at 21-22 (Rakow Direct); DOC-DER Ex. 86 at 14 (Rakow Rebuttal).
[39] *Id.*

The term, "800 MW of wind" assumed the Courtenay, Odell, and Pleasant Valley wind units and a 200 MW generic wind unit would be added in 2015-16.[40] The assumption was that all three projects would be approved by the Commission in Docket No. E002/M-13-603 and a single project will be approved in Docket No. E002/M-13-716, for a total of approximately 800 MW.[41] Also, 200 MW of generic wind units are no longer added in 2020 and 2022 and 100 MW of wind units are not added in 2024, 2025, and 2026 so that the overall quantity of wind energy added wind remained relatively constant. DOC-DER Ex. 83 at 21-22 (Rakow Direct).

Dr. Rakow added these three new wind units in alphabetical order given that their cost was not an issue in this case, and he added the generic unit last to represent the wind unit for which specific data was not yet available. DOC-DER Ex. 83 at 22 (Rakow Direct).

3. Reliability: Required "Reserve Ratios" for Capacity

For reliability purposes, Dr. Rakow included different assumptions regarding the amount of capacity that is reserved to ensure that there is sufficient capacity to serve load during periods of peak demand on the electrical system. Dr. Rakow considered two different methods: the reserve ratio used by Xcel in its 2010 IRP and a new reserve ratio to be used by MISO for its peak, DOC-DER Ex. 83 at 22 (Rakow Direct).

The Department is continuing to evaluate how MISO's changing methods may impact Minnesota's resource planning. DOC-DER Ex. 83 at 23 n.11 (Rakow Direct). Moreover the new MISO method has not been brought to the Commission for determination as to whether

[40] Strategist generic wind units are 100 MW in size, and two generic units produce about 17 percent more energy than is expected from the unit actually proposed by Xcel in Docket No. E002/M-13-716. There was insufficient time and too little difference (in energy and accredited capacity) to pursue obtaining additional inputs for the proposed unit at this first stage of the analysis. However, the actual data for the fourth wind unit was used in subsequent Department analysis. DOC-DER Ex. 83 at 21 n.10 (Rakow Direct).

[41] On October 17, 2013, the Commission voted to approve the Xcel's acquisition petitions with conditions; a written order will be issued.

this significant change is a reasonable planning method for regulated utilities in Minnesota. *See id.* As shown by Dr. Rakow, however, the new MISO method is likely to have a significant (decrease) effect on the amount of reserve capacity that MISO may require of Xcel in future years. DOC-DER Ex. 83 at 27 (Rakow Direct).

Xcel's peak reliability method or "non-coincident peak" method refers to the reliability method used during the analysis of Xcel's last Commission-approved resource plan – the 2010 IRP. Briefly, under this method a 3.79 percent reserve ratio was added to Xcel's forecast of the Company's peak demand (or, the peak demand that is non-coincident with any other entity's peak). Then, resources were required to be added by Strategist so that Xcel had sufficient capacity to cover the Company's peak demand forecast plus required reserves. This was the method used by MISO for the June, 2012 to May, 2013 planning year and in Xcel's most recent resource plan. DOC-DER Ex. 83 at 22 (Rakow Direct).

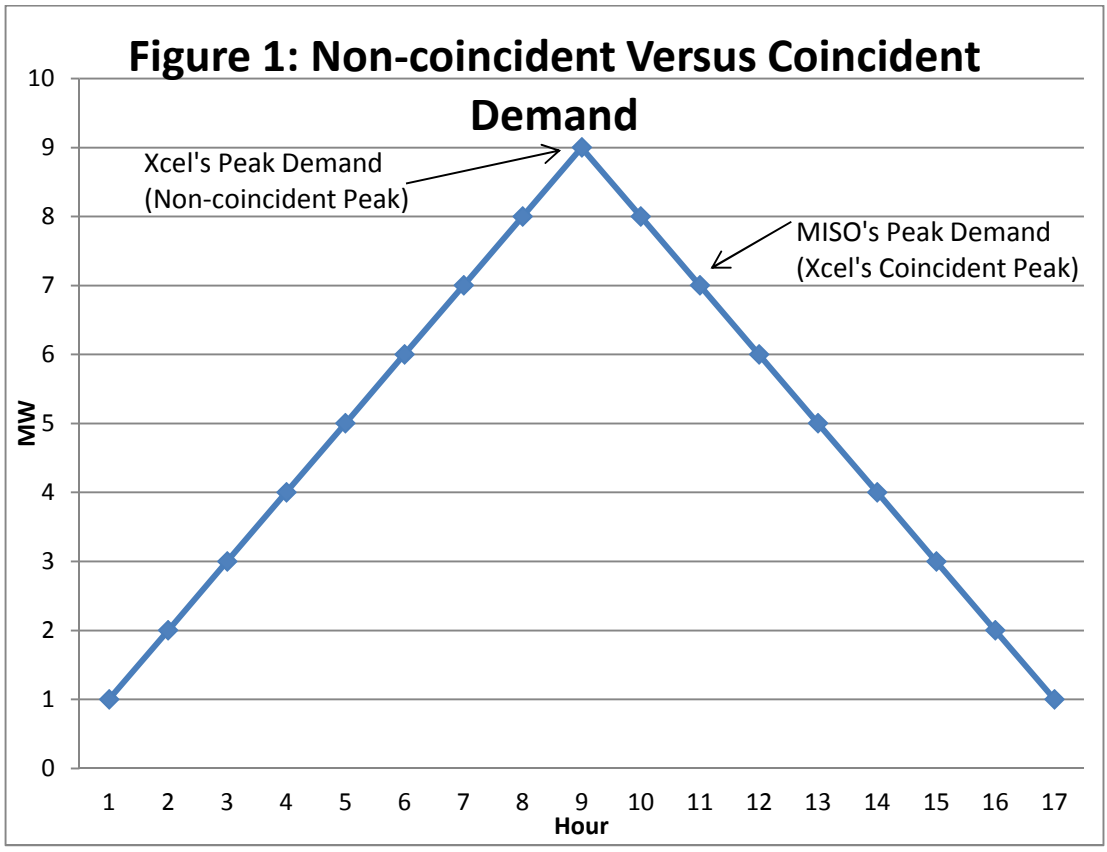
The term "MISO coincident peak" refers to a new reliability method to be used by MISO for the June, 2013 to May, 2014 planning year. Briefly, the reliability method requires that a 6.2 percent reserve ratio be added to Xcel's forecast of its demand at the time of (or coincident with) MISO's peak.[42] The MISO coincident peak demand is determined by discounting the non-coincident peak demand (i.e. the utility's peak demand) by a diversity factor.[43] Dr. Rakow developed the diversity factor using Xcel's response to Minnesota Chamber of Commerce

[42] This method is a significant change from the method typically used in resource planning, where the focus is on ensuring that the utility has enough resources to meet the peak demands on its own system, regardless of when MISO's peak occurs. The Department is continuing to examine how to incorporate MISO's changing methods into Minnesota's resource planning process. DOC-DER Ex. 83 at 23 n.11 (Rakow Direct).

[43] For example, if Xcel's demand at the time of (coincident with) MISO's peak is ten percent lower than Xcel's peak demand, then the "diversity factor" would be equal to ten percent. *Id.* at n.12.

Information Request No. 746 in Docket No. E002/GR-12-961 (MCC IR 746). Then, resources are required to be added by Strategist so that Xcel has sufficient capacity to cover the "MISO coincident peak" forecast plus required reserves. Note that Xcel's system is dispatched to meet the Company's forecast of non-coincident (utility) peak demand; the reserve ratio input is calculated to produce the correct quantity of reserves plus coincident peak according to MISO's approach. DOC-DER Ex. 83 at 23 (Rakow Direct).

Dr. Rakow explained that Xcel's peak demand (non-coincident) and MISO's peak may occur on different days or at different hours on the same day. DOC-DER Ex. 83 at 23-24 (Rakow Direct). His example in Figure 1, below, demonstrates the difference between Xcel's peak demand on its own system and MISO's peak demand (Xcel's non-coincident peak demand) at different hour on the same day.



DOC-DER Ex. 83 at 24 (Rakow Direct).

Uncertainties regarding how to best estimate the impact of MISO's proposed new reliability method required the Department to use both Xcel's (the Commission's) current method and MISO's new method. One uncertainty is the correct diversity factor to apply to the non-coincident (utility) peak demand to determine the coincident peak demand. Xcel's response to discovery indicates that a variety of diversity factors would be reasonable.

A second uncertainty is the correct level of demand side management (DSM) or customer usage response to assume. Briefly, at this time it is not clear if the full quantity (in MW) of DSM that is assumed available to reduce Xcel's (non-coincident) peak demand (such as Xcel customer's reducing their usage through Xcel's automated air conditioning control program) is also available to meet Xcel's demand coincident with (at the time of) MISO's peak demand. For example, Dr. Rakow reviewed the hourly Saver's Switch air conditioning interruption data provided by Xcel in annual compliance filings in Docket No. E002/M-01-46. This load management data shows changes in customer usage (demand) from hour to hour that, at times, exceed 100 MW. Thus, it was reasonable for the Department to use these two reliability methods to determine a reasonable range of capacity needs. DOC-DER Ex. 83 at 25 (Rakow Direct).

Interpretation of the results of using the two different reliability methods is significant. The Department's non-coincident (utility) peak demand calculations assume that the capacity forecast reduction (from non-coincident to coincident) is roughly offset by a reduction in DSM capability and the net impact is too small to matter. This result means that Xcel's original (non-coincident, utility peak) calculations are assumed to be a reasonable estimate of the coincident (MISO) peak reliability reserve requirement. DOC-DER Ex. 83 at 25 (Rakow Direct).

On the other hand, Dr. Rakow's coincident (MISO) peak demand calculations assume that the amount of capacity or MW of DSM available does not vary significantly with the conditions that are driving the differences in the coincident and non-coincident demand forecasts. Under this assumption it is reasonable to reduce the coincident demand forecast by the original quantity DSM. DOC-DER Ex. 83 at 25 (Rakow Direct).

The Department compared Strategist results regarding Xcel's capacity needs under the coincident and non-coincident peak reliability methods as well as under two different demand forecasts (the fall 2011 demand forecast from Xcel's approved 2010 IRP as well as Xcel's proposed spring 2013 demand forecasts).[44] Differences in Strategist results as to Xcel's needs using the two different reliability methods were considerable. The following describes how different factors affected the results:[45]

First, the effects of Dr. Rakow's updates to Xcel's Strategist model caused the net capacity deficit to remain relatively unchanged in 2017 but by 2020 the changes reduce the deficit by about 135 MW and by 150 MW in 2021. DOC-DER Ex. 83 at 27 (Rakow Direct).

Second, the impact of the choice of net demand forecast (2011 or 2013) did not appear to be significant.[46]

Third, the impact of the choice of reliability method caused a reduction in net peak demand under the proposed MISO method of between about 275 MW and 290 MW each year.[47] Thus, the uncertainty regarding how to most accurately estimate the impact of the new

[44] Only the fall 2011 demand forecast in Xcel's 2010 IRP has been evaluated for reasonableness and approved by the Commission. Tr.V. 2 at 29-30 (Shah).
[45] For greater detail, see DOC-DER Ex. 83 at 26-27 (Rakow Direct).
[46] *Id.*
[47] *Id.*

reliability method on the demand forecast and associated demand-side management resources is significant. DOC-DER Ex. 83 at 27 (Rakow Direct).

4. End Date Used in Models

Each Strategist analysis or "run" ends in 2036. The 2036 end date is the approximate end of the proposals for 20-year power purchase agreements coming on-line in 2016 or 2017. Thus, the 2036 end date ensures that the 20 year bids are not penalized to a significant degree by speculation regarding the cost of replacement capacity 20 years in the future. DOC-DER Ex 83 at 28 (Rakow Direct).

However, such an end date, even with end effects, likely does not account for the full value of Xcel's bids, which are expected to have a 35 year life. While a 2050 end date would allow the full life of Xcel's bids to be analyzed, that approach would then require the other bids to acquire replacement capacity and energy at the prices assumed in Strategist for the generic units, and the costs of generic units are generally higher than the costs of the bids.

Dr. Rakow concluded that it was reasonable to use an end-date of 2036 for several reasons. First, because Xcel traditionally has run Strategist for the full duration available (through 2050), Dr. Rakow expected Xcel to follow that approach in this proceeding (which it did). Thus, he reasonably expected that the record would allow the Commission to compare Strategist results of using an end-date of 2036 with an end-date of 2050. Second, Strategist could complete a run using a 2036 end-date faster than using a 2050 end-date and might avoid problems associated with providing Strategist with too many choices.[48] DOC-DER Ex. 83 at 28 (Rakow Direct). Finally, it appeared to Dr. Rakow that a Strategist run using 2050 as the

[48] Strategist runs can take more than a day to complete if a model is particularly complex; moreover, giving the model too many choices could cause Strategist not to be able to "solve" – that is, not to produce reliable results. DOC-DER Ex. 83 at 28 n.19 (Rakow Direct).

end date would require at least some expansion units to be locked in rather than allowing the model to choose the optimal expansion plan. Locking expansion units limits the alternatives available in Strategist analysis. DOC-DER Ex. 83 at 31-32 (Rakow Direct).

As Dr. Rakow stated:

> Based on the information and time available to me in this proceeding, I conclude that using 2036 as the end date is the best approach. Thus, when reviewing the results of my analysis using 2036 as the end date, the Commission should keep in mind that there is extra value in having Xcel's bids on the system for several years beyond the end of the planning period.

DOC-DER Ex. 83 at 29 (Rakow Direct).

5. Relationship between Generic Units and Amount of Capacity in Bid Packages

Because Bidders' proposals in this matter add significantly different quantities of capacity, it is important to understand the relationship between the cost of the generic replacement units in Strategist runs and the cost of the proposals. Packages with a small capacity proposal (in MW) rely more upon generic units to fill in the rest of Xcel's capacity need than packages with a large capacity proposal (in MW). If the generic units are cheaper than the proposals in this proceeding, then when Strategist is run the small packages will generally look better (less costly) than large packages because of the more extensive use of the (cheaper) generic units. Similarly, if the generic units are more expensive than the proposals, then when Strategist is run, large packages will tend to look cheaper than smaller packages. DOC-DER Ex. 83 at 29 (Rakow Direct).

The costs of generic units in this proceeding are more expensive than the bid proposals of Calpine, Invenergy, and Xcel that rely on combustion turbines or combined cycle proposals such that Strategist runs result in a cheaper -- higher rank -- than the base case (which adds only generic units). However, the opposite is true for Geronimo's solar proposal which is more

expensive than the generic units. DOC-DER Ex. 83 at 30 (Rakow Direct). Dr. Rakow explained that by allowing Geronimo's solar proposal to be considered part of the SES requirement the Geronimo proposal would be able to rely more on the lower cost of generic units than would otherwise be the case. *See* DOC-DER Ex. 83 at 30 (Rakow Direct).

Differences between the costs of the generic units and the Bidders' proposals raise a concern about the reasonableness of the cost of generic units; if the costs of the generic units are unreasonably high, smaller capacity (MW) packages would be disadvantaged. DOC-DER Ex. 83 at 31 (Rakow Direct). That is, if the CT and CC proposals represent a temporary availability of low-cost new units and the cost of the generic units is otherwise accurate, then the favorable Strategist results given to the proposals with a large quantity of MW (relative to small quantities of MW) is reasonable, all else being equal. DOC-DER Ex. 83 at 30 (Rakow Direct). If, however, the CT and CC proposals are representative of a long run lower cost of new units (meaning the generic units are over-priced), then the bonus given to the proposals with a large quantity of MW may not be reasonable if the bonus is significant since that would mean that proposals with small quantities of MW would be unfairly disadvantaged. DOC-DER Ex. 83 at 30-31 (Rakow Direct).

While more information may become available with future power plant construction or replacement, there is no record basis to conclude that the costs of the generic units are too high. DOC-DER Ex. 83 at 31-32 (Rakow Direct). These costs came from Xcel's most recent resource plan and are intended to represent costs over the planning period rather than costs at a specific time. DOC-DER Ex. 83 at32 (Rakow Direct). For this reason, the Department assumes that generic unit costs are representative of costs in the long run such that the CT and

CC bid prices likewise are representative of such costs. DOC-DER Ex. 83 at 31 (Rakow Direct).

Nonetheless, Dr. Rakow considered methods that might avoid the potential of over-priced generic units. One method he explored was locking in the expansion plan so that Strategist could not select a large package having a lower cost than a smaller package due only to the addition of fewer generic units being added to the larger package. Ultimately, he rejected use of a locking method due to its limitation on Strategist results. Locking in the expansion plan would restrict Strategist from adapting to various capacity sizes of proposed packages by making other changes in the expansion plan. He explained, "[T]he cost of each package reported by Strategist would be influenced by how well the package fits with pre-determined expansion plans for many years into the future." DOC-DER Ex. 83 at 31-32 (Rakow Direct). By not locking the expansion plan, Strategist runs in this proceeding resulted in a wide variety of potential projects due to the significant difference in the proposed size, type and timing of the bids. DOC-DER Ex. 83 at 31 (Rakow Direct).

Another method that may avoid the issue of the relative price of proposals and generic units would be to run Strategist with expansion units as options but then consider only those proposal packages that cover Xcel's capacity deficit through a certain year, thus limiting the bonus given to large capacity (MW) packages. Without a reasonable basis to conclude that the costs of the generic units are too high, however, Dr. Rakow rejected this option as well. DOC-DER Ex. 83 at 32 (Rakow Direct). The Department's analysis leaves the expansion units as options and considered only those packages covering deficits through the year 2024. DOC-DER 83 at 32-33 (Rakow Direct).

6. Varying Levels of Cost Inputs

In its first round of Strategist runs, the Department included no scenarios with varying levels of cost assumptions. The purpose of the first round of analysis was to reduce the number of potential packages to a manageable number while achieving the overall objectives in this proceeding. Use of a variety of load and capability situations provided a reasonable spectrum of situations to assess the relative performances of the packages at a high level. This method was reasonable. Detailed cost analysis of the packages was reserved for the second round of analysis. DOC-DER Ex. 83 at 33 (Rakow Direct).

B. First Round (Screening) Results of Strategist Runs

From the results of the first round of its Strategist analysis,[49] the Department selected the following seven packages for further detailed analysis:

Those packages are as follows:

[49] The Department used the following of codes for the units in this analysis:

- BD617—Xcel's Black Dog unit 6, 2017 in-service date;
- BD618—Xcel's Black Dog unit 6, 2018 in-service date;
- BD619—Xcel's Black Dog unit 6, 2019 in-service date;
- CCC1—Calpine Combined Cycle proposal;
- GPV1—Geronimo Solar proposal, "bundled" pricing;
- GPV1 DEGRADE—Geronimo Solar proposal, "bundled" pricing, but performance degrades over time;
- GPV1 FVP—Geronimo Solar proposal, with "Fixed + Variable" pricing;
- GRE1—Great River Energy proposal 1 (the smaller proposal);
- GRE2—Great River Energy proposal 2 (the larger proposal);
- ICT1—Invenergy Combustion Turbine proposal 1 (Cannon Falls);
- ICT2—Invenergy Combustion Turbine proposal 2 (Hampton);
- ND118—Xcel's North Dakota unit 1, 2018 in-service date;
- ND119—Xcel's North Dakota unit 1, 2019 in-service date;
- ND218—Xcel's North Dakota unit 2, 2018 in-service date; and
- ND219—Xcel's North Dakota unit 2, 2019 in-service date.

1. BD617— Xcel's Black Dog unit 6, 2017 in-service date and CCC1— Calpine's Combined Cycle Mankato Energy Center expansion proposal;
2. ICT1— Invenergy Combustion Turbine proposal 1 (Cannon Falls);
3. GPV1— Geronimo Solar proposal, "bundled" pricing;
4. BD619 CCC1—the least-cost package, with Black Dog unit 6 in-service by 2019 and Calpine's CC Mankato Energy Center expansion proposal;
5. ICT1 BD618—a package covering needs through 2020, with Invenergy Combustion Turbine proposal 1 (Cannon Falls) and Black Dog unit 6 in-service by 2018;
6. ICT1 CCC1—the only CT/CC combination remaining, with Invenergy Combustion Turbine proposal 1 (Cannon Falls) and Calpine's CC Mankato Energy Center expansion proposal; and
7. Base Case—a no-build alternative.

The first three packages are simply the proposals from the packages selected for detailed analysis on their own.

Dr. Rakow highlighted important aspects of the first round Strategist results, and the selection of packages for further consideration, as follows:

- The package with Xcel's Black Dog CT unit and Calpine's CC unit is the highest ranked under all 24 scenarios and was an obvious candidate for further analysis. However, this is a rather large package, covering Xcel's needs for several years. Thus, to allow for greater exploration of alternative approaches, I examined the effects of using smaller packages covering the deficits for a shorter period of time.

- After the least-cost package above, Strategist tends to produce significantly different results in the various scenarios, meaning Strategist doesn't indicate that there is a highly robust alternative. That result in itself is interesting since it suggests that using the least-cost package above would be a reasonable outcome in this proceeding.

- Focusing on scenario nine and the packages that require a generic unit to be added in 2020, I decided to include a package with Invenergy's Cannon Falls CT unit and Xcel's Black Dog CT unit as well. Finally, considering Minnesota's renewable preference statutes, I included an analysis of Geronimo's proposal to provide the Commission a comparison across a range of cost assumptions.

DOC-DER Ex. 83 at 34-35 (Rakow Direct).

Additionally, he explained why he selected packages with different in-service dates for Xcel's Black Dog unit 6, even though a 2019 in-service date for Xcel's Black Unit 6 proposal provided the lowest cost:

> When considered alone, Black Dog unit 6 needs to be in-service in 2017 to cover the capacity deficit that year. Black Dog unit 6 in-service in 2018 was the actual unit in the package with ICT1 that I selected, use of any other in-service date represent a different package. Black Dog unit 6 in-service in 2019 was the actual unit in the package with CCC1 that is least-cost as noted above.

DOC-DER Ex. 83 at 36 (Rakow Direct).

C. Second Round (Detailed Analysis) Set-Up

For the base case in the second round of analysis, the Department used Xcel's 2011 forecast, non-coincident peak reliability method, 800 MW of wind, and 72 percent solar accreditation factor. This is scenario three from the first round of analysis. DOC-DER Ex, 83 at 36 (Rakow Direct).

Contingencies run on each package the Department selected for inclusion in the second round of analysis included the list of contingencies used in Xcel's most recent resource plan (Docket No. E015/RP-13-53). Dr. Rakow modified that list by removing contingencies not relevant to this proceeding, such as varying wind prices. The resulting list of contingencies for the second round included:

- CO_2 reduction per Minnesota Statutes;
- The Commission's high and low CO_2 internal cost values;

- low externality values;[50]
- high and low wholesale market prices (±25 percent);
- high and low capital costs (±10 percent);
- high and low coal costs (±20 percent and ±10 percent);
- low natural gas costs (-$1.50, -$1.00, -$0.50);
- high natural gas costs (+$2.50, +$2.00, +$1.50 + $1.00, and, +$0.50);
- high and low wind accreditation (±25 percent); and
- high and low forecast of energy and demand (±5 percent and ±2.5 percent).

DOC-DER Ex. 83 at 36-37 (Rakow Direct). In addition, consistent with its analysis of Xcel's most recent resource plan, the Department ran each scenario and contingency a second time with the Commission's CO_2 internal cost and externality values removed. *Id.*

Several issues appeared during Dr. Rakow's second round of Strategist analysis. For example, while testing the low wind capacity accreditation contingency, Dr. Rakow enabled Strategist to determine whether the low wind accreditation packages covered the capacity deficits in the 2017 to 2020 time frame or whether additional long term capacity (from generic units) was needed by forcing the model to add 100 MW of short term capacity in both 2015 and 2016.[51] He made a similar adjustment while testing the high (+ 5 percent) forecast and mid-high (+ 2.5 percent) forecast contingencies.[52] As with the low wind accreditation contingency, this approach enabled Strategist to determine whether the packages covered the

[50] The high externality values are included in the base case. DOC-DER Ex. 83 at 36 n.20 (Rakow Direct).
[51] For greater detail, see DOC Ex. 83 at 37 (Rakow Direct).
[52] *Id.*

capacity deficits in the 2017 to 2020 time frame or whether additional long term capacity (from generic units) was needed. DOC-DER Ex. 83 at 37-38 (Rakow Direct).

The Department did not change the energy conservation and load management inputs in the second round, similar to how such contingencies are performed in resource planning, but did replace a generic wind unit with the costs of a particular Xcel wind project. Dr. Rakow explained that his analysis from two other dockets that demonstrated showed "these wind proposals to be least-cost in every one of the nearly 1,800 Strategist runs in each of those proceedings." DOC-DER Ex. 83 at 38 (Rakow Direct).

D. Second Round (Detailed Analysis) Results of Strategist

From the results from of its second round of Strategist analysis,[53] together with several additional considerations, the Department selected the following packages for Commission approval: Calpine's proposal and Xcel's Black Dog Unit 6 bid with a 2019 in-service date. DOC-DER Ex. 83 at 43 (Rakow Direct).

Dr. Rakow identified two risks he considered in his review of second round of Strategist outputs beyond those modeled in Strategist, First, at the September 16, 2013 MISO Loss of Load Expectation Working Group meeting, MISO's presentation provided preliminary results regarding the required capacity reserve ratio for the next year. The preliminary results were that the required reserve ratio was expected to increase by about 1 percentage point. Thus, given a peak demand forecast of about 10,000 MW, each percentage point increase in the reserve ratio requires Xcel to obtain approximately 100 MW of additional accredited capacity. DOC-DER Ex. 83 at 39 (Rakow Direct).

[53] The results of the second round are set forth in DOC-DER Ex. 84 SR-5A (Rakow Direct Attachments).

Second, Xcel's 125 MW power purchase agreement with Manitoba Hydro (see Docket No. E002/M-10-633) includes as one of Manitoba Hydro's conditions precedent, absolute discretion of Manitoba Hydro regarding the awarding of a contract for construction of a new 1000 MW (installed capacity) hydroelectric project and its timeframe, as follows:

> …the awarding by [Manitoba Hydro] MH, in MH's sole and absolute discretion, on or before May 1, 2018, the major general civil contract for the civil construction of a new hydraulic electrical generation facility, after all approvals and licenses have been obtained, which generation facility will be designed to have an installed capacity of at least 1000 MW and will have a targeted in-service date of on or before May 1, 2021.

DOC-DER Ex. 83 at 39 (Rakow Direct). Public information regarding Manitoba Hydro's project states, "[T]he earliest possible in-service date of the project is 2025." Thus, Dr. Rakow concluded that it appears that Manitoba Hydro will be able to exercise this condition precedent if it desires. If that happens, Xcel may lose access to this resource. DOC-DER Ex. 83 at 39 (Rakow Direct).

Although Dr. Rakow recommended the least-cost bid packages for Commission approval, he acknowledged that the Commission has several options available depending on its goals. If the overall goal is to minimize costs, as is typically the case, then referring to the information including CO_2 costs, the results clearly demonstrate that the least-cost package is Calpine's CC proposal combined with Xcel's proposal for a CT unit at the Black Dog site in 2019. The Calpine proposal plus Black Dog in 2019 covers Xcel's capacity deficit to 2023 under the normal forecast and to 2025 and beyond under the mid-low and low forecasts.

If, however, the Commission is concerned about the MW size of the package, the second ranked package under base case conditions is Calpine's proposal alone. Under certain other contingencies either Black Dog Unit 6 with an in-service date of 2017 or Invenergy's Cannon Falls CT proposal plus Calpine's CC proposal appear favorable. The exact ranking of second

round results depends upon which contingencies are of greatest concern. DOC-DER Ex. 83 at 40 (Rakow Direct).

Dr. Rakow also concluded that Xcel's level of excess capacity reserves that are expected to result after Xcel would add Xcel's Black Dog Unit 6 in 2017 plus Calpine's proposal to be reasonable. DOC-DER Ex. 83 at 40-41 (Rakow Direct). Specifically, he examined Xcel's load and capability report (which represents the utility's supply and demand information) as set forth on page 41 of his Direct Testimony. He further considered the size of the excess reserves based on effects of differences in solar capacity accreditation, the effect of a one percent increase in required reserves and Xcel's spring 2013 forecast (not yet vetted by the Department or approved by the Commission), which is lower than the fall 2011 forecast by 80 MW to 125 MW between 2017 and 2022.[54] DOC-DER Ex. 83 at 41 (Rakow Direct). In addition, the Department considered the size of the excess reserves to be reasonable in light of the fact that a number of Xcel's resources are aging, which may result in the need to replace those facilities, and that the economy in Minnesota is still in recovery mode, meaning that demand is expected to increase as the economy improves. DOC-DER Ex. 41 (Rakow Direct).

Finally, Xcel's promotional activities with respect to its new Business Incentive Rider (BIS Rider) is not in effect and, thus, could not have contributed to the demand at issue in this proceeding. Nonetheless, Dr. Rakow suggested that the Commission carefully evaluate future CN petitions to ensure that Xcel does not benefit financially from promotional practices while imposing costs on others through the CN process. DOC-DER Ex 83 at 42 (Rakow Direct).

[54] For greater detail, see DOC-DER Ex. 83 at 40-41 (Rakow Direct).

E. Recommendation: Department Direct Testimony

In Direct Testimony, the Department recommended that the Commission approve Calpine's proposal together with Xcel's proposal for a CT unit at the Black Dog site (Black Dog Unit 6) with a 2019 in-service date. It also recommended that the Commission consider requiring Xcel to issue an all solar RFP in consideration with other information that is known in the context of Xcel's next IRP.

IV. THIRD ROUND ANALYSIS (REBUTTAL TESTIMONY)

A. Summary of Third Round Analysis

In its third round of Strategist runs, the Department included assumptions regarding interruptible natural gas supply and flexible in-service dates among other factors. The results of the third round identified the three top performing packages as follows:

1. Calpine's Mankato proposal with Black Dog Unit 6,
2. Calpine's Mankato proposal with Invenergy's Cannon Falls proposal, and
3. Invenergy's Cannon Falls proposal with Xcel's Black Dog unit 6.

DOC-DER Ex. 86 at 12 (Rakow Rebuttal). Using interruptible natural gas supply assumptions as well as a delayed in-service date of 2019, significantly reduced the cost of Invenergy's Cannon Falls proposal. DOC-DER Ex. 86 at 10-11 (Rakow Rebuttal).

The Department recommends that PPA negotiations include consideration of firm and interruptible gas supply as well as flexible in-service dates such that those two of three projects with terms negotiated to be most favorable to ratepayers should be selected by the Commission. DOC-DER Ex. 86 at 2, 15, 21 (Rakow Rebuttal); Tr. V. 2 at 50 (Rakow).

B. Third Round Set-Up for Strategist Analysis

1. Interruptible Natural Gas Supply

Contrary to Xcel's Strategist analysis, Dr. Rakow initially did not model interruptible natural gas for any of the proposals. Rather, his Direct Testimony evaluated all proposals based upon the same assumption—firm natural gas supplies. The Department's initial approach ensured that all bids were analyzed on an equal basis. DOC-DER Ex. 86 at 4 (Rakow Rebuttal).

In Rebuttal Testimony, Dr. Rakow explained that modeling the assumption of firm natural gas supply favored Calpine's Mankato project and Xcel's Black Dog Unit 6 and disfavored Invenergy's projects. DOC-DER Ex. 86 at 4-5 (Rakow Rebuttal). He agreed with Xcel on this point. *Id.* In addition, he observed that, given that the Invenergy project is proposed as a peaking facility, Dr. Rakow agreed that it is reasonable to explore the use of firm or interruptible natural gas for the Invenergy Cannon Falls project, "at least to allow for more discussions in PPA negotiations, especially since different types of natural gas could affect the costs to be charged to ratepayers." DOC-DER Ex. 86 at 5 (Rakow Rebuttal).

The Department used the inputs for interruptible natural gas supply at Invenergy's Cannon Falls proposed project that Xcel provided in response to Department discovery. DOC-DER Ex. 86 at 5 (Rakow Rebuttal). With those inputs, Dr. Rakow ran six additional Strategist scenarios from his second round of Strategist analysis, but replaced firm gas with interruptible gas for bid packages that include Invenergy's Cannon Falls project.[55] These additional six scenarios represented the first part of the Department's third round of analysis.

[55] For greater detail, see DOC-DER Ex. 86 at 6 (Rakow Rebuttal).

Dr. Rakow made clear that his consideration of using interruptible natural gas supply for the Invenergy Cannon Falls project was not a recommendation that interruptible rather than firm supply be used, but may be a way to minimize costs while maintaining reliability. He explained that providing this additional analysis allowed interruptible supply to be considered as a factor in PPA negotiations to reduce costs for ratepayers. DOC-DER Ex. 86 at 6 (Rakow Rebuttal).

Whether there could be a negative effect on electric reliability if interruptible gas supplies were used at Invenergy's peaking project is an issue that will need to be explored during PPA negotiations. Dr. Rakow noted, however, that preliminary information from Xcel suggested that reliability of the Invenergy Cannon Falls project might be acceptable with interruptible gas supply. Specifically, assuming that a lack of firm natural gas supply would be a larger problem in winter than in summer, Xcel's winter load and capability information provided in response to Department discovery confirmed that it is reasonable for the Commission to explore the use of interruptible natural gas supplies for the Invenergy project as Xcel has sufficient capacity available in winter months. DOC-DER Ex. 86 at 7 (Rakow Rebuttal); DOC-DER Ex. 88 at SR-R-8 (Rakow Rebuttal Attachments).

2. Flexible In-Service Dates

Dr. Rakow, in Rebuttal Testimony, agreed with Xcel Witness Mr. Wishart that several uncertainties such as the expected MISO required capacity reserve ratio, and Xcel's 125 MW PPA with Manitoba Hydro, warranted consideration of flexible options such as delayed in-service dates in order to adjust to changed circumstances. DOC-DER Ex. 86 at7-8 (Rakow Rebuttal) Using data that Xcel obtained from Calpine and Invenergy in this regard, Dr. Rakow re-ran the eight scenarios from the second round of his Strategist analysis that changed the in-service dates for Calpine's Mankato proposal and Invenergy's Cannon Falls proposal, as bid

and with a 2019 in-service date.[56] The Department did not take a position as to the appropriateness of flexible in-service dates but, rather, sought to develop such information for later consideration by the Commission when ultimately evaluating the various proposals. DOC-DER Ex. 86 at 9 (Rakow Rebuttal).

These additional eight results represented the second part of the Department's third round of Strategist analysis in this proceeding. To keep the assumptions consistent throughout the third round of analysis, Dr. Rakow assumed interruptible natural gas supplies for Invenergy's Cannon Falls project. DOC-DER Ex. 86 at 9 (Rakow Rebuttal).

3. Variations in Xcel's Wind Additions

The third part of Dr. Rakow's third Strategist analysis modeled variations in wind projects acquired by Xcel, as he did in the first round. Specifically, he ran an additional ten scenarios for the Calpine Mankato project and the Invenergy Cannon Falls project (and assumed interruptible gas supply for the Invenergy project), but with 600 MW of wind added rather than 750 MW to assess effects of uncertainties regarding the 150 MW of wind in Docket No. E002/M-13-716, and he ran the base case, but with 600 MW of wind added rather than 750 MW to provide a point of comparison. [57]

C. Third Round Results

Third round results of Strategist runs regarding the potential use of interruptible natural gas supply for Invenergy's Cannon Falls project showed that this assumption significantly reduced the present value society cost (PVSC) for the project and, thus, significantly reduced the difference between packages with the Invenergy Cannon Falls project and the other packages—by about $35 million PVSC. DOC-DER Ex. 86 at 10 (Rakow Rebuttal).

[56] For greater detail, see DOC-DER Ex. 86 at 8-9 (Rakow Rebuttal).
[57] *Id.* at 9-10 (Rakow Rebuttal).

Third round results with assumptions of a deferred in-service date for Calpine's Mankato project and Invenergy's Cannon Falls project, indicated that the potential for flexible in-service dates for Invenergy's Cannon Falls project significantly reduced the difference between packages with the Invenergy project deferred and the packages with Invenergy's original in-service date for Cannon Falls—by about $50 to $55 million PVSC under base case conditions. DOC-DER Ex. 86 at 11 (Rakow Rebuttal); DOC-DER Ex. 88 at SR-R-11A (Rakow Rebuttal Attachments).

Further, results of third round analysis also indicated that the potential for flexible in-service dates for Calpine's Mankato project has a small impact on the overall PVSC. The difference between packages with Calpine's project deferred and the packages with Calpine's original in-service date is only about $5 to $12 million PVSC under base case conditions. DOC-DER Ex. 86 at 11 (Rakow Rebuttal); DOC-DER Ex. 88 at SR-11A (Rakow Rebuttal Attachments).

The combined impact of the two issues—interruptible natural gas and deferred in-service dates, is that the package with Black Dog Unit 6 and Calpine still ranked first, but the gap between that costs of that package and the second and third ranked packages (Calpine with Invenergy's Cannon Falls project and Xcel's Black Dog Unit 6 with Invenergy Cannon Falls) decreased considerably. DOC-DER Ex. 86 at 12 (Rakow Rebuttal); DOC-DER Ex. 88 at SR-R-11A (Rakow Rebuttal Attachments). One the other hand, the impact of potentially acquiring less wind in Docket Nos. E002/M-13-603 and E002/M-13-716 was not shown to be significant. Eliminating one wind project (the final wind project under consideration, Border wind), did not materially impact the results. DOC-DER Ex. 86 at 12 (Rakow Rebuttal); DOC-DER Ex. 88 at SR-R-12 (Rakow Rebuttal Attachments).

Based on his third round results, Dr. Rakow concluded that it would be worthwhile for Xcel to pursue negotiations with both Calpine and Invenergy regarding flexibility of in-service dates and use of interruptible natural gas for Invenergy's project. He testified, "While there may not be much gained by adjustments to Calpine's in-service date, adjusting the date of Invenergy's project could yield significant results for ratepayers." DOC-DER Ex. 86 at 12 (Rakow Rebuttal).

V. DEPARTMENT RESPONSE TO PARTIES' TESTIMONY

A. Response to Xcel

In addition to issues of interruptible gas service and delayed in-service dates discussed previously in this Initial Brief, the Department addressed several other issues raised by Xcel in its Direct Testimony.

1. Size of Xcel's Capacity Deficit

Xcel Witness Mr. Alders stated that the Xcel's most recent analysis "indicates a capacity deficit of 93 MW in 2017, which grows to 307 MW by 2019" based upon its spring 2013 forecast. Xcel Ex. 49 at 7 (Alders Direct). Dr. Rakow agreed with Xcel's calculations using MISO's non-coincident peak method, and not MISO's proposed new coincident peak method. *See* DOC-DER Ex. 86 at 3 (Rakow Rebuttal). The non-coincident peak calculations represent the reliability method used during Xcel's most recent resource plan approved by the Commission on March 5, 2013, *Order Approving Plan, Finding Need, Establishing Filing Requirements, and Closing Docket,* (Docket No. E002/RP-10-825) (2010 IRP Order). In the 2010 IRP Order, however, the Commission established the capacity need *in this proceeding* as a need for an additional 150 MW in 2017, increasing up to 500 MW in 2019 based upon the fall 2011 forecast. The Commission further determined that this need should be met by

peaking resources, intermediate resources, or a combination of the two. DOC-DER Ex. 86 at 20 (Rakow Rebuttal). The Department's and Xcel's capacity deficit estimates for Xcel's system are consistent with the Commission's 2010 IRP Order.

2. Top Performing Portfolios

Xcel identified the top performing proposals from of its Strategist analysis as, "[T]he least cost portfolio includes Black Dog 6 and Invenergy's Cannon Falls Expansion proposal, while the next least cost portfolio includes Black Dog 6 and Calpine's Mankato Expansion proposal." Xcel Ex. 49 at 7 (Alders Direct). The Department's Strategist analysis, which did not "lock" the model, identified both of these bid packages as least cost together with a third package – Calpine on its own (without Black Dog Unit 6). DOC-DER Ex. 86 at 3 (Rakow Rebuttal); DOC-DER Ex. 88 at SR-5A at 3 and 7 (Rakow Rebuttal Attachments).

3. Avoided Transmission and Distribution Losses

Regarding costs associated with avoided transmission and distribution losses associated with Geronimo's solar bid, Xcel Witness Mr. Wishart stated:

> For roof top solar projects that avoid all transmission and distribution line losses we estimate the savings to be equal to 7% of the energy and capacity benefits… even if the full 7% is applied to the energy and capacity credit savings estimated for the Geronimo project, the PVSC of the line loss savings would only equal an additional $10 million, not enough to make the project cost effective.

Xcel Ex. 46 at 35 (Wishart Direct).

In general, the Department agreed. Dr. Rakow did not include line loss savings in his analysis of Geronimo's bid because it appeared that Geronimo did not include such data in Geronimo's proposed Strategist inputs. DOC-DER Ex. 86 at 13 (Rakow Rebuttal); DOC-DER Ex. 88 SR-R-6 (Rakow Rebuttal Attachments). Further, the PVSC difference between the package with Geronimo's proposal and all other packages in the Department's second round of

Strategist analysis is far greater than the potential $10 million line loss savings. DOC-DER Ex. 88 at SR-5A (Rakow Rebuttal Attachments).

4. Credit for Excess Capacity

Xcel stated that inclusion in Strategist modeling of credits for excess capacity was critical:

> Another critical assumption is the capacity credit value used in the model. Because the various combinations of bids result in different total capacity, a capacity credit is used in the model to give additional value to larger portfolios. For 2016-2037, the levelized capacity credit is $6/kW-mo."

Xcel Ex. 46 at 37 (Wishart Direct).

Dr. Rakow disagreed. He did not include in Strategist any capacity credits for excess capacity for any of the proposals due to his concern that the model may have a bias in favor of larger capacity proposes such as Xcel's bid. Thus, including a credit for excess capacity would only serve to reinforce such a bias towards larger packages. DOC-DER Ex. 86 at 13 (Rakow Rebuttal); DOC-DER Ex. 88 at SR-R-6 (response to Geronimo IR 9) (Rakow Rebuttal Attachments). Dr. Rakow provided information regarding the quantity of excess reserves resulting from the addition of each package. DOC-DER Ex. 88 at SR-R-6 (response to Geronimo IR 10) (Rakow Rebuttal Attachments).

5. Treatment of Energy from 750 MW of Wind

The Department ran similar Strategist scenarios to assess the impact of differing quantities of wind on the PVSC of bid packages. Xcel stated that it "removed the proposed 750 MW of wind and re-ran the top 20 plans identified by Strategist." Xcel Ex. 46 at 37 (Wishart Direct). Likewise, Dr. Rakow's first round of Strategist analysis included a run of each scenario with 400 MW, 600 MW, and 800 MW of wind added, and in his third round he

ran both 750 MW and 600 MW of wind. The Department, however, did not run any scenarios with no wind added. DOC-DER Ex. 86 at 14 (Rakow Rebuttal).

Xcel's conclusion from its wind contingency analysis was that the cost effectiveness of proposals including Calpine's Mankato project "improved significantly" when the 750 MW of wind proposed by the Company was removed from the Strategist model. Mr. Wishart testified, "This is because when wind is removed from the model, natural gas units must run more often to meet customer demand…." Xcel Ex. 46 at 38 (Wishart Direct). The Department did not perform a similar analysis. Rather, Dr. Rakow described his analysis that when wind units representing the four proposals in Docket Nos. E002/M-13-603 and E002/M-13-716 were added, equivalent generic wind energy were removed to keep the overall quantity of wind energy for the duration of the Strategist run the same. Contrary to Xcel, Dr. Rakow explained that the Department's wind contingency analysis did not show a significant impact on the costs of bids:

> Thus, while the wind proposed by Xcel is added somewhat earlier than had been previously assumed, the overall quantity of wind energy remains relatively unchanged. Under my approach the overall impact of differing quantities of wind the on PVSC differences across scenarios is not significant.

DOC-DER Ex. 86 at 14-15 (Rakow Rebuttal).

6. Flexibility in PPAs.

Xcel's proposal includes adjustable in-service dates, and the Company concluded that similar flexibility is important for the PPA proposals and that such options may impact pricing. Xcel Ex. 49 at 8 (Alders Direct). The Department agreed that changes in in-service dates may affect pricing of the proposals. Specifically, Dr. Rakow testified that any in-service date flexibility ultimately approved by the Commission may increase or decrease the overall PVSC of a package for Xcel's ratepayers. Analysis of the impact of in-service date flexibility on the

cost/ranking of various packages is provided previously in this Initial Brief. DOC-DER Ex. 86 at 10 (Rakow Rebuttal).

7. Competition in the PPA Negotiation Process

The Department agreed with Xcel's view that maintaining competition though the PPA negotiation phase is an important consideration, *see* Xcel Ex. 46 at 42 (Wishart Direct), but that it is also important to maintain competitive pressures on Xcel in order to ensure that ratepayers' interests are foremost. DOC-DER Ex. 86 at 15 (Rakow Rebuttal). For example, terms of the negotiated PPAs may mean that Black Dog Unit 6 is more expensive than either Calpine's or Invenergy's proposal. Tr.V. 2 at 52 (Rakow). A PPA process that includes such competitive pressures on Xcel may ensure that the Black Dog Unit 6 proposal, if selected by the Commission, is a competitive proposal. *See, id.* at 52-53. Dr. Rakow agreed that it is prudent for multiple projects to proceed towards PPA negotiations, but only as long as the projects are reasonably close in economic performance. DOC-DER Ex. 86 at 15 (Rakow Rebuttal).

Based on its third round of Strategist analysis, and as noted previously in this Initial Brief, the Department recommends that the Commission send both Invenergy's Cannon Falls project and Calpine's Mankato project to PPA negotiations. Based on the results of those negotiations, the Department recommends that the Commission select the two most favorable projects of the three under consideration: Invenergy's Cannon Falls project, Calpine's Mankato project, and Xcel's Black Dog Unit 6 proposal. DOC-DER Ex. 86 at 15 (Rakow Rebuttal).

B. Response to Geronimo's Testimony

The Department disagreed with Geronimo's criticisms of its Strategist modeling. Specifically, Geronimo claimed that the Department should have updated its inputs and

modeling as to sizes and locations of proposed solar facility sites based on Geronimo's supplemental data. Geronimo Ex. 57 at 2 (Engleking Direct). Dr. Rakow disagreed.

The Department ran its initial Strategist analysis after determining that Geronimo's suggested corrections to inputs had no effect on the selection results. DOC-DER Ex. 83 at 8-9 (Rakow Direct). Geronimo's Appendix F contains the Strategist input data. Updates to those inputs, in Dr. Rakow's view, were too small to matter based on the results of his Strategist analysis and following discussion of the proposed changes with Geronimo. DOC-DER Ex. 86 at 16 (Rakow Rebuttal). Moreover, by the time Geronimo supplemented its data, significant portions of the Strategist analysis in this matter was completed. *Id.*

The Department also disagreed that Geronimo's correction of the estimated accredited capacity for its solar project from 72 megawatts ("MW") to 71 MW was a material change for purposes of Strategist analysis. Dr. Rakow testified, "Because Geronimo's 72 MW accredited proposal was so significantly below the top performing packages in terms of Strategist results, a 1 MW change in the accredited capacity of the project would not result in a material difference in the Strategist results." DOC-DER Ex. 86 at 16 (Rakow Rebuttal).

Dr. Rakow explained at the evidentiary hearing, in response to questioning, that he had advanced the poorly performing Geronimo solar project to the second round of Strategist analysis, given Minnesota's renewable resource preferences. However, renewable preferences were not enough to recommend that the Commission consider the Geronimo project for purposes of this present docket. He explained:

> If Geronimo had been closer, state policy preferences regarding renewables may have been a consideration, but it was too far removed to be considered.

Tr.V.2 at 56 (Rakow).

C. Response to Calpine's Testimony

1. Dispatch in Strategist

Calpine Witness Mr. Hibbard raised concerns with respect to the dispatch model used in Strategist, as follows:

> [T]he Strategist model may fail to capture operational details…as variable renewable resources become a major contributor to generation, the dispatch model used in Strategist may not be well-suited to understanding how units will be committed and/or operated to manage potential variations in wind and solar output."

Calpine Ex. 52 at 7-8 (Hibbard Direct).

While he agreed with Calpine's above statement and the materials from Xcel's resource plan that Calpine quoted regarding Strategist's approach of simplifying dispatch and certain operational details, Dr. Rakow noted that Xcel's generating units are dispatched by MISO in the context of the regional electric grid. He testified:

> However, when considering the details of system dispatch and unit operation it should be kept in mind that Xcel's system is modeled in Strategist by Xcel and the Department in isolation from the regional electric grid but generating units are not dispatched in such isolation. Instead, Xcel's generating units are dispatched by the Mid-Continent Independent System Operator (MISO).

DOC-DER Ex. 86 at 17 (Rakow Rebuttal).

MISO's dispatch includes not only Xcel's generating units, but the generating units of many utilities in Minnesota and the surrounding states. This means that any potential needs regarding load following, adjusting to the output of intermittent resources, and so forth must be considered in the broader, regional context of MISO rather than Xcel's system in isolation. Stated simply, Xcel does not have a need to adapt its generation dispatch to adapt to wind and solar output, but MISO may have such a need. However, such a need for the larger MISO region may well be different than the need for an individual utility. Dr. Rakow testified that he does not know if such a need exists at MISO or, if it does exist, how MISO would indicate

such a need to its members. DOC-DER Ex. 86 at 17 (Rakow Rebuttal). He concluded, as follows:

> In a sense, I agree that Strategist modeling cannot capture the precise dispatch that will occur on the MISO system. However, the goal in this proceeding is to reflect how costs on Xcel's system could be affected by addition of the bids in this proceeding. Given that Xcel does not have a need to adapt its generation dispatch to adapt to wind and solar output due to MISO's role, I conclude that attempting to adjust Strategist modeling to capture expectations about changes in dispatch of Xcel's system alone would not capture the bigger picture as to how MISO dispatches resources and thus would not be accurate.

DOC-DER Ex. 86 at 17-18 (Rakow Rebuttal).

2. Environmental Costs

The Department agreed with Calpine that the Commission should – and does – consider the value of mitigating environmental impacts of CT capacity since failure to do so "would place Mankato at a competitive disadvantage, and would, in effect, punish Mankato for being a cleaner option." Calpine Ex. 52 at 29-30 (Hibbard Direct).

Dr. Rakow explained that the Commission's externality values, CO_2 internal cost estimate, and the cost of SO_x and NO_x emissions credits (collectively, Emissions Costs) all serve to reward units that are more efficient in terms of environmental impact (i.e., reduced air emissions). These Emissions Costs were all included in Strategist. Thus, the proposals for CT units can then either have a higher cost via proposing to install the emissions control technologies discussed by Mr. Hibbard or have a higher cost when Strategist applies the Emissions Costs to the air emissions. DOC-DER Ex. 86 at 18 (Rakow Rebuttal).

D. Response to Invenergy's Direct Testimony

1. Strategist Modeling

Contrary to Invenergy's view that Strategist's extended time horizon will penalize a 20-year PPA proposal by requiring that the PPA be replaced at the end of the PPA's term with a

generic unit, Invenergy Ex. 65 at 15 (Ewan Direct), Dr. Rakow's process of running Strategist for this proceeding does not do so. He testified, "As discussed in my Direct Testimony at page 28 I ran Strategist through 2036 to avoid the necessity of speculating regarding the addition of generic units at the end of a PPA's term." DOC-DER Ex. 86 at 19 (Rakow Rebuttal).

Regarding Invenergy's concern about how Strategist may consider other important issues such as the cost-benefit impact of including or not including dual fuel capabilities, Invenergy Ex. 65 at 16 (Ewan Direct), the Department clarified that some potential benefits of dual-fuel capability are captured in Strategist. Dr. Rakow explained:

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

DOC-DER Ex. 86 at 19-20 (Rakow Rebuttal).

Dr. Rakow also disagreed in part with Mr. Ewan's view that "since Strategist reduces resource options to a net present value for comparison, the timing of resource additions becomes critical." Invenergy Ex. 65 at 16 (Ewan Direct). Dr. Rakow explained that this may or may not be the case. While the Department's analysis of flexible in-service dates demonstrated that this is a critical issue for Invenergy's Cannon Falls proposal, it has a relatively minor impact on the PVSC for Calpine's proposal. DOC-DER Ex. 86 at 20 (Rakow Rebuttal).

2. Need Established by the Commission

Invenergy correctly stated that the capacity need established by the Commission in this proceeding is for an additional 150 MW in 2017, increasing up to 500 MW in 2019. The Commission further determined that this need should be met by 'peaking resources, intermediate resources, or a combination of the two. The Commission has already determined the size and timing of Xcel's need, and it left the type of resource that would best fill the need open to both peaking and intermediate resources. DOC-DER Ex. 86 at 20 (Rakow Rebuttal).

VI. NEXT STEPS: THE PPA PROCESS

The Department recommends that these three projects be further considered by the Commission:[58] Calpine's Mankato project, Invenergy's Cannon Falls project, and Xcel's Black Dog Unit 6 project. Tr.V.2 at 49-50 (Rakow). Both the Calpine Mankato project and Invenergy Cannon Falls project should proceed to PPA negotiations. Based on the results of those negotiations, the Commission should select the two projects with terms most favorable to ratepayers. If no issues arise with these three projects, Calpine's Mankato project and Xcel's Black Dog Unit 6 project provide the overall best package. DOC-DER Ex. 86 at 21. While it has been the Department's expectation that PPA negotiations would occur after the Commission made its initial determination in this matter, Mr. Shaw acknowledged that Bidders may choose to begin negotiating at any time. Tr.V.2 at 41-42 (Shaw). The PPA process should result in negotiated contracts that are brought to the Commission for final evaluation, selection and approval of the two most reasonable and prudent projects. *Id.* at 43-44 (Shaw); Tr.V.2 at 102 (Rakow).

[58] DOC-DER Ex. 102 (Rakow Opening Statement); Tr.V.2 at 52 (Rakow).

The Department expects terms such as pricing, characteristics of resources, in-service dates, firm versus interruptible gas supply, dual fuel capability, and interconnection that are negotiated as part of the PPA process must be consistent with the analysis conducted in this matter. Tr.V.2 at 42-43 (Shaw). Ultimately, it will be Xcel's burden to demonstrate the reasonableness of the PPA's for which it seeks Commission approval. Tr.V. 2 at 43 (Shaw). The Department has put Bidders on notice that negotiated terms that shift risk or unknown costs to ratepayers are not likely to be reasonable, in the Department's view. *Id.* at 44. That is, as the Department has stated throughout this proceeding, ratepayers should not be at risk for costs that are higher than bid or for benefits assumed in bids that do not materialize. If actual costs are lower than the bids, all bidders including Xcel should be allowed to keep those savings. DOC-DER Ex. 101 (Shaw Opening Statement).

VII. OVERALL DEPARTMENT RECOMMENDATION

The Department recommends that the Commission send Calpine's Mankato Project and Invenergy's Cannon Falls project to PPA negotiations such that ratepayers may benefit from parties' incentives to provide favorable terms.[59] Based on the results of those negotiations, the Department recommends that the Commission approve two of the following three projects: Calpine's Mankato project, Invenergy's Cannon Falls project, and Xcel's Black Dog Unit 6 project. Absent differences negotiated in the PPAs, the best combination is the Black Dog and Calpine projects.[60] The Department also recommends that the Commission consider requiring Xcel to issue an all solar RFP in consideration with other information that is known in the context of Xcel's next IRP**.**

[59] DOC-DER Ex. 102 (Rakow Opening Statement); Tr.V.2 at 52 (Rakow).
[60] *Id.*; Tr.V.2 at 50 (Rakow).

CONCLUSION

The Department recommends that the Commission send Calpine's Mankato Project and Invenergy's Cannon Falls project to PPA negotiations such that ratepayers may benefit from parties' incentives to provide favorable terms. Issues regarding use of firm versus interruptible natural gas supply, flexible in-service dates and dual fuel capability, among others, should be addressed in PPA negotiations. Following review of the negotiated PPAs, the Department recommends that the Commission select the two most reasonable and prudent projects of the following three projects: Calpine's Mankato project, Invenergy's Cannon Falls project, and Xcel's Black Dog Unit 6 project. Negotiated PPAs, however, should not put ratepayers at risk for costs that are higher than bid or for benefits assumed in bids that do not materialize. If negotiated PPAs result in costs that are lower than bid, all bidders including Xcel should be allowed to keep those savings. Absent differences negotiated in the PPAs, the Department recommends as the best combination the Black Dog and Calpine projects. The Department also recommends that the Commission consider requiring Xcel to issue an all solar RFP in consideration with other information that is known in the context of Xcel's next IRP**.**

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Respectfully submitted,

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