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TRADE SECRET INFORMATION REDACTED

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the Petition	)	
Northern States Power Company	)	**MPUC Docket No. E-002/CN-12-1240**
to Initiate a Competitive	)	**OAH Docket No. 8-2500-30760**
Resource Acquisition Process	)	

EXCEPTIONS TO ALJ RECOMMENDATION OF CALPINE CORPORATION

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Pursuant to the Minnesota Public Utilities Commission's ("Commission") January 3, 2014 Notice, Calpine Corporation and its affiliate Mankato Energy Center, LLC ("Calpine") hereby respectfully submit their Exceptions to the Administrative Law Judge's ("ALJ") December 31, 2013 Findings of Fact, Conclusions of Law and Recommendation ("Recommendation") in the above-referenced proceeding. The record developed in this proceeding was voluminous and Calpine appreciates the substantial effort of the ALJ to complete the Recommendation. Notwithstanding these efforts, however, Calpine believes the Recommendation is not supported by the record developed in this case and respectfully requests the opportunity to present oral argument on the issues raised herein. Indeed, the ALJ recommendation is, in many respects, diametrically opposed to the key recommendation of the Department of Commerce ("Department") and Xcel Energy Inc. ("Xcel"), which is that Calpine's proposal be subject to power purchase agreement ("PPA") negotiations.

As discussed below, the ALJ's ultimate recommendation that combining Geronimo's solar proposal (potentially coupled with Great River Energy's ("GRE") capacity credits) represents the most reasonable and prudent alternative to meet Xcel's near-term resource needs is predicated on the conclusion that Xcel requires as little as 26 MW in the 2017-2019

timeframe. In reaching this conclusion, and in stark contrast to the Commission-approved resource need in Docket No. E-002/RP-10-825, the ALJ adopted a surprisingly conservative view of Xcel's future capacity requirements despite substantial evidence to the contrary provided by Xcel and the Department. Indeed, the record in the contested case confirms that Xcel has a potential capacity need of 300-500 MW by 2019. Concluding that Xcel has a resource need of only 26 MW essentially suggests that Xcel needs no additional (or replacement) capacity through the end of this decade. This is an extreme and high-risk assumption that not only fails to accurately reflect the record, but also fails to take into consideration the broad range of pending market uncertainties related to issues such as potential load growth as the economy continues to improve and/or regional plant retirements due to environmental regulation or other factors.

In erroneously relying on a scenario where Xcel would require only 26 MW by 2019, the ALJ effectively eliminated from consideration the merits of any of the proposed gas-fired generation facilities simply because the individual proposals were each substantially larger than 26 MW. The Recommendation is effectively silent on the relative costs and benefits of those competing bids, which was the very purpose of the contested case in the first place, and which comprises the bulk of the contested case record.

Moreover, in unilaterally eliminating a relative evaluation of the competing gas-fired proposals, the ALJ's Recommendation ignores the quantitative and qualitative merits of Calpine's proposed combined-cycle Expansion Proposal. Among the resources proposed in this proceeding, the contested case demonstrated that Calpine's Expansion is uniquely positioned to meet the need identified by this Commission, Xcel and the Department with state-of-the-art, environmentally responsible and cost effective combined cycle technology. Selecting Calpine's Expansion as one resource to meet Xcel's capacity needs will ensure that Xcel and Commission

have greater flexibility in responding to future changes on Xcel's system brought about by increasing demand and baseload resource retirements. Foregoing the opportunity to add Calpine's proposed Expansion to Xcel's resource portfolio through this procurement will likely subject ratepayers to higher costs in the future. There is no reason why the Commission should not adopt the prudent recommendation of the Department and Xcel that Calpine's proposal should now be subject to formal PPA negotiation. Such discussions will fine-tune various aspects of the proposal and may identify additional ratepayer benefits. Such PPA negotiation would, of course, be subject to subsequent Commission review and approval.

I.
EXCEPTIONS

A. The ALJ's Conclusion That Xcel Will Likely Only Require 26 MW By 2019 Is Not Supported By The Record.

Through Xcel's Integrated Resource Planning ("IRP") process, the Commission determined that Xcel would require an additional 150 MW of capacity by 2017, increasing up to 500 MW by 2019 to reliably serve its customers.[1] In this proceeding, the Department and Xcel presented an extensive review of the forecasted need and confirmed that Xcel continues to have a potential capacity need of 100-150 MW in 2017, that could increase up to 300-500 MW by 2019. To meet this need, Xcel and the Department recommended that Xcel enter into PPA negotiations with both Calpine and Invenergy (related to its proposed Cannon Falls peaking unit). Recognizing the uncertainty inherent in forecasting, both Xcel and the Department recommended that Commission require Xcel to file updated need assessments in 2014 and 2015 to confirm the timing of its future capacity needs.[2]

[1] *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).

[2] *See e.g.*, Exhibit No. 86, Rebuttal Testimony of Dr. Steve Rakow at p. 7 ("Rakow Rebuttal").

Rather than accepting the Department and Xcel's recommendations, the ALJ adopted the most conservative need forecast in the record to support a finding that Xcel's likely need is as little as 26 MW by 2019. This determination is not supported by the record, as it (1) discounts substantial testimony in the record supporting a continuing need for up to 500 MW of capacity in 2019; (2) ignores the strong possibility that existing resources will retire contributing to an increased capacity need by Xcel and the Midcontinent Independent System Operator, Inc.'s ("MISO") publicly-stated concerns about regional resource adequacy; and (3) is based on the flawed assumption that gas-fired resources can be brought online through a subsequent procurement in an efficient and economic manner without prejudicing Xcel's customers and system reliability. Each is discussed in turn below.

1. The Record Continues To Support A Need Of Up To 500 MW By 2019.

In his Recommendation, the ALJ determined that "the most reasonable and prudent solution is to select scalable projects that meet Xcel's near-term shortfalls and for the Commission to conduct a second procurement for needs which may occur after 2019."[3] According to the ALJ, "combining Geronimo's proposal with the GRE's proposal, represents the most reasonable and prudent alternative to meet Xcel's near-term needs."[4] Underlying this recommendation is the ALJ's determination that since the Commission determined that Xcel would require up to 500 MW by 2019, three factors substantially reduced Xcel's potential need: (1) lower demand based on Xcel's September 2013 updated forecast; (2) the passage of the solar mandate; and (3) the adoption of a new reserve margin methodology implemented by MISO.[5] Due to these factors, the ALJ determined that there is not likely to be a shortfall in capacity

[3] Recommendation at p. 2.

[4] *Id.*

[5] *Id.* at p. 37, Findings 236-238.

through 2018 and only 26 MW needed by Xcel in 2019.[6] The record does not support the ALJ's conclusion.

Initially, the Department and Xcel are the only parties to substantively address Xcel's forecasted need in this proceeding. Xcel reassessed its capacity need forecast based upon a September 2013 Update, which included:

(1). A new spring 2013 load forecast;[7]

(2). Updated unit capacity ratings;

(3). Consideration of the impact of Minnesota's solar mandate; and

(4). Updated forecast of load management resources.[8]

According to Xcel Witness Steve Wishart, these intervening factors resulted in a potentially smaller capacity deficit of 93 MW starting in 2017 growing to 307 MW by 2019.[9] In addition, Xcel noted that a change in the manner in which MISO calculates Xcel's reserve margin requirement could result in a need as low as 26 MW in 2019.[10] Mr. Wishart, however, cautioned against relying on changes in MISO's reserve margin requirements to establish Xcel's resource needs in the 2017-2019 timeframe.

In particular, Mr. Wishart testified that the change in the MISO reserve margin methodology only has the ***potential*** to lower Xcel's future capacity obligations and only ***temporarily***. Mr. Wishart testified that "at the same time MISO changed the methodology of how to apply the reserve margin by no longer applying it to the Company's peak demand

[6] *Id.* at p. 37, Finding 239.

[7] As the Department demonstrated, there are significant uncertainties surrounding the accuracy of the Xcel's lower spring 2013 forecast. Exhibit No. 76, Direct Testimony of Sachin Shah at pp. 8-14 ("Shah Direct").

[8] Exhibit No. 44, Direct Testimony of Steve Wishart at pp. 7-8 ("Wishart Direct").

[9] *Id.* at p. 7.

[10] *Id.* at p. 8.

forecast, but rather applying it to a forecast of NSP's customer demand at the time when the MISO system reaches its total peak demand."[11] According to Mr. Wishart, however, the reduced capacity need under MISO's new methodology is predicated on MISO reaching its system peak at a different time then Xcel – but that "NSP and MISO reached peak demand at the same time in some years."[12]

Moreover, as Mr. Wishart testified, MISO has not established a long-term reserve margin requirement and "MISO has indicated that it will be looking at this issue in 2014 and hopes to provide an updated long-term planning criteria by next fall."[13] Such facts support Mr. Wishart's conclusion that "[r]eserve requirements 5-10 years from now are not very predictable under the current process."[14] In this respect, it is not only uncertain that MISO's new reserve requirement methodology will result in a reduced capacity need for Xcel, it uncertain that the same reserve requirement methodology will be in place for the next planning year, let alone in 2019.

In this respect, the ALJ's finding that "[w]hen the new MISO method of calculating reserves is used, there is a reduction in the net peak demand of between of between 275 MW and 290 MW each year"[15] is predicated on (1) Xcel and MISO reaching peak demand at different times; and (2) MISO's current interim reserve margin methodology applying in 2017 and beyond. As discussed above, Mr. Wishart's testimony clearly explains why this is unlikely to occur and cannot be relied on to make long-term planning decisions.

As part of its forecast evaluation, the Department correctly noted that "…the fundamental goal in certificate of need and resource planning proceedings is not to establish a plan that is

[11] Wishart Direct p. 8, lines 14-18.

[12] *Id.* at p. 8.

[13] *Id.* at p. 10.

[14] *Id*.

[15] Recommendation at p. 26, Finding 180.

least cost under a single forecast but for the plan to be least cost across a wide range of forecasts."[16] For this reason, the Department appropriately used the fall 2011 forecast that the Commission relied on in establishing the 500 MW need in this procurement as a starting point to begin its analysis.[17] In considering a number of forecast scenarios and intervening events (*e.g.*, wind capacity additions and passage of the solar mandate), the Department ultimately concluded that it continues to be appropriate to add gas-fired resources to the system resulting from this procurement.[18] In this respect, the record in this proceeding supports a need determination of up to 300-500 MW by 2019, with updated need assessments in 2014 and 2015 as recommended by Xcel and the Department. Such assessments will ensure that any single forecast is not relied on exclusively to determine the timing of future resource needs.

Based on the discussion above, at a minimum, Calpine believes that the Commission should make the following changes to the ALJ's Recommendation:

Revise Finding No. 24 to read:

> 24. Calculating the minimum reserve capacity based upon the MISO system peak could have ~~has~~ a significant impact upon the amount of reserves Xcel must maintain in order to meet applicable reliability standards. ~~The net impact of the methodology changes reduces Xcel's reserve requirements by approximately 200 MW.~~

Revise Finding No. 25 to read:

> 25. In recent weeks, Xcel has revised downward its projected energy needs. If the reserve requirements that are applicable today are included in a need forecast, alongside more recent load projections, there is a small possibility that there will be no shortfall in capacity through 2018 and only 26 MW ~~is~~ needed by Xcel in 2019. However, this is predicated on (1) Xcel and MISO reaching peak demand at different times; and (2) MISO's current interim reserve margin methodology applying in 2017 and beyond. This is unlikely to occur.

[16] Shah Direct at p. 14.

[17] *Id*.

[18] Exhibit No. 86, Rebuttal Testimony of Dr. Steve Rakow at p. 21 ("Rakow Rebuttal").

Revise Finding No. 172 to read:

> 172. The new MISO method may ~~is likely to~~ have a significant effect on the amount of reserve capacity that MISO may require of Xcel in future years. ~~This amount is likely to be much lower than the reserves required in 2011.~~

Revise Finding No. 180 to read:

> 180. The forecasted amount of Xcel's needs varies depending upon whether one uses the previous reliability calculation method or MISO's new method. Moreover, the difference in forecasts could be ~~is~~ substantial. Therefore, it is prudent for the Commission to require Xcel enter into PPA negotiations for new gas-fired capacity (such PPAs remaining subject to final Commission review and approval) and that Xcel be required to file updated need assessments in 2014 and 2015 of its capacity need in the 2017-2019 time period. ~~reduction in net peak demand of between about 275 MW and 290 MW each year.~~

Delete ALJ Findings 239, 250, 258, 259, 260, 261, 262, and 267 related to the ALJ's forecast findings in their entirety and replace with the following Conclusions:

> The record evidence supports a finding that Xcel may have a potential capacity need of 100-150 MW in 2017, that could increase up to 300-500 MW by 2019. However, due to changes in MISO's reserve margin calculations and other market factors, both the Department and Xcel Energy consider the need during that timeframe to be uncertain.
>
> In light of the uncertainty surrounding the level of need that will emerge in the 2017-2019 time period, both the Department and Xcel Energy recommended that the Commission require Xcel Energy to file updated need assessments in 2014 and 2015 of its capacity need in the 2017-2019 time period.

Delete Conclusions of Law 4, 7, 8, 9, 11, 17, and 18.

2. The ALJ's Need Determination Does Not Adequately Take Into Consideration Possible Resource Retirements.

This proceeding is about securing long-term generation resources that will provide capacity and energy to Xcel's customers through at least 2036 – not simply from 2017-2019.[19] Because Calpine's Expansion uses combined cycle technology, it is the only proposed resource

[19] Calpine proposed a 20-year PPA with Xcel beginning as early as 2017 and provided alternative pricing for a later 2019 in-service date.

that can effectively serve as a hedge against future baseload resource retirements. No mention of this fact is made in the ALJ's Recommendation with respect to forecast uncertainty.

Among the thermal resources proposed in this proceeding, only Calpine's proposed combined cycle technology allows the proposed Expansion to operate as an intermediate or baseload resource. For this reason, installing combined-cycle capacity at this time will provide a valuable hedge against the risk of intermediate and baseload resource retirements in light of anticipated environmental regulation or unforeseen factors.[20] As Calpine witness Paul Hibbard pointed out, "[t]he potential loss of baseload resources in Xcel's service territory heightens the need for replacement with intermediate or baseload capacity, such as can be provided by CC units."[21]

In evaluating the merits of adding additional combined cycle capability to Xcel's system, the ALJ should have adequately considered the potential that a significant quantity of baseload coal-fired resources may become uneconomic as a result of changes in the dispatch of resources due to low natural gas costs and/or existing and future environmental requirements that will be relevant within the timeframe of interest in the current proceeding. According to Mr. Hibbard:

> The Commission should consider this risk in its evaluation of the resources competing in this procurement, since new regulations – possibly including requirements on CO_2 emissions at existing power plants – will influence asset decisions by the time this procurement's resources come on line. The potential loss of baseload resources in Xcel's service territory heightens the need for replacement with intermediate or baseload capacity, such as can be provided by CC units.[22]

[20] As Calpine Witness Todd Thornton testified, "[p]eaking units are often selected not because they provide greater value to the market in terms of energy production or operational flexibility, but simply because they typically require a lower capital investment than a combined-cycle unit." Exhibit No. 55, Direct Testimony of Mr. Todd Thornton at p. 11 ("Thornton Direct").

[21] Hibbard Rebuttal at p. 16.

[22] Hibbard Rebuttal at p. 16.

As Department correctly noted, "a number of Xcel's resources are aging, which may result in the need to replace those facilities."[23] Indeed, the future of Xcel's Sherburne County ("Sherco") generating facility is uncertain as evidenced by the on-going Commission proceedings in Docket No. E002/RP-13-368.

Importantly, Mr. Hibbard further pointed out that retirement risk and its impact on reserve margins has implications beyond the Xcel service territory as Xcel's neighbors are heavily dependent on coal-fired generation at risk of retirement, and "this has implications for the future development of sufficient baseload and intermediate resources throughout all of MISO."[24] As noted by the Independent Market Monitor for the MISO region, "the increased penetration of wind resources and new EPA regulations will put substantial economic pressure on baseload coal resources that should accelerate retirements and reduce planning reserve margins."[25] As a result, Mr. Hibbard noted that "the Commission should not assume that there will be sufficient excess reserve capacity throughout MISO to fill in any gaps in Xcel's needs."[26]

The ability of Calpine's Expansion to serve as a hedge against future market uncertainty is an important attribute from a public policy perspective that the Commission should take into consideration in its evaluation of the bids. Selection of Calpine's Expansion will provide the Commission with greater flexibility in making future resource decisions. These attributes are supported by the record but absent from the ALJ's Recommendation and the evaluation of the resources proposed in this proceeding.

The following Findings/Conclusions should be included in any recommendation:

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[23] Exhibit No. 83, Direct Testimony of Dr. Steve Rakow at p. 41 ("Rakow Direct").

[24] Hibbard Rebuttal at p. 16.

[25] *Id.*

[26] *Id.*

A. A significant portion of Xcel's resource need should be met by combined cycle technology that can operate as an intermediate or baseload resource.

B. If baseload coal-fired resources become uneconomic as a result of changes in the dispatch of resources due to low natural gas costs and/or existing and future environmental requirements, there may be a need to replace retiring resources with intermediate or baseload capacity, such as can be provided by Calpine's Expansion as proposed in this proceeding.[27]

D. Installing cost-effective combined-cycle capacity can provide a valuable hedge against the risk of intermediate and baseload resource retirements in light of anticipated environmental regulation or unforeseen factors.[28]

E. The ability of Calpine's Expansion to serve as a hedge against future market uncertainty is an important attribute from a public policy perspective. The records shows that selection of Calpine's Expansion is cost-effective and will provide the Commission with greater flexibility in making resource decisions in the future.

3. The Reasoning Underlying The Findings/Conclusions That Gas-Fired Resources Can Be Cost-Effectively And Efficiently Added After 2019 Through A Separate Procurement Is Flawed.

In his Recommendation the ALJ concludes that "the most reasonable and prudent solution in this circumstance is to select scalable projects that meet Xcel's near-term shortfalls . . . and for the Commission to conduct a second procurement for needs which may occur after 2019."[29] According to the ALJ, "[i]f gas turbines are needed to meet larger, forecasted needs after 2019, these turbines can be constructed and placed into service within 21 months of a need determination by the Commission."[30] These conclusions fail to take into account (1) the impact of delay on ratepayers; and (2) the timeline for bringing gas-fired resources online, including the

[27] Exhibit No. 53, Hibbard Rebuttal at p. 16.

[28] Calpine Witness Todd Thornton testified that "[p]eaking units are often selected not because they provide greater value to the market in terms of energy production or operational flexibility, but simply because they typically require a lower capital investment than a combined-cycle unit." Exhibit No. 55, Thornton Direct at p. 11, lines 17-20.

[29] Recommendation at pp. 39-40, Finding 258.

[30] Recommendation at p. 40, Finding 261.

completion of any subsequent IRP proceedings, management of an additional competitive procurement process, and any necessary state and federal permitting.

The Commission has gone to great lengths to develop a competitive procurement process to meet a resource need that was identified via a multi-year resource planning process that involved broad-based stakeholder input. As demonstrated by the record in the contested case, that process resulted in the submission of a number of high-quality, highly competitive bids. Deferring this matter to a future resource planning and procurement effort will create substantial uncertainty with respect to system reliability, and a substantial risk that consumers will face higher costs compared with the currently-pending proposals.

While capacity additions are often "lumpy" and rarely a perfect fit, it is also important to recognize that the Commission is selecting resources in this procurement that will not only meet the projected capacity need in the 2017-2019 timeframe but also in the decades to come.[31] If the Commission adopts the ALJ's Recommendation, it will have foregone the opportunity to add aggressively priced natural gas-fired generation resources resulting from this procurement and almost certainly subject Xcel's customers to higher capacity costs in the future. At hearing Xcel Witness Wishart confirmed that Xcel's assumed pricing for capacity for a "generic" combined cycle resource was higher than Calpine's Expansion Proposal and that Xcel was "pleasantly surprised with the pricing of the proposals that were submitted to this docket."[32]

Further, the ALJ's conclusion that "[i]f gas turbines are needed to meet larger, forecasted needs after 2019, these turbines can be constructed and placed into service within 21 months of a

[31] As Dr. Rakow notes, for example, the addition of both Black Dog 6 and Calpine's Expansion would address "Xcel's capacity deficit to 2023 under the normal forecast and to 2025 and beyond under the mid-low and low forecasts." Rakow Direct at p. 40.

[32] *See* Hearing Transcript, Volume 1 (October 22, 2013) at p. 109, line 1 through p. 110, line 2.

need determination by the Commission"[33] ignores the fact that there is more to bringing an electric generation facility on line than constructing the project, including, for example, an additional lengthy resource planning process, a subsequent procurement effort followed by Commission review and approval, and the timing related to obtaining necessary permits, interconnection rights, etc. In this respect, the ALJ's conclusion that "assuming a procurement decision is made in early 2017, a natural gas turbine could be constructed and placed into service by late 2018"[34] is not accurate. Delaying the addition of natural gas-fired resources on Xcel's system is not in the best interests of ratepayers, particularly when reserve margins have been tightening in MISO.[35] If the Commission adopts the ALJ's Recommendation, it runs the risk of scrambling to procure more expensive resource options in the future only after a reliability crisis is identified.

Based on the discussion above, the following Findings/Conclusions should be included in any recommendation:[36]

A. The Commission is selecting resources in this procurement that will not only meet the projected capacity need in the 2017-2019 timeframe, but also in the decades to come.

B. The record shows that this procurement will provide Xcel with the opportunity to add aggressively priced natural gas-fired generation resources to its resource portfolio. Delay in adding such resources could subject Xcel's customers to higher capacity costs in the future.

C. Delaying the addition of natural gas-fired resources on Xcel's system is not in the best interests of ratepayers.

[33] Recommendation at p. 40, Finding 261.

[34] Recommendation at p. 45, Conclusion 18.

[35] *See e.g.*, MISO-OMS' Resource Assessment Survey Update (December 5, 2013). The survey can be found at, https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/SAWG/2013/20131205/20131205%20SAWG%20Item%2003%20OMS%20MISO%20Survey%20Results.pdf

[36] Other Findings and Conclusions in the ALJ's Recommendation related to forecasting and delays in the procurement of gas-fired resources should be revised as set forth above.

B. In Determining That Xcel Would Only Require 26 MW By 2019, The ALJ's Did Not Address The Quantitative And Qualitative Merits Of Calpine's Expansion Proposal.

In determining that Xcel would require only 26 MW through 2019, the ALJ effectively eliminated from consideration on the merits any of the proposed gas-fired generation facilities because they significantly exceeded the determined need. The ALJ found that "it is not reasonable to procure one or more gas turbines when the projected needs through 2019 are modest – and may be getting smaller."[37] On this basis, the ALJ concluded that "[t]he most efficient solution in this circumstance is to select scalable projects that meet Xcel's near-term shortfalls . . . and for the Commission to conduct a second procurement for needs which may occur after 2019."[38] As a consequence of this determination, the ALJ did not substantively address the substantial evidence in the record demonstrating quantitative and qualitative merits of Calpine's proposed combined-cycle Expansion Proposal. According to the ALJ, such evaluation can occur at a later date should a need be shown:

> If the Commission determines that more than 71 MW is needed in 2019, the decision to procure additional resources could safely be postponed until after Xcel's next resource planning process. Assuming a procurement decision is made in early 2017, a natural gas turbine could be constructed and placed into service by late 2018. Similarly, other renewable resources could be placed into service in that same timeframe.[39]

While not taking a position on the specific merits of Geronimo's solar proposal, Calpine notes that solar resources are not considered intermediate or baseload capacity, and believes there is merit to Xcel and the Department's suggestion that customers may benefit from having a separate solar RFP so that Geronimo's proposal can be weighed against other solar energy

[37] Recommendation at p. 40, Finding 260.

[38] *Id.* at p. 44, Conclusion 8.

[39] *Id.* at p. 45, Conclusion 18.

proposals as Xcel takes steps to meet the requirements of the solar mandate.[40] Such a process would likely provide the same level of transparency as was accomplished by evaluating competing gas-fired resources in the current proceeding. Regardless of the merits of Geronimo's proposal, however, had the ALJ appropriately concluded that Xcel could require up to 500 MW by 2019, the evidence in the record supports the selection of Calpine's April 15, 2013 Expansion Proposal to supply all or a portion of that need.

As discussed below, the record demonstrates that (1) each quantitative economic analysis supports the selection of Calpine's Expansion Proposal as the most reasonable and prudent strategy for Xcel – independent of any resource determination made in this proceeding with respect to Geronimo; and (2) qualitative non-price factors support the selection of Calpine's Expansion Proposal.

1. Each Quantitative Economic Analysis Supports The Selection Of Calpine's Expansion Proposal As The Most Reasonable And Prudent Strategy For Xcel.

Throughout the course of this proceeding, three parties submitted comprehensive quantitative economic analyses outlining the objective merits of the resources proposed in this procurement. While the ALJ discusses these analyses in his Recommendation, as a result of the ALJ's need determination, the discussion relates primarily to the merits of Geronimo's proposal. What is missing from the Recommendation is a full discussion of the fact that each independent analysis supports the selection of Calpine's Expansion Proposal to meet all or a portion of Xcel's likely future resource needs.

In particular, Calpine Witness Paul J. Hibbard demonstrated that Calpine's Expansion Proposal is the least expensive option among the thermal (*i.e.,* gas-fired) resources offered in this

[40] Rakow Direct at p. 12-13.

procurement by Xcel, Calpine, and Invenergy based on the levelized cost of energy ("LCOE"), as seen from the perspective of Xcel's ratepayers. Similarly, the Department's and Xcel's Strategist analyses, which analyzed the present value of societal costs ("PVSC") of different combinations of bids, support the selection of Calpine's Expansion Proposal. The Department and Xcel proffered testimony recommending that, accordingly, Calpine's proposal be approved for subsequent PPA negotiations.

a. Calpine's Expansion Has The Lowest LCOE Among Thermal Resources Proposed By A Wide Margin.

As part of its direct case filed in this proceeding, Calpine recognized both the value and limitations of the Strategist modeling undertaken by the Department and Xcel in evaluating the resource proposals submitted by bidders. As Calpine Witness Paul J. Hibbard testified, "Strategist can be a useful tool for considering at a high level and from a long-term resource planning perspective the potential implications of different resource combinations over time" but "the Strategist model may fail to capture operational details that could be important in understanding the relative value of CC versus CT technologies on the Company's system, in particular as the level of variable renewable generation on the Company's system increases."[41] As a check on the "black box" proprietary Strategist modeling, Mr. Hibbard presented a LCOE analysis to provide the Commission with "an additional analytical tool to inform its decision."[42]

As the ALJ noted in his Recommendation, "LCOE represents the net present value of the expected annual costs – including variable and fixed operations and maintenance costs, capital costs and the return on investment – divided by annual generation over the term of the

[41] Exhibit No. 51, Direct Testimony of Paul J. Hibbard at p. 7, lines 10-17 ("Hibbard Direct").

[42] Hibbard Direct at p. 8, lines 18-21.

proposal."[43] The purpose of the LCOE analysis was to determine the cost of proposals to Xcel customers, which the ALJ concluded is a "better prediction of costs and impacts to ratepayers" in the present circumstances.[44]

While the ALJ relied on the LCOE analysis to support the economic merits of Geronimo's proposal,[45] he did not address the fact that Mr. Hibbard developed the LCOE for the thermal bids (*i.e.*, Calpine's combined cycle Expansion Proposal and Invenergy and Xcel's combustion turbine or "CT" proposals) using data contained in each proposal, including capital costs, energy costs, operating costs, financing costs, and pollutant emissions provided by each company.[46] Calpine purposefully limited its LCOE analysis to a comparison of only the gas-fired resources submitted in this proceeding to ensure reasonable comparability,[47] but does not take a position regarding the appropriateness of relying on the LCOE analysis to support the economics of Geronimo's solar proposal as the ALJ did in his Recommendation.[48]

As set forth in Mr. Hibbard's Direct Testimony, the LCOE analysis presented demonstrates that Calpine's Expansion Proposal offers the lowest LCOE across all gas-fired

[43] Recommendation at p. 39, Finding 254. Mr. Hibbard testified that under his LCOE analysis, "capacity, energy, and other cost elements in project proposals are translated into an equivalent dollars-per-megawatt hour (MWh) metric, using consistent financial, market, and temporal assumptions across all proposals." Hibbard Direct at p. 5, lines 8-12.

[44] Recommendation at p. 39, Finding 253.

[45] *See e.g.,* Recommendation at pp. 39-40, Findings 253-259.

[46] Hibbard Direct at p. 9, lines 3-5. As Mr. Hibbard further testified, "[t]o complete the analysis, I made a number of additional operational and financial assumptions," all of which are set forth and explained in his Direct Testimony. *Id.* at p. 9, lines 5-7.

[47] *See e.g.,* Hearing Transcript, Volume 1 (October 22, 2013) at p. 66, lines 2-3 where Mr. Hibbard testifies that he was "only asked to review the thermal energy generating resources."

[48] Recommendation at p. 44, Conclusion 6 ("The record in this proceeding indicates that Geronimo's proposal, when properly analyzed under either a LCOE or Strategist modeling, is the lowest cost resource proposed.").

resource bids by a wide margin. The results of Mr. Hibbard's analysis are shown in Figure 1 of his Direct Testimony[49] and shown below:

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As depicted in Figure 1, under base case assumptions,[50] Calpine's Expansion Proposal offers the lowest LCOE across all gas-fired bids at **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS],** while Xcel's proposed Black Dog Unit 6 bid is the lowest cost option among the CT proposals at **[TRADE SECRET**

[49] Figure 1 is set forth in Mr. Hibbard's Direct Testimony at p. 10.

[50] Exhibit No. __ (PJH-3) to Mr. Hibbard's Direct Testimony includes a full list of model assumptions and inputs.

INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]. These results are not addressed in the ALJ's Recommendation.

Importantly, the findings presented in Mr. Hibbard's LCOE analysis are constant, even when a different range of assumptions beyond the base case are applied. In fact, Mr. Hibbard demonstrated that Calpine's Expansion remains the least cost resource under a number of scenarios.[51] In virtually every case, Mr. Hibbard demonstrated "that the Mankato facility consistently represents the lowest-cost resource from the ratepayer's perspective, often by a wide margin."[52] The results of Mr. Hibbard's analysis under each of these scenarios are summarized in Exhibit No. __ (PJH-4) to his Direct Testimony.

While Invenergy argued that the LCOE analysis is biased in favor of Calpine's Expansion Proposal because it "relies on calculating costs on a per MWh basis, effectively skews results towards high-capacity factor resource additions with limited regard to overall costs to ratepayers,"[53] such criticism is effectively an argument that the efficiency benefit of Calpine's combined cycle Expansion Proposal when compared to less efficient CTs proposed by Invenergy (and by Xcel) should be ignored. The record shows that this argument has no merit and must be rejected.

The value to ratepayers of combined cycle versus CT capacity varies significantly based upon how often the resources are expected to be called on to run, which is expressed as the

[51] As Mr. Hibbard noted, his LCOE analysis included a number of different scenarios "to explicitly and transparently test the sensitivity of modeling results to factors directly relevant in the current procurement, such as capacity factors, pollution control technology investments, power purchase agreement ('PPA') terms (extending the PPAs to 35 years), CO2 cost variations, and the pricing of natural gas transportation service (*i.e.*, firm versus non-firm)." Exhibit No. 53, Rebuttal Testimony Paul J. Hibbard at p. 8, line 12-17 ("Hibbard Rebuttal").

[52] Hibbard Rebuttal at p. 8, lines 17-18.

[53] Exhibit No. 73, Rebuttal Testimony of Ron Norman at p. 8, line 3-5 ("Norman Rebuttal").

resource's average annual capacity factor ("CF").[54] Combined cycle resources are more efficient and therefore will be dispatched more often than CT resources. As Xcel Witness Wishart correctly recognized, Calpine's clear "efficiency advantage" as a combined cycle resource must be factored into any economic analysis of the resources proposed.[55]

Importantly, in conducting his LCOE analysis Mr. Hibbard used "estimates of resource utilization that would seriously understate the value of Mankato relative to competing CT proposals" and yet "Mankato is the clear winner."[56] In particular, Mr. Hibbard testified:

> Specifically, assuming average annual capacity factors of **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]** for CT units and 20 percent for the Mankato CC unit . . . the LCOE of Mankato is 42 percent less than the next closest proposal (Xcel's Black Dog CT), and 46 percent to 59 percent less than all other bids that I evaluated. At average annual capacity factor assumptions that are higher than 20 percent for the Mankato unit, or lower than **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]** for CTs – both likely outcomes for reasons that I discuss later in this testimony – Mankato's advantage from a LCOE perspective increases.[57]

Based upon Mr. Hibbard's review of historical CF data presented in the Xcel Fuel Plan,[58] a **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]** may overstate the CF for CTs because Xcel's Fuel Plan "shows that the vast majority of CFs for natural gas-fired CT units from 2010 through 2012 were between 1 and 3 percent in each year."[59] In contrast, Mr. Hibbard testified that:

> Xcel Fuel Plan shows that Xcel's two most efficient CC units (High Bridge and Riverside – **[TRADE SECRET INFORMATION BEGINS**

[54] Hibbard Direct at p. 18, lines 7-9.

[55] Exhibit No. 44, Wishart Direct at p. 17, lines 5-15.

[56] Hibbard Direct at p. 11, lines 35-37.

[57] *Id.* at p. 11, line 37 through p. 12, line 9.

[58] *See* Xcel's Fuel Acquisition and Risk Management Plan filed on July 1, 2013 in Docket No. E002/RP-10-825 ("Xcel Fuel Plan").

[59] Hibbard Direct at p. 16, line 21 through p. 17, line 2.

> **TRADE SECRET INFORMATION ENDS]** operated at 37 percent and 44 percent CF in 2012, and between 14 percent and 23 percent in 2010 and 2011. My choice of 20 percent for a CC CF is less than the three year average CF (25 percent) for these two plants over the 2010-2012 period.[60]

As the ALJ appropriately found, Calpine's proposed Expansion "would operate as an intermediate type resource with capacity factors in the 20 to 30 percent range." [61]

Even assuming the CTs proposed by Xcel and Invenergy were expected to operate at higher CFs as the ALJ posits in his Recommendation[62] and Calpine's Expansion Proposal at a lower CF than 20%, Calpine's Expansion is still the most economical resource from a LCOE perspective. As set forth in Figure 2 of Mr. Hibbard's Direct Testimony and shown below,[63] if one assumes a **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]** for Black Dog 6 (the next most economical resource from a LCOE perspective) then the Calpine Mankato Expansion offers a lower LCOE at a CF of approximately 8 percent, and *always* lower than this at CFs above 8 percent.

[TRADE SECRET INFORMATION BEGINS

[60] *Id.* at p. 17, lines 11-17. Mr. Hibbard further noted that "to the extent that over the next several years emerging CO_2 and other Environmental Protection Agency (EPA) requirements lead to the retirement of additional baseload coal-fired generation, I would expect the role and CFs of CC units on Xcel's system – particularly the most efficient, highest heat rate units – to expand significantly relative to past performance and current expectations." *Id.* at p. 17, lines 17-21.

[61] Recommendation at p. 16, Finding 93.

[62] In his Recommendation at p. 12, Finding 66, the ALJ states that "Black Dog 6 would operate as a peaking generator, with an anticipated annual capacity factor of four to ten percent." This Finding ignores Xcel Witness Steve Wishart testimony that his current expectation is that Black Dog 6 (and Invenergy's proposed Cannon Falls CT) would have around a 5% CF. Wishart Direct at p. 13, lines 10-11; *see also* Hearing Transcript, Volume 1 (October 22, 2013) at p. 93, line 16 through p. 94, line 4 (stating "my expectation is still that any peaking resource should be around 5 percent.").

[63] Figure 2 is set forth in Mr. Hibbard's Direct Testimony at p. 19.

TRADE SECRET INFORMATION ENDS]

This Figure 2 demonstrates that "if the Black Dog CT is modeled at a **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]**, Mankato will always be more cost effective at any CF above 8 percent than Black Dog (or any other proposed CT, as can be seen in Exhibit No. __ (PJH-5))."[64] And while arguably one could be skeptical if Calpine's Expansion Proposal was determined to be the least cost resource under Mr. Hibbard's LCOE analysis alone, the results of Xcel and the Department's Strategist modeling corroborates Mr. Hibbard's conclusions that Calpine's Expansion is the best choice.

[64] Hibbard Direct at p. 18, line 20 through p. 19, line 6. Exhibit No. __ (PJH-5) to Mr. Hibbard's Direct Testimony shows that at any CF greater than approximately 14 percent, Calpine's Expansion will always be the most cost-effective option on a $/MWh basis compared to any proposed CT operating at the same, or lower, CF.

b. Strategist Results Support The Selection Of Calpine's Expansion.

The Department and Xcel used Strategist to analyze the relative economic merits of the proposals submitted in this proceeding. As Mr. Hibbard testified, the Strategist modeling results differ somewhat in scope and approach from his LCOE analysis:

> [T]he Strategist results compare the present value of societal costs ("PVSC") of different combinations of bids that would, at a minimum, meet the identified resource needs. While there are many similarities in the bid cost information presented in the analyses, the key difference is that the Strategist model also includes a representation of the impact that incorporating the proposed units in system dispatch has on overall system costs.[65]

Notwithstanding such differences, Xcel and the Department's Strategist analyses demonstrate that Calpine's Expansion proposal is "among the highest-value resources in the procurement under base case conditions, but its value is by far the most robust to changes in key assumptions and sensitivities."[66] The record is clear on this point and is reflected to some degree in the ALJ's Recommendation.

With respect to the Department's analysis, the ALJ found that:

> 226. The results of the third round of Department analyses identified three top performing packages:
>
> a. Calpine's Mankato proposal with Black Dog Unit 6,
> b. Calpine's Mankato proposal with Invenergy's Cannon Falls proposal, and
> c. Invenergy's Cannon Falls proposal with Xcel's Black Dog unit 6.
>
> 227. If the Department assumed both flexible in-service dates and the use of interruptible gas supplies, the cost of Invenergy's Cannon Falls proposal was significantly reduced.
>
> 228. The Department recommended that PPA negotiations include consideration of firm and interruptible gas supply as well as flexible in-service dates. It recommended that such negotiations be limited to Xcel, Calpine and Invenergy

[65] Hibbard Rebuttal at p. 4, lines 1-7.

[66] *Id.* at p. 2, lines 3-5.

> and that, based upon the results of these negotiations, two of three projects should be selected by the Commission.[67]

These Findings are only partially complete.

Initially, the ALJ's Findings confirm that if Invenergy's Cannon Falls proposal is modeled on interruptible fuel and Invenergy's proposed in-service date is moved out from its original proposed in-service date,[68] the gap between Calpine's Proposal and Invenergy's proposal narrows, though the Calpine/Black Dog option "is still ranked first."[69] The Findings do not, however, appropriately highlight the fact that both Xcel and the Department's recommendations assume that Invenergy's pricing for natural gas will be based on interruptible natural gas transportation service, with no cost adjustment for sufficient alternative fuel storage capability needed to ensure reliable, year-round operations.[70] This is a fundamental inconsistency in the comparison of resources proposed in this procurement, and inappropriately favors the Invenergy's Cannon Falls proposal relative to both Calpine's Expansion and Xcel's proposed Black Dog 6 facility – both of which include the costs of firm fuel. When modeled on a comparable basis, Invenergy's Cannon Falls proposal is simply not competitive.

Xcel Witness Wishart specifically noted that "the total PVSC for Plan 1 increases by about $30 million with the addition of firm gas at Cannon Falls, ***making it uncompetitive with***

[67] As discussed below, Calpine's proposed Findings and Conclusions related to the evaluation of the gas-fired bids are set forth in Attachment A to these Exceptions. Calpine's decision not to challenge a particular Finding or Conclusion in the Recommendation should not be construed as Calpine's agreement with the Finding or Conclusion. Instead, Calpine's analysis in this proceeding was largely limited to an evaluation of the gas-fired proposals submitted.

[68] As noted by Dr. Rakow, his "analysis indicates that the potential for flexible in-service dates for ICT1 significantly reduces the difference between packages with ICT1 deferred and the packages with ITC1's original in-service date – by about $50 to $55 million PVSC under base case conditions." Exhibit No. 86, Rebuttal Testimony of Dr. Steve Rakow at p. 11, lines 11-14 ("Rakow Rebuttal").

[69] Rakow Rebuttal at p. 12, lines 3-6.

[70] Xcel Witness Wishart noted that "…the fuel tanks at the site are barely sufficient to support the operation of a single turbine. For reliable winter operation the amount of on-site fuel storage would need to be expanded. Invenergy has not included these costs in their bid and has not provided supplemental information on the issue." Wishart Direct at p. 50, lines 1-5.

the Calpine proposal."[71] Department Witness Dr. Rakow similarly concluded that "the potential use of interruptible natural gas supply for ITC1 significantly reduces the PVSC for ITC1 and, thus, significantly reduces the difference between packages with ITC1 and the other packages – by about $35 million PVSC."[72] Assuming a comparable firm-fuel transportation requirement for the proposed Invenergy Cannon Falls CT, the economic advantage of the Calpine/Black Dog 6 combination as the highest-ranked resource plan would be even more magnified.[73]

Based on its separate Strategist analyses, Xcel recommends that the "Commission identify Black Dog 6 in combination with either Invenergy's Cannon Falls proposal or Calpine's Mankato Energy Center expansion as the least cost projects in this process."[74] However, a more thorough review Xcel's analysis also demonstrates that Calpine's Expansion Proposal is more favorable when variations are made in key assumptions related to cost, emissions, and contract-term values.

In particular, Table 9 of Xcel Witness Wishart's Direct Testimony shows that in (1) virtually every resource plan Calpine is the most robust across different sensitivity tests – that is – Calpine's Expansion is even more favorable economically in scenarios involving higher gas costs, higher CO2 costs and increased capacity values, and (2) every plan involving Invenergy's units fails relative to Calpine's Expansion in particular – as well as all other plans – when all bids

[71] Wishart Rebuttal at p. 22, lines 11-13. Emphasis added.

[72] Rakow Rebuttal at p. 10, lines 21-23.

[73] Nevertheless, if the Commission were to determine that the economic merits of Invenergy's Cannon Falls proposal should be based on operation on interruptible fuel, the Commission should also ascribe greater value to Calpine's and Xcel's proposals from a reliability perspective. In Invenergy's case, if served by interruptible fuel the proposed Cannon Falls CT "…will not be available on many winter days" potentially decreasing the value of the CT's capacity. Exhibit No. 77, Attachments to the Direct Testimony of Mr. Sachin Shah at DOC Attachment __ at (SS-5), pp. 30 and 31 of 32 ("Shah Direct Attachments").

[74] Wishart Direct at p. 43, line 16-18.

are compared consistently on the basis of firm natural gas transportation costs.[75] In this respect, the ratepayer benefits of Calpine's Expansion Proposal are strongly supported by the modeling analyses carried out by Xcel and the Department. The ALJ's Recommendation does not address these facts.

2. Qualitative Non-Price Factors Support The Selection Of Calpine's Expansion Proposal.

Similar to the results of the economic analyses presented in this proceeding, the qualitative "non-price" considerations also support the selection of Calpine's Expansion. For the most part, these "non-price," but measureable factors, were not addressed in the ALJ's Recommendation. Nevertheless, the record developed in this proceeding demonstrates the Expansion's (1) superior environmental performance vis-à-vis the other thermal resources proposed; and (2) ability to support the integration of renewable resources and state environmental goals.[76]

a. Environmental Considerations Support The Selection Of Calpine's Expansion Proposal.

In his Recommendation, the ALJ found that Geronimo's solar proposal was superior to the gas-fired resources proposed from an environmental/emission perspective.[77] The ALJ found that "each of the gas-powered turbines proposed in this proceeding produces criteria pollutants and CO2 during the combustion of natural gas."[78] The ALJ did not, however, set forth a comparison of the proposed gas-fired resources from an emissions perspective. If he had done so, the Recommendation would reflect the fact that the emissions from the proposed Calpine

[75] Wishart Direct, Table 9 at page 39; *see also*, Hibbard Rebuttal at p. 9, line 18 through p. 10, line 2.

[76] The ALJ's Recommendation provides a thorough review of Calpine's unique ability to take advantage of earlier planning to reduce impacts on the environment and host community in pursuing its Expansion Proposal. Recommendation at pp. 15-16, Findings 87-94.

[77] Recommendation at p. 41, Findings 269-274.

[78] Recommendation at p. 41, Finding 274.

Expansion are far lower than from the CTs proposed in this procurement on a per unit of energy generated basis. The relative impact of CT versus CC technologies from an emission perspective was presented in Exhibit Nos. __ (PJH-6a) and (PJH-6b) to Mr. Hibbard's Direct Testimony.

Exhibit Nos. __ (PJH-6a) and (PJH-6b) show emission rates from each unit proposed in this solicitation on a pounds per MWh (lbs/MWh) basis as well as the reductions in emissions resulting from the installation of state-of-the-art selective catalytic reduction ("SCR"). Exhibit No. __ (PJH-6a), reproduced below, shows emission rates by technology for nitrous oxide ("NOx"): **[TRADE SECRET INFORMATION BEGINS:**

TRADE SECRET INFORMATION ENDS]

As shown in this Exhibit __ (PJH-6a), the NO_x emission rates for Calpine's Expansion are lower than the next-closest option by **[TRADE SECRET INFORMATION BEGINS**

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Exhibit No. __ (PJH-6b), reproduced below, shows emission rates by technology for carbon dioxide ("CO_2"):

[TRADE SECRET INFORMATION BEGINS:

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As shown in this Exhibit __ (PJH-6b), the CO_2 emission rates for Calpine's Expansion are lower than the next-closest option by [**TRADE SECRET INFORMATION BEGINS**

TRADE SECRET INFORMATION ENDS]. No party substantively challenged these conclusions.

As Mr. Hibbard testified, "[t]hese emission rates are primarily a direct function of the relative energy efficiency (i.e., heat rates) of the respective projects; in simple terms, using less fuel per MWh results in less air pollution per MWh. With respect to NO_x, the differential is also due to the fact that Mankato includes back-end emission control technology that is not included in the CT bids."[79]

While other parties have argued that total annual emissions are likely to be lower for the CTs proposed by Invenergy and Xcel,[80] as Mr. Hibbard testified a "true apples-to-apples comparison of the environmental impacts of the projects in this procurement requires a comparison not of total annual tonnage, but based on emissions per unit of energy produced. From this perspective, the emissions from the Calpine Expansion are far lower than from the CTs proposed in this procurement, per unit of energy generated."[81] Thus, assuming equal quantities of MWh produced, the Calpine Expansion would have lower total emissions than the CTs proposed. Moreover, the ALJ failed to include information related to the fact that neither the proposed Xcel or Invenergy projects include commercially-available emissions control technology, which, as Calpine noted in its testimony, biases the economic comparison toward proposals whose bids do not include costs for similar emissions controls.[82]

[79] Hibbard Direct at p. 29, lines 13-17.

[80] *See e.g.*, Exhibit No. 43, Rebuttal Testimony of Xcel Witness Gregory Ford at p. 4, lines 18-22 (noting that Calpine's emissions could be higher on an annual basis due to the fact that combined cycle units commonly operate "at a capacity factor that is four times higher than the capacity factor for CTs.") ("Ford Rebuttal").

[81] Hibbard Rebuttal at p. 19, lines 10-13.

[82] Through its testimony in this proceeding, Calpine urged the ALJ and the Commission to consider the value of mitigating the environmental impacts of CT capacity used to help manage net load variability by requiring the installation of SCR technology on Invenergy and Xcel's proposed CT resources and that the costs of that equipment be included in the economic evaluation of the bids. As Mr. Hibbard testified, "[r]elying on any argument that such equipment is not necessary strictly from a permitting perspective may be appropriate for a project that is being considered on a stand-alone basis, but would be shortsighted and contrary to the obvious state policy objectives . . ." Hibbard Direct at p. 30, line 9-13.

b. Calpine's Expansion Supports The Integration Of Renewable Resources.

Minnesota has adopted an aggressive renewable energy standard, which requires that eligible renewable electricity account for 31.5% of Xcel's total retail electricity sales in Minnesota by 2020.[83] The standard has resulted in the integration of significant renewable/intermittent resources on Xcel's system. In his Recommendation, the ALJ finds:

> 95. The combined cycle power plant provides comparatively "fast start" capabilities and "start-stop" scheduling flexibility.
>
> 96. Calpine asserts that these features make a combined cycle resource the most appropriate addition to Xcel's growing portfolio of intermittent power resources.

The record supports these Findings without the qualification that "Calpine asserts."

The record shows that both CTs and Calpine's combined-cycle Expansion Proposal can be used to support the integration of renewable resources on Xcel's system. As Mr. Hibbard testified, "[t]he fast-start and fast-ramp capability of CTs mean that they are effective in addressing system contingencies that need to be met through resource activation within a half-hour to several hours."[84] According to Mr. Hibbard, however, the value of Calpine's Expansion to help integrate variable resources is "likely higher" because combined cycle resources:

> [C]an manage net load variability more efficiently, and at lower cost and lower emissions than CT capacity: (a) when variation needs to be managed on timescales of several hours or more, when the capacity is off line, and (b) when variations of *any* timescale (i.e., on the order of seconds to minutes to hours to days) need to be managed, and there is CC capacity already on line. Put another way, compared to CC capacity, CT capacity is an expensive and higher-emitting way to meet any net load variability that otherwise could be met by on-line or off-line CC capacity.[85]

[83] *See* Minn. Stat. § 216B.1691.

[84] Hibbard Rebuttal at p. 17, lines 17-19.

[85] *Id.* at p. 18, line 19 through p. 19, line 2.

As Mr. Hibbard concluded, "compared to CC capacity, CT capacity is an expensive and higher-emitting way to meet any net load variability that otherwise could be met by on-line or off-line CC capacity."[86] In this respect, both the CT resources proposed by Xcel and Invenergy and the combined cycle Expansion proposed by Calpine can aid the integration of renewables. As noted above, however, Calpine's Expansion can do so more cost effectively and with fewer emissions on a per unit of energy generated basis.

Accordingly, in addition to the Findings and Conclusions set forth in Attachment A, ALJ Finding 96 should be revised as follow:

> 96. The record shows that the value of Calpine's Expansion to help integrate variable resources is likely higher than the resources proposed by Xcel and Invenergy because combined cycle resources can manage net load variability more efficiently, and at lower cost and lower emissions than CT capacity.[87] ~~Calpine asserts that these features make a~~ A combined cycle resource is the most appropriate addition to Xcel's growing portfolio of intermittent power resources.

3. Revisions to Findings and Conclusions.

Due to the fact that the ALJ did not address the substantive merits of Calpine's Expansion Proposal vis-à-vis the other proposed gas-fired resources proposed in this proceeding, Calpine attaches its Proposed Findings and Conclusions related to the merits of Calpine's Proposal for the Commission's consideration. Calpine's Proposed Findings and Conclusions are substantively similar to the Proposed Findings it filed in conjunction with its Reply Brief on December 5, 2013 in this proceeding and are organized in a manner that mirrors the organization of Section II. B. of these Exceptions.[88] Such proposed Findings/Conclusions accurately reflect

[86] *Id.* at p. 19, lines 2-4.

[87] *Id.* at p. 18, line 19 through p. 19, line 2.

[88] The proposed Findings and Conclusions are in addition to those specifically noted herein.

the evidence in the record in this proceeding and support the selection of Calpine's Expansion Proposal as the most reasonable and prudent alternative to meet Xcel's future resource needs.

II.
CONCLUSION

The Commission's final decision in this proceeding should reflect the fact that the detailed record developed in this case shows that consideration of ratepayer costs, Xcel's changing resource mix needs, and Minnesota's energy and environmental policy goals supports the selection of the Calpine Expansion in this procurement. At a minimum, there is no reason not to require that Xcel initiate PPA negotiations with Calpine. Based on the results of those negotiations, the Commission will have additional information upon which to make an informed decision.

Dated: January 21, 2014

Respectfully submitted,

/s/ Brian M. Meloy

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ATTACHMENT A

CALPINE'S PROPOSED FINDINGS AND CONCLUSIONS RELATED TO THE EVALUATION OF THE GAS-FIRED RESOURCES PROPOSED IN THIS PROCEEDING

FINDINGS

FINDINGS THAT EACH QUANTITATIVE ECONOMIC ANALYSIS SUPPORTS THE SELECTION OF CALPINE'S EXPANSION PROPOSAL AS THE MOST REASONABLE AND PRUDENT STRATEGY FOR XCEL. (EXCEPTIONS, SECTION II. B.).

1. Three parties submitted comprehensive quantitative economic analyses outlining the financial impact that selection of one or more of the resources proposed in this procurement would have on Xcel customers.

2. Calpine analyzed the thermal (*i.e.*, gas-fired) resources offered in this procurement by Xcel, Calpine, and Invenergy based on the levelized cost of energy ("LCOE") as seen from the perspective of Xcel's ratepayers.

3. The Department and Xcel undertook independent Strategist analyses, which analyzed the present value of societal costs ("PVSC") of different combinations of bids. No other party submitted a quantitative economic analysis – though parties commented on and challenged various aspects of the analyses submitted.

Findings that Calpine's Expansion Has The Lowest LCOE Among Thermal Resources Proposed By A Wide Margin. (Exceptions, Section II. B. 1. (a)).

4. Calpine recognized both the value and limitations of the Strategist modeling undertaken by the Department and Xcel in evaluating the resource proposals submitted by

bidders. As a check on the "black box" proprietary Strategist modeling, Calpine presented a LCOE analysis to provide the Commission with another analytical tool to inform its decision.[1]

5. Under Calpine's LCOE analysis, capacity, energy, and other cost elements in project proposals are translated into an equivalent dollars-per-megawatt hour (MWh) metric, using consistent financial, market, and temporal assumptions across all proposals.[2] The purpose of the LCOE analysis is to determine the cost of proposals to Xcel customers.

6. Calpine developed the LCOE for Calpine's combined cycle Expansion Proposal and Invenergy and Xcel's CT proposals using data contained in each proposal, including capital costs, energy costs, operating costs, financing costs, and pollutant emissions provided by each company.[3]

7. Calpine's analysis demonstrates that Calpine's Expansion Proposal offers the lowest LCOE across all gas-fired resource bids by a wide margin. The results of Calpine's analysis are shown in Figure 1[4] below:

[TRADE SECRET INFORMATION BEGINS

[1] Exhibit No. 51, Direct Testimony of Paul J. Hibbard at p. 8, lines 18-21 ("Hibbard Direct").

[2] Exhibit No. 51, Hibbard Direct at p. 5, lines 8-12.

[3] Exhibit No. 51. Hibbard Direct at p. 9, lines 3-5.

[4] Figure 1 is set forth in Exhibit No. 51, Hibbard Direct at p. 10.

TRADE SECRET INFORMATION ENDS]

8. Under base case assumptions,[5] Calpine's Expansion Proposal offers the lowest LCOE across all gas-fired bids at **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS],** while Xcel's proposed Black Dog Unit 6 bid is the lowest cost option among the CT proposals at **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]**.

9. The findings presented in Calpine's LCOE analysis are constant, even when a different range of assumptions beyond the base case are applied.[6] In virtually every case,

[5] Exhibit No. __ (PJH-3) to Exhibit No. 51, Hibbard Direct, includes a full list of model assumptions and inputs.

[6] Exhibit No. 53, Rebuttal Testimony Paul J. Hibbard at p. 8, lines 12-17 ("Hibbard Rebuttal").

Calpine demonstrated Calpine's Expansion represents the lowest-cost resource from the ratepayer's perspective.[7]

10. While Xcel contended that reliance on a LCOE analysis is only appropriate when comparing similar resources of the same type where cost is the principal distinguishing factor between the resources,[8] the record shows that Calpine limited its LCOE analysis to a comparison of the gas-fired resources submitted in this proceeding to ensure reasonable comparability.[9] Calpine's LCOE analysis provides a second useful analytical tool such that the Commission does not need to rely on Strategist alone.

11. Invenergy argued that the LCOE analysis is biased in favor of Calpine's Expansion Proposal because the LCOE analysis relies on calculating costs on a $/MWh basis, which favors high-capacity factor resource additions like Calpine's Expansion.[10] This argument is not credible as it would result in the Commission ignoring the efficiency benefit of Calpine's combined cycle Expansion Proposal when compared to less efficient CTs proposed by Invenergy and Xcel.

12. The record in this case shows that the value to ratepayers of combined cycle versus CT capacity varies significantly based upon how often the resources are expected to be called on to run, which is expressed as the resource's annual average capacity factor ("CF").[11] Combined cycle resources are more efficient and therefore will be dispatched more often than

[7] Exhibit No. 53, Hibbard Rebuttal at p. 8, lines 17-18. The results of Mr. Hibbard's analysis under each of these scenarios is summarized in Exhibit No. __ (PJH-4) to his Direct Testimony, Exhibit No. 51.

[8] Exhibit No. 47, Rebuttal Testimony of Steven Wishart at p. 15, lines 20-22 ("Wishart Rebuttal").

[9] *See e.g.*, Hearing Transcript, Volume 1 (October 22, 2013) at p. 66, lines 2-3.

[10] Exhibit No. 73, Rebuttal Testimony of Ron Norman at p. 8, line 3-5 ("Norman Rebuttal").

[11] Exhibit No. 51, Hibbard Direct at p. 18, lines 7-9.

CT resources. Calpine's clear "efficiency advantage" as a combined cycle resource was appropriately factored into the economic analyses in the record.[12]

13. In conducting his LCOE analysis, Calpine Witness Hibbard assumed average annual capacity factors of **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]** for CT units and 20 percent for Calpine's Expansion.[13]

14. Under such assumptions, the LCOE of Calpine's Expansion is 42 percent less than the next closest proposal (Xcel's Black Dog CT), and 46 percent to 59 percent less than all other bids that were evaluated. At average annual capacity factor assumptions that are higher than 20 percent for Calpine's Expansion, or lower than **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]** for the CTs proposed by Xcel and Invenergy, Calpine's advantage from a LCOE perspective increases.[14]

15. A review of historical CF data presented in Xcel's Fuel Acquisition and Risk Management Plan filed on July 1, 2013 in Docket No. E002/RP-10-825 ("Xcel Fuel Plan") shows that a **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]** may overstate the CF for CTs because Xcel's Fuel Plan shows that the vast majority of CFs for natural gas-fired CT units from 2010 through 2012 were between 1 and 3 percent.[15]

16. In contrast, the Xcel Fuel Plan shows that Xcel's two most efficient combined cycle units (High Bridge and Riverside) – **[TRADE SECRET INFORMATION BEGINS TRADE**

[12] Exhibit No. 44, Direct Testimony of Steve Wishart at p. 17, lines 5-15 ("Wishart Direct").

[13] Exhibit No. 51, Hibbard Direct at p. 10, lines 12-15.

[14] Exhibit No. 51, Hibbard Direct at p. 11, line 37 through p. 12, line 9.

[15] Exhibit No. 51, Hibbard Direct at p. 16, line 21 through p. 17, line 2.

SECRET INFORMATION ENDS] – operated at 37 percent and 44 percent CF in 2012, and between 14 and 23 percent in 2010 and 2011. The use of 20 percent for a combined cycle CF is less than the three year average CF (25 percent) for these two plants over the 2010-2012 period.[16]

17. Even assuming the CTs proposed by Xcel and Invenergy were expected to operate at higher CFs and Calpine's Expansion Proposal at a lower CF than 20%, Calpine's Expansion is still the most economical resource from a LCOE perspective. As set forth in Figure 2 below,[17] Calpine's Expansion's LCOE is equal to Black Dog 6's (the next most economical resource from a LCOE perspective) at a CF of approximately 8 percent, and *always* lower than this at CFs above 8 percent.

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[16] Exhibit No. 51, Hibbard Direct at p. 17, lines 11-17.

[17] Figure 2 is set forth in Exhibit No. 51, Hibbard Direct at p. 19.

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18. This Figure 2 demonstrates that if the Black Dog CT is modeled at a **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]**, Calpine's Expansion will always be more cost effective at any CF above 8 percent. Furthermore, as can be seen in Exhibit No. __ (PJH-5) to Calpine Witness Hibbard's Direct Testimony, at any CF greater than approximately 14 percent, Calpine's Expansion will always be the most cost-effective option on a $/MWh basis compared to any proposed CT operating at the same, or lower, CF.[18]

[18] Exhibit No. 51, Hibbard Direct at p. 18, line 20 through p. 19, line 6.

19. Calpine's assumed 20% CF for Calpine's Expansion and a [**TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]** for the CTs proposed by Xcel and Invenergy is further supported by Xcel's testimony. Xcel Witness Steve Wishart testified that his current expectation is that Black Dog 6 (and Invenergy's proposed Cannon Falls CT) would have around a 5% CF.[19] Mr. Wishart also testified that with Calpine's efficiency advantage, "the unit would operate as an intermediate type resource with capacity factors in the 20%-30% range."[20]

Findings That Strategist Results Support The Selection Of Calpine's Expansion. (Exceptions, Section II. B. 1 (b)).

20. Relying on its Strategist analysis, the Department initially recommended that the Commission approve Calpine's Expansion and Xcel's proposal for a unit at the Black Dog site with a 2019 in-service date.[21] Dr. Rakow tested 27 different scenarios for his eight preferred resource plans[22] varying inputs such as load forecast, fuel prices, CO_2 prices and externality values, market prices, and capital costs. The results show that the Calpine Expansion/Black Dog combination was the lowest-cost option across all 27 scenarios.[23]

21. The Department noted that if Invenergy's Cannon Falls proposal is modeled on interruptible fuel and Invenergy's proposed in-service date is moved out from its original

[19] Exhibit No. 44, Wishart Direct at p. 13, lines 10-11; *see also* Hearing Transcript, Volume 1 (October 22, 2013) at p. 93, line 16 through p. 94, line 4 (stating "my expectation is still that any peaking resource should be around 5 percent.").

[20] Exhibit No. 44, Wishart Direct at p. 17, lines 9-10.

[21] Exhibit No. 83, Direct Testimony of Dr. Steve Rakow at p. 43, lines 3-6 ("Rakow Direct").

[22] Dr. Rakow's eight best resource plans were selected based upon his initial screening of resource plans in Strategist. Exhibit No. 83, Rakow Direct at p. 35, lines 9-20.

[23] Exhibit No. 81, Rakow Direct, Department Direct Testimony Attachment (SRR-5A), page 3 of 8.

proposed in-service date,[24] the gap between Calpine's Proposal and Invenergy's proposal narrows. As the Department's Strategist analysis showed, a later in-service date for Invenergy's proposed Cannon Falls CT significantly reduces the difference between packages with Cannon Falls deferred and the packages with Cannon Falls' original in-service date – by about $50 to $55 million PVSC.[25]

22. Even with these changes that benefit Invenergy's Cannon Falls proposal, Under the Department's Strategist analysis, Calpine's Expansion along with Black Dog Unit 6 is still ranked first from a PVSC standpoint.[26]

23. Based on its separate Strategist analyses, Xcel recommended that the Commission identify Black Dog 6 in combination with either Invenergy's Cannon Falls proposal or Calpine's Expansion Proposal as the least cost projects.[27]

24. Table 9 of Xcel Witness Wishart's Direct Testimony, however, shows that in (1) virtually every resource plan Calpine is the most robust across different sensitivity tests – that is – Calpine's Expansion is even more favorable economically in scenarios involving higher gas costs, higher CO2 costs and increased capacity values, and (2) every plan involving Invenergy's units fails relative to Calpine's Expansion in particular – as well as all other plans – when all bids are compared consistently on the basis of firm natural gas transportation costs.[28]

[24] Exhibit No. 86, Rebuttal Testimony of Dr. Steve Rakow at p. 11, lines 11-14 ("Rakow Rebuttal").

[25] Exhibit No. 86, Rebuttal Testimony of Dr. Steve Rakow at p. 11, lines 11-14 ("Rakow Rebuttal").

[26] Exhibit No. 86, Rakow Rebuttal at p. 12, lines 3-6.

[27] Exhibit No. 44, Wishart Direct at p. 43, line 16-18.

[28] Exhibit No. 44, Wishart Direct, Table 9 at page 39; *see also*, Exhibit No. 53, Hibbard Rebuttal at p. 9, line 18 through p. 10, line 2.

25. The ratepayer benefits of Calpine's Expansion Proposal are strongly supported by the modeling analyses carried out by Xcel and the Department.

26. The Department and Xcel's Strategist analyses and recommendations understate the value of Calpine's Expansion is several material respects, including (1) by failing to base their final recommendations on firm fuel requirements for all thermal resources; and (2) by failing to include the costs of selective catalytic reduction ("SCR") technology on the CT resources proposed in the proceeding.

27. Both Xcel and the Department's recommendations assume that Invenergy's pricing for natural gas at its proposed Cannon Falls CT will be based on interruptible natural gas transportation service, with no cost adjustment for sufficient alternative fuel storage capability needed to ensure reliable, year-round operations.[29]

28. When modeled on a comparable basis, Invenergy's Cannon Falls proposal is not economically competitive. Under Xcel's Strategist analysis, the total PVSC for its top rated plan (Plan 1) that includes Invenergy's Cannon Falls CT increases by about $30 million with the addition of firm gas, "making it uncompetitive with the Calpine proposal."[30] Under the Department's Strategist analysis, the use of interruptible natural gas supply for Invenergy's Cannon Falls facility significantly reduces the PVSC for Invenergy's proposal and significantly reduces the difference between packages with Cannon Falls and the other packages by about $35 million PVSC.[31]

[29] Xcel Witness Wishart noted that "…the fuel tanks at the site are barely sufficient to support the operation of a single turbine. For reliable winter operation the amount of on-site fuel storage would need to be expanded. Invenergy has not included these costs in their bid and has not provided supplemental information on the issue." Exhibit No. 44, Wishart Direct at p. 50, lines 1-5.

[30] Exhibit No. 47, Wishart Rebuttal at p. 22, lines 11-13.

[31] Exhibit No. 86, Rakow Rebuttal at p. 10, lines 21-23.

29. Assuming a comparable firm-fuel transportation requirement for the proposed Invenergy Cannon Falls CT would cause the Strategist results to assign even greater value to the Calpine/Black Dog 6 combination as the highest-ranked resource combination under the Department's analysis.

30. If the Commission determines that it is appropriate to allow Invenergy's proposed Cannon Falls CT to use interruptible rather than firm gas service, it is appropriate to ascribe greater value to Calpine's and Xcel's proposals from a reliability perspective. This is because a resource's availability could impact its capacity accreditation by MISO.[32] If served by interruptible fuel, the proposed Cannon Falls CT will not be available on many winter days[33] potentially decreasing the value of the CT's capacity.[34] The greater possibility that Cannon Falls will be interrupted in the winter would result in a lower level of certainty of service and other units on the system needing to pick up the slack.[35] In addition to the relative economics, such reliability considerations favor moving forward with Calpine's Expansion.

31. Calpine argued that the Commission should consider the value of mitigating the environmental impacts of CT capacity used to help manage net load variability by requiring the installation of state-of-the-art selective catalytic reduction ("SCR") technology on Invenergy and Xcel's proposed CT resources and that the costs of that equipment be included in the economic evaluation of the bids.[36]

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[32] Hearing Transcript, Volume 2 (October 23, 2013) at p. 21, lines 13-15.

[33] Exhibit No. 77, Attachments to the Direct Testimony of Mr. Sachin Shah at DOC Attachment __ at (SS-5), pp. 30 and 31 of 32 ("Shah Direct Attachments").

[34] Exhibit No. 44, Wishart Direct at p. 6, lines 10-14 (emphasis added).

[35] Hearing Transcript, Volume 1 (October 22, 2013) at p. 89, lines 4-19 and p. 91, lines 2-15.

[36] *See e.g.,* Exhibit No. 55, Direct Testimony of Mr. Todd Thornton at p. 12, lines 12-22 ("Thornton Direct").

32. While Xcel and Invenergy argued that SCR is not required to permit the proposed CTs, Xcel Witness Ford and Invenergy Witness Ewan conceded that including SCR would reduce expected emissions at their proposed CT facilities.[37]

33. In light of the state's policy objectives as reflected in Minnesota's renewable energy standards and other efforts to address power plant emissions, requiring SCR on Xcel and Invenergy's proposed CTs creates a more level playing field from an emissions perspective for the resources under consideration and evaluation in this procurement. Based on the record in this case, the cost of SCR installations on the CTs proposed in this proceeding would be approximately $15 million in 2017 dollars.[38] Including such costs for Invenergy and Xcel's proposed CTs would further widen the gap between the cost-effectiveness of Calpine's Expansion and Xcel and Invenergy's proposed projects.

FINDINGS THAT QUALITATIVE NON-PRICE FACTORS SUPPORT THE SELECTION OF CALPINE'S EXPANSION PROPOSAL. (EXCEPTIONS, SECTION II.B.2)

Findings that Environmental Considerations Support the Selection of Calpine's Expansion Proposal. (Exceptions, Section II.B.2.a).

34. Calpine argued that the emissions from the proposed Calpine Expansion are lower than from the CTs proposed in this procurement on a per unit of energy generated basis. The relative impact of CT versus CC technologies from an emission perspective was presented in Exhibit Nos. __ (PJH-6a) and (PJH-6b) to Calpine Witness Hibbard's Direct Testimony, Exhibit No. 51.

35. Exhibit Nos. __ (PJH-6a) and (PJH-6b) show emission rates from each unit proposed on a pounds per MWh (lbs/MWh) basis as well as the reductions in emissions resulting

[37] Hearing Transcript, Volume 1 (October 22, 2013) at p. 78, lines 2-9 and Volume 2 (October 23, 2013) at p. 12, lines 11-17.

[38] Exhibit No. 51, Hibbard Direct at p. 30, FN 35.

from the installation of SCR. Exhibit No. __ (PJH-6a), reproduced below, shows emission rates by technology for nitrous oxide ("NOx"):

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36. As shown in this Exhibit __ (PJH-6a), the NOx emission rates for Calpine's Expansion are lower than the next-closest option by **[TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]**.

37. Exhibit No. __ (PJH-6b), reproduced below, shows emission rates by technology for carbon dioxide ("CO_2"):

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38. As shown in this Exhibit __ (PJH-6b), the CO_2 emission rates for Calpine's Expansion are lower than the next-closest option by [**TRADE SECRET INFORMATION BEGINS TRADE SECRET INFORMATION ENDS]**.

39. The record shows that these emission rates are primarily a direct function of the relative energy efficiency (*i.e.*, heat rates) of the respective projects. With respect to NO_x, the differential is also due to the fact that Calpine's Expansion includes back-end emission control technology, *i.e.*, SCR, that is not included in Invenergy and Xcel's proposed CT resources.[39]

[39] Exhibit No. 51, Hibbard Direct at p. 29, lines 13-17.

40. Both Xcel and Invenergy argued that total annual emissions are likely to be lower for the CTs proposed by Invenergy and Xcel than Calpine's Expansion.[40] The record shows, however, that assessing the environmental impacts of the thermal projects in this procurement requires a comparison not of total annual tonnage, but based on emissions per unit of energy produced.[41] Thus, assuming equal quantities of MWh produced, the Calpine Expansion would have lower total emissions than the CTs proposed.

41. To the extent that the Calpine Expansion operates more hours than the CTs due to its efficiency advantage, on a unit-to-unit comparison basis, the Calpine Expansion could have higher total annual emissions. However, for every hour of operation of Calpine's proposed combined cycle resource it is likely displacing generation from resources that also have a higher emission rate in lbs/MWh than the new combined cycle facility, and thus emissions are reduced.[42]

Findings that Calpine's Expansion Supports The Integration Of Renewable Resources. (Exceptions, Section II.B.2.b).

42. Minnesota has adopted an aggressive renewable energy standard, which requires that eligible renewable electricity account for 31.5% of Xcel's total retail electricity sales in Minnesota by 2020.[43]

[40] *See e.g.*, Exhibit No. 43, Rebuttal Testimony of Xcel Witness Gregory Ford at p. 4, lines 18-22 (noting that Calpine's emissions could be higher on an annual basis due to the fact that combined cycle units commonly operate "at a capacity factor that is four times higher than the capacity factor for CTs.") ("Ford Rebuttal").

[41] Exhibit No. 53, Hibbard Rebuttal at p. 19, lines 10-13.

[42] Exhibit No. 53, Hibbard Rebuttal at p. 20, lines 7-10.

[43] *See* Minn. Stat. § 216B.1691.

43. The record in this case shows that the CTs proposed by Xcel and Invenergy and Calpine's combined-cycle Expansion can be used to support the integration of renewable resources on Xcel's system.[44]

44. The record shows, however, that the value of Calpine's Expansion to help integrate variable resources is likely higher because combined cycle resources can manage net load variability more efficiently, and at lower cost and lower emissions than CT capacity.[45]

CONCLUSIONS

1. The quantitative economic analyses outlining the objective merits of the proposed resources support the selection of Calpine's Expansion Proposal to meet all or a portion of Xcel's future resource needs. Calpine Witness Paul J. Hibbard demonstrated that Calpine's Expansion Proposal is the least expensive option among the thermal energy resources offered in this procurement by Xcel, Calpine, and Invenergy based on the LCOE as seen from the perspective of Xcel's ratepayers. The LCOE results show that the Calpine Expansion is the least cost resource over a broad range of differing scenarios, assumptions and contingencies – demonstrating that the Expansion can serve as a valuable hedge against foreseeable and unknown changing system conditions for years to come.

2. The Department and Xcel's Strategist analyses, which analyzed the present value of societal costs ("PVSC") of different combinations of bids, similarly support the selection of Calpine's Expansion. No other party submitted a quantitative economic analysis. As a result, the Commission has before it three separate modeling exercises – conducted using similar inputs but slightly varying methods and assumptions – that conclude that Calpine's Expansion should

[44] Exhibit No. 53, Hibbard Rebuttal at p. 17, lines 17-19.

[45] Exhibit No. 53, Hibbard Rebuttal at p. 18, line 19 through p. 19, line 2.

be viewed as the best (or in Xcel's analysis, among the best) resource options available to the Commission from LCOE and PVSC perspectives.

3. In addition, the record demonstrates that the economic modeling performed understates the value of Calpine's Expansion Proposal. Mr. Hibbard's LCOE analysis purposefully used conservative assumptions that tended to disadvantage Calpine relative to its competition. Notwithstanding this purposeful approach, Calpine's Expansion has the lowest LCOE among the thermal resource proposals by wide margin. The Strategist modeling relied on by the Department and Xcel in making their recommendations failed to ascribe certain fuel costs and costs related to environmental control technology to other thermal bids, the effect of which is to undervalue the relative cost-effectiveness of Calpine's Expansion. These facts further support the selection of Calpine's Expansion based on purely quantitative metrics.

4. From a qualitative standpoint, the economic modeling fails to fully reflect the significant "non-price" benefits related to the operation of Calpine's proposed combined-cycle generation compared with simple-cycle generation proposed by Xcel and Invenergy. The Expansion's environmental performance and the ability to serve as a hedge against future market uncertainty set Calpine's Proposal apart from the CT resources proposed in this proceeding. Calpine's Expansion Proposal also benefits from being an expansion of an existing facility that was planned and constructed with the Expansion in mind. While such planning allowed Calpine to price its proposal aggressively, the planning also reduces the Expansion's impact on the environment and the community in which it operates. These are important qualitative attributes that also support the selection of Calpine's Expansion Proposal.

5. The record in this case highlights the importance of adding combined cycle capacity through this procurement. The record shows that selecting only CT peaking capacity in

this proceeding – compared to combined cycle capacity or a mix of CT and combined cycle capacity – would diminish the resilience of Xcel's resource mix to respond to higher-than-expected load growth and future resource retirements, and would constrain the flexibility Xcel's system has to integrate variable renewable resources in an economically- and environmentally-responsible manner.

6. Accordingly, based on the record developed in this proceeding, the Commission directs Xcel to enter into PPA negotiations with Calpine to secure the clear benefits of the Calpine Expansion for Xcel's customers.