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STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION

In the Matter of Xcel Energy's 2016-2030 Upper Midwest Resource Plan	PUC Docket No. E002/RP-15-21

CLEAN ENERGY ORGANIZATIONS' INITIAL COMMENTS

On Behalf Of

Izaak Walton League of America - Midwest Office

Fresh Energy

Sierra Club

Wind on the Wires

Minnesota Center for Environmental Advocacy

July 2, 2015

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Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia.

Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation, can limit climate change risks.

- IPCC, Fifth Assessment Report, 2014

It is the goal of the state to reduce statewide greenhouse gas emissions across all sectors producing those emissions to a level at least 15% below 2005 levels by 2015, to a level at least 30% below 2005 levels by 2025, and to a level at least 80% below 2005 levels by 2050.

- Minnesota Statutes Section 216H.02, subd. 1

The urgent challenge to protect our common home includes a concern to bring the whole human family together to seek a sustainable and integral development, for we know that things can change.

Young people demand change. They wonder how anyone can claim to be building a better future without thinking of the environmental crisis and the sufferings of the excluded.

- Pope Francis, Climate Encyclical, 2015

INTRODUCTION

These Comments on the 2015 Xcel Integrated Resource Plan ("IRP") are jointly sponsored by the following clean energy nonprofit organizations: Fresh Energy, the Izaak Walton League of America – Midwest Office, Wind on the Wires, Sierra Club, and the Minnesota Center for Environmental Advocacy (collectively "Clean Energy Organizations"). The Comments were prepared with substantial technical assistance from consultants Anna Sommer and Peter Lanzalotta.[1]

Clean Energy Organizations commend Xcel for engaging in an open process that has allowed stakeholders to question and understand many of the underlying assumptions in its IRP

[1] Resumes for Sommer and Lanzalotta are included as Exhibits A and B to these comments.

and the modeling that is offered to support it. We appreciate that Xcel has submitted an IRP with a Preferred Plan that invests in renewables. Xcel's Preferred Plan, however, fails to retire its aging coal plants, Sherco Units 1 and 2. Although Xcel says it can achieve significant pollutant emission reductions while still operating these units, that claim is false and based on unreasonable assumptions and modeling idiosyncrasies.

Clean Energy Organizations, pursuant to Minnesota Rule 7843.0300, offer the Clean Energy Plan as an alternative to the company's Preferred Plan. The Clean Energy Plan retires Sherco Units 1 and 2 in 2021 and 2024 respectively, is slightly less expensive than Xcel's Preferred Plan on a present value of societal cost (PVSC) basis, and far out-performs Xcel's Preferred Plan with regard to pollution emissions and associated risks.

What Xcel's Integrated Resource Plan demonstrates – even without much of the analysis presented here by the Clean Energy Organizations – is that there is no economic justification for continued operation of Sherco Units 1 and 2. The cost differences between the retirement and non-retirement scenarios are simply too slight to provide a sound basis for decision. Xcel proposes to continue to operate Sherco 1 and 2 through the entire planning period, taking a business-as-usual approach. But that approach commits the company, ratepayers, and the state to millions of dollars of expense in maintaining and operating last century's technology, millions of dollars of expense for coal that comes from outside Minnesota, and millions of tons of pollutant emissions that are making people sick and causing severe and irreversible damage to humans and the environment.

The Clean Energy Plan offers an alternative vision at the same price. It invests in home-grown clean energy industries that will create investment and jobs here in Minnesota. It eliminates the millions of harmful tons of greenhouse gases (GHG) and other pollutant emissions

from these older coal units. It mitigates significant risks from the uncertainty of future regulation. And it responds to the growing demand from Xcel's customers and Minnesota's policymakers to provide energy from clean energy resources rather than coal.

In these Initial Comments, the Clean Energy Organizations provide the following: Section I introduces the Clean Energy Plan; Section II discusses some of the limitations of Strategist modeling; Section III explains the shortcomings of Xcel's Preferred Plan and provides justification for the changed assumptions the Clean Energy Organizations made in their modeling; Section IV discusses the greater regulatory risk of Xcel's Preferred Plan; and Section V sets out why the Clean Energy Plan is in the public interest and should be adopted by the Commission.

I. THE CLEAN ENERGY PLAN.

The Clean Energy Organizations developed the Clean Energy Plan and offer it for the Commission's consideration pursuant to Minn. R. 7843.0300, subp. 11. The Clean Energy Plan is in the public interest and is preferable to Xcel's Preferred Plan because it achieves significantly more pollutant emission reductions, reduces regulatory risks, provides certainty in planning for Sherco 1 and 2 retirement, and is slightly less expensive than the company's Preferred Plan.

The Clean Energy Alternative would

- Retire Sherco Unit 1 in 2021
- Retire Sherco Unit 2 in 2024
- Increase Xcel's energy efficiency by 0.2% annually
- Add approximately 2,500 MW of wind resources (same as Preferred Plan)
- Add approximately 1,700 MW of solar resources (same as Preferred Plan)
- Add approximately 1,300 additional MW of natural gas peaking resources as compared to the Preferred Plan.

A. The Clean Energy Plan Shows That Sherco Units 1 And 2 Can Be Retired Without The Need To Build New Combined Cycle Natural Gas.

Xcel has promoted its Preferred Plan based mainly on the Plan's deferral of investment in large combined-cycle ("CC") natural gas units until after the 15-year planning period: "[the Plan] will provide the flexibility to evaluate CC replacements for key facilities beyond the planning period without significantly shifting our resource mix to be heavily reliant on natural gas-fired CC generation."[2] Xcel assumes, as it did in the Sherco Life-Cycle Management Study, that retirement of Sherco 1 and 2 will require the addition of large CCs. It does not.

The Clean Energy Plan does not require large-scale combined cycle construction. This is because Xcel's system will already have sufficient capacity in place by 2021 such that one of the Sherco units can be readily retired *without* any capacity additions above and beyond those envisioned in Xcel's Preferred Plan. Indeed, it is not until 2024 when the second unit retires in the Clean Energy Plan that 690 MW of combustion turbines ("CTs,") but not CCs, are added. This is a point worth emphasizing – the retirement of Sherco 1 and 2 does *not* necessitate the construction of any additional combined cycle capacity.

Figures 1 and 2 illustrate the relationship between capacity additions and retirements and Xcel's peak plus reserve margin requirement under the Clean Energy Plan and Xcel's Preferred Plan.

[2] IRP Supplement at 9 (Mar. 16, 2015.

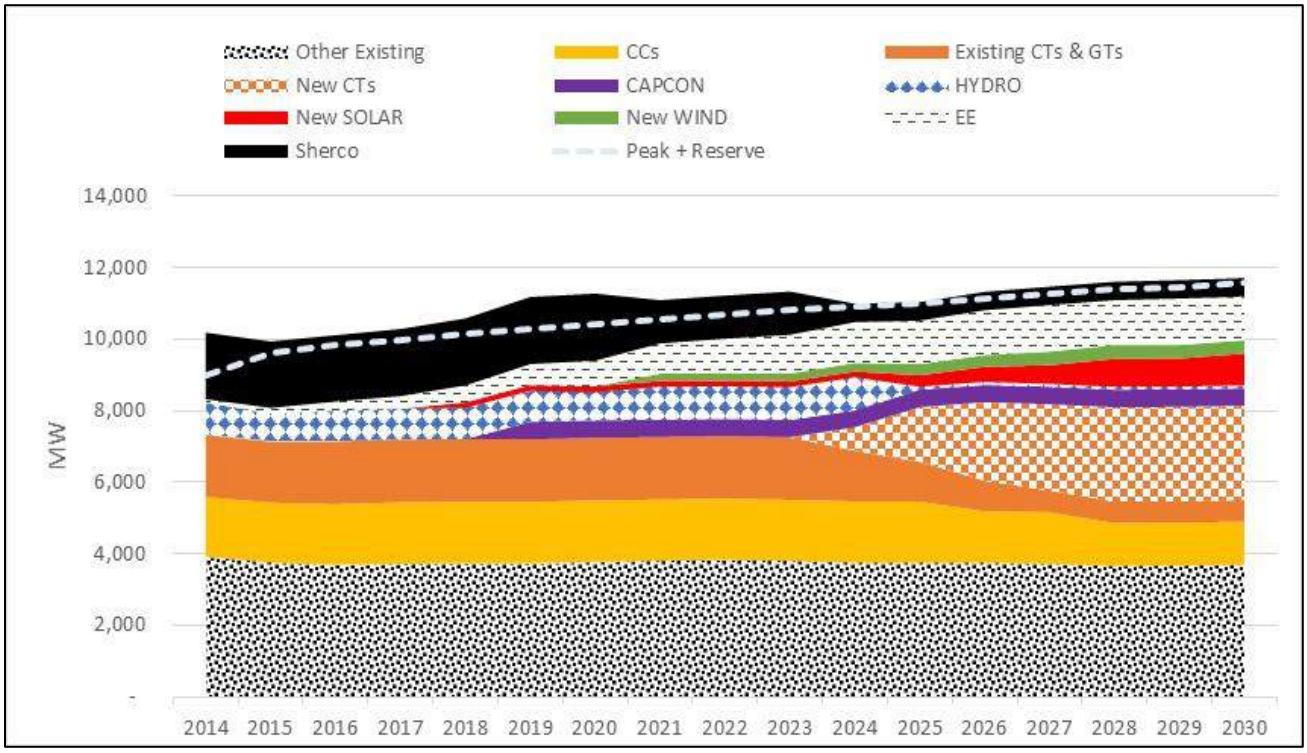

Figure 1. Resources and Demand Under CEO's Clean Energy Plan

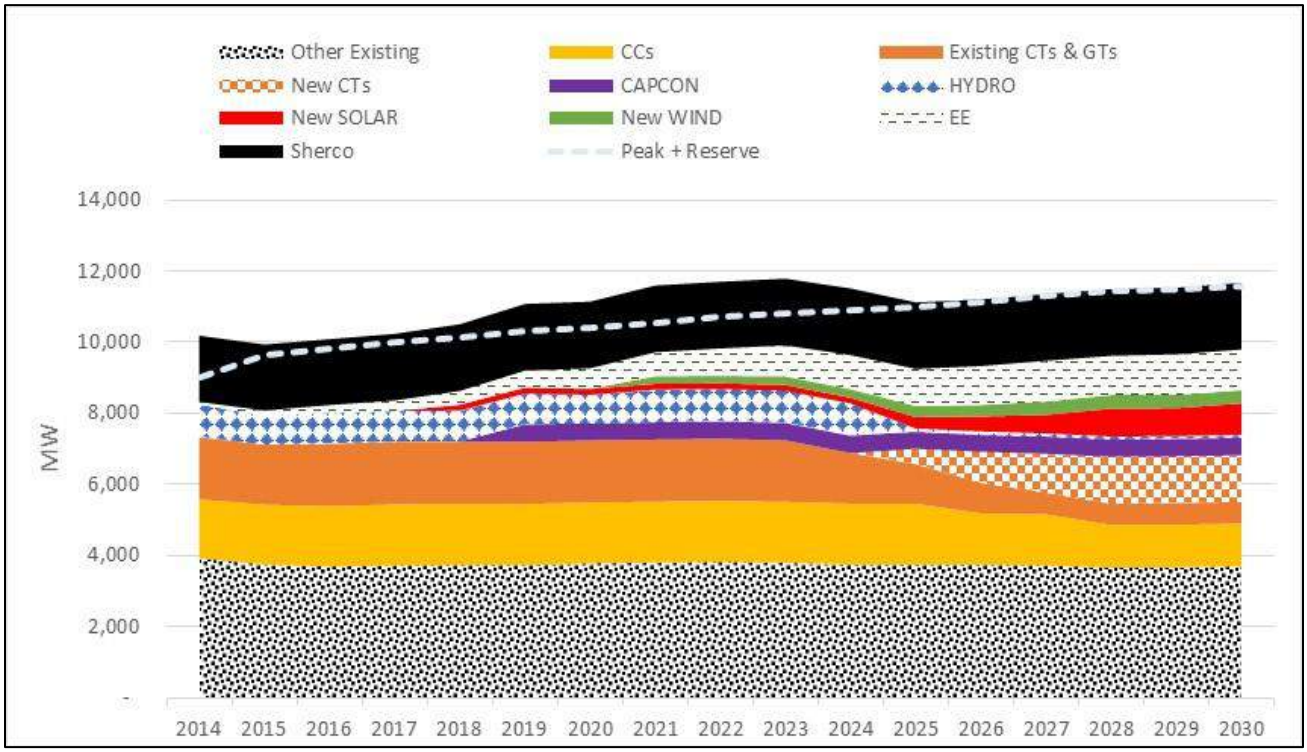

Figure 2. Resources and Demand Under Xcel's Preferred Plan

Note that in Figure 1, even when one Sherco unit retires in 2021, enough additional capacity remains that Xcel still *exceeds* its planning obligation. A number of CTs are chosen by Strategist in 2024 after the Sherco 2 retirement, but a significant portion of this capacity comes online to replace retiring combustion and gas turbines, not to replace Sherco.

While the Clean Energy Plan includes additional CT capacity a decade from now, we believe it is unlikely that the entire amount of that capacity would, in fact, be required from CTs. Nearly ten years from now, it is very likely that alternatives such as energy storage and solar will be cheaper, more efficient and therefore economic alternatives to some or all of this CT capacity. For example, in its 2010 IRP, Xcel touted the fact that it had "added just over a megawatt of solar electricity production"[3] and said that "we expect this amount to grow over the next decade to approximately 20 MW of solar photovoltaics."[4] Just five years later, it is now proposing to add 1,700 MW of solar in the next 16 years. In its 2010 IRP, Xcel said the reason for choosing 20 MW of solar was that "[a]bsent large gains in PV productivity and additional reductions in the cost of PV systems, solar PV will likely not be a cost effective generation resource in the Upper Midwest for some time."[5] Xcel went on to say that, "capacity factors for solar PV in the southwestern US can be about 20%. In Minnesota, capacity factors for solar PV are more likely to be in the 12 to 15% range."[6] When the Aurora, North Star, Marshall and Juwi projects come online in 2016, however, they will have annual capacity factors of over **[TRADE SECRET BEGINS... ...TRADE SECRET ENDS].** Xcel actually assumes that the solar PV coming online in the later years of its Preferred Plan would have *lower*, not higher capacity factors than these four projects. Because Strategist assumes a lower capacity factor for solar than

[3] Xcel 2010 IRP at 5-10.
[4] *Id.*
[5] *Id.*
[6] *Id.*

what is expected from actual projects and because the model cannot fully account for the trend toward more efficient and less costly solar, it is likely solar will be a cost-effective resource that can displace much of the post-2024 CT capacity Strategist selects in the Clean Energy Plan.

In addition, an extension of Manitoba Hydro's contract would help to reduce the need for CTs in 2024 – our modeling showed that an extension of the contract reduced the amount of additional CT capacity needed by 66%.

In any case, overall, the natural gas generation relied on in the Clean Energy Plan is comparable to Xcel's Preferred Plan. Although the Clean Energy Plan adds more CTs than the Preferred Plan, the actual cumulative gas consumption is only 17% greater as shown in Figure 3.

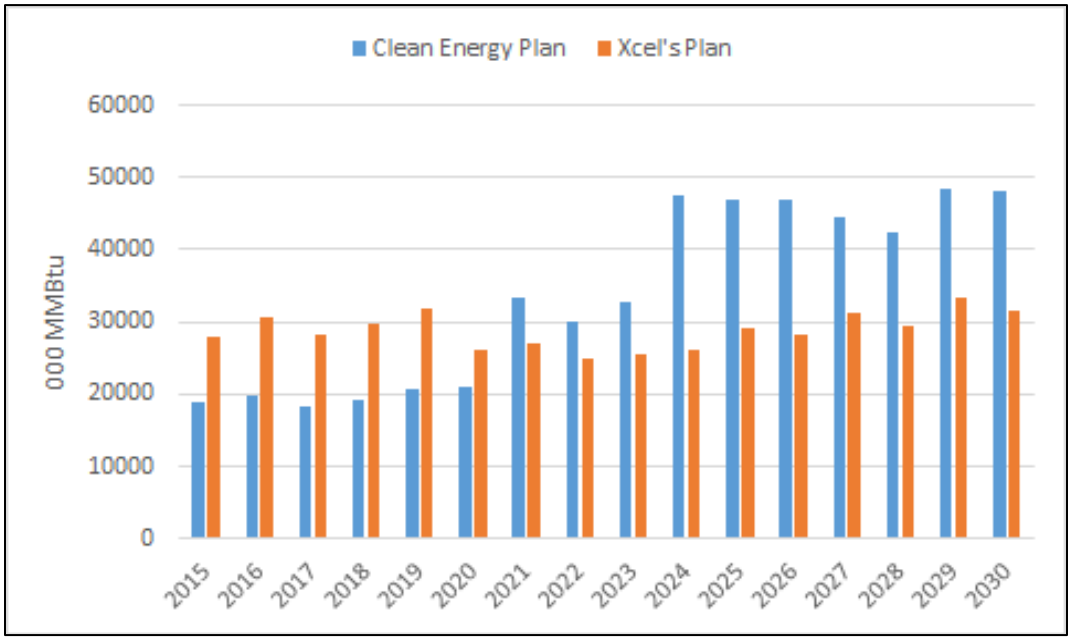

Figure 3. Annual Gas Consumption in Clean Energy Plan and Xcel's Preferred Plan[7]

As we stated above the additional gas may very well be offset wholly or in part by non-gas alternatives. And it should be noted that gas generation does not replace Sherco generation

[7] Xcel's Scenario 10, scenario U was used in this comparison since there was no scenario combining Scenario 10, scenario U with markets "on".

one for one. The retirement of those units is not merely a question of tradeoffs between burning more coal or burning more gas.

As shown in Figure 4 below, the Clean Energy Plan *reduces* expenditures on coal consumption a far greater% than it increases expenditures on gas. The benefits of this in terms of both emission reductions and also risk from exposure to coal-related prices should not be overlooked.

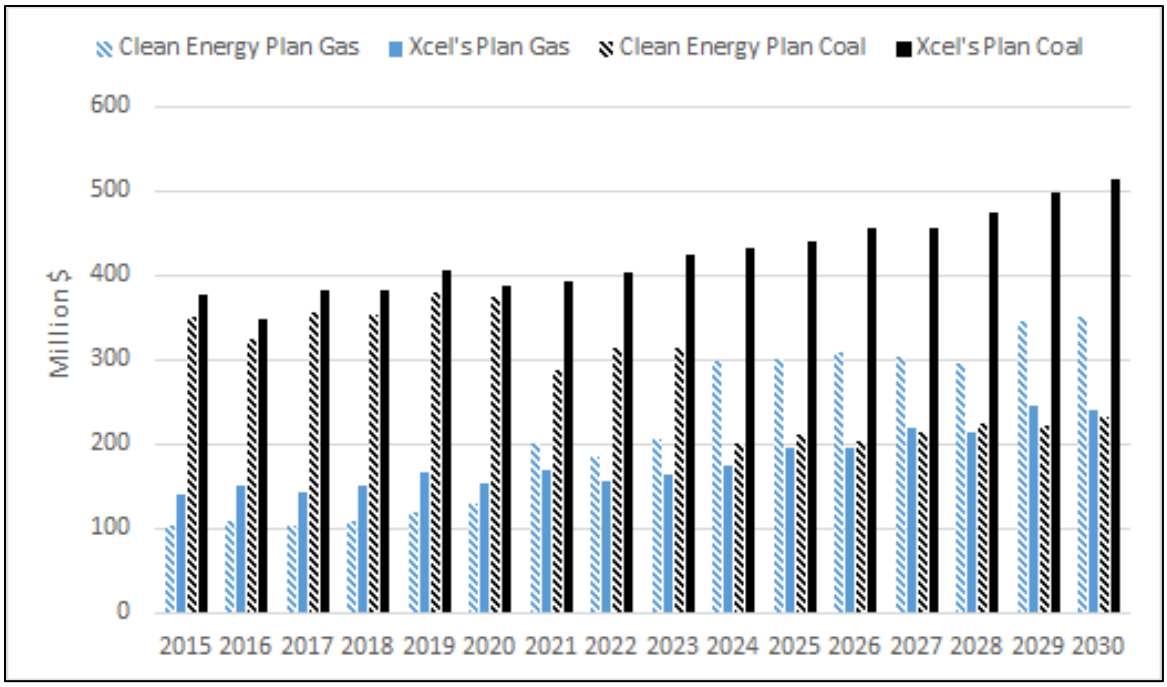

Figure 4. Annual Coal Consumption and Gas Consumption in Clean Energy Plan and Xcel's Preferred Plan

B. The Clean Energy Plan Is Comparable In Price To Xcel's Preferred Plan

As is clear from Xcel's IRP, the cost differential between the Preferred Plan and various scenarios in which one or both of the Sherco units would be retired are very slight. For example, Xcel's own modeling shows only a 0.5% difference between its Preferred Plan and Scenario 10F, which is the Preferred Plan with retirements of Sherco Units 1 and 2 in 2020 and 2023

respectively.[8] (When the social cost of carbon and higher, more realistic, externality values for criteria pollutants are considered, Xcel's own modeling shows that the retirement scenario 10F is 0.8% *less expensive* than the Preferred Plan.[9]) The cost differential between Xcel's Preferred Plan and the Clean Energy Plan is similarly slight. What is clear is that the PVSC for an Xcel system without Sherco Units 1 and 2 does not differ, in any material way, from a system that relies on Sherco Units 1 and 2. Given the enormous other benefits of retirement, it is clear that setting firm retirement dates for these units in this IRP is the best choice.

The Clean Energy Plan was developed using the Strategist model largely with Xcel's inputs and assumptions. However, the Clean Energy Organizations made changes to some of the assumptions in Xcel's modeling. These changes are discussed in detail in Section III below. The changes correct erroneous assumptions. They relate to the price of energy efficiency, the amount of achievable efficiency, the revenue and emissions Xcel assigned to excess or "dump" energy, the availability of the CAPCON units to meet near-term capacity, the ability of Strategist to optimize selection of gas resources, and the availability of market purchases. All of these changes, we submit, portray a more accurate vision of what is likely over the 15-year planning period.

In order to ensure that the Clean Energy Plan could be compared to Xcel's Preferred Plan on an apples-to-apples basis, we ran Strategist applying the same corrected assumptions to Xcel's Preferred Plan. As shown in Figure 5 this apples-to-apples comparison demonstrates that the Clean Energy Plan is essentially the same cost as Xcel's Preferred Plan. (Over the 15-year planning period the Clean Energy Plan is $7.5 million – or .03% -- cheaper than Xcel's Preferred Plan.)

[8] IRP Supplement, 14, Table 6.
[9] Xcel Response to CEO IR 35.

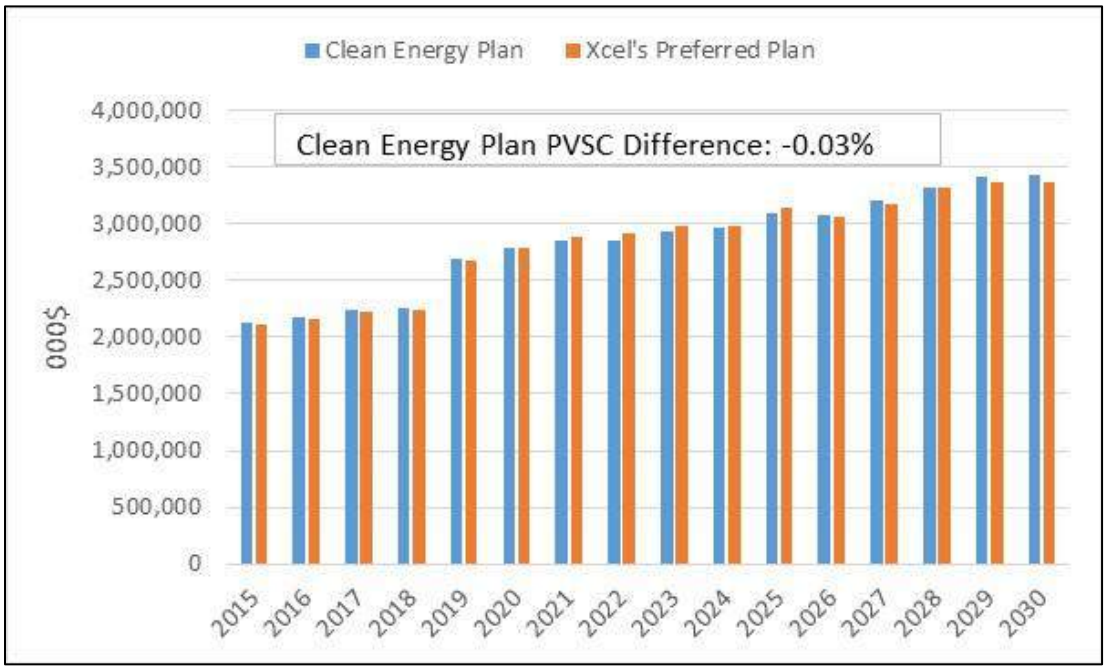

Figure 5. Incremental revenue required under the Clean Energy Plan and Xcel's Preferred Plan with same assumptions.

We also ran both plans through various sensitivities. We were limited with respect to the number and type of sensitivities we could run both by time and resources and by the fact that "high" and "low" fuel price sensitivities did not have corresponding values for market prices. Because the Clean Energy Plan is run in Strategist with markets on[10], we would have needed to account for the impact lower and/or higher fuel prices would have had on market prices – but those inputs were not available.

The sensitivities we were able to run, show that the Clean Energy Plan compares favorably to Xcel's Preferred Plan. For example, we discovered that the price Xcel used for coal in its model was less than the price it actually paid for coal in 2014. (This is discussed more

[10] "Markets on" refers to allowing the model to select energy/capacity from the market when that is more economic than requiring the addition of a generating unit. Under "markets off" conditions, these market purchases are not made available to the model.

fully below in Section III.) When we corrected for this, the Clean Energy Plan performed slightly better, costing 0.27% less than the Preferred Plan as shown in Figure 6.

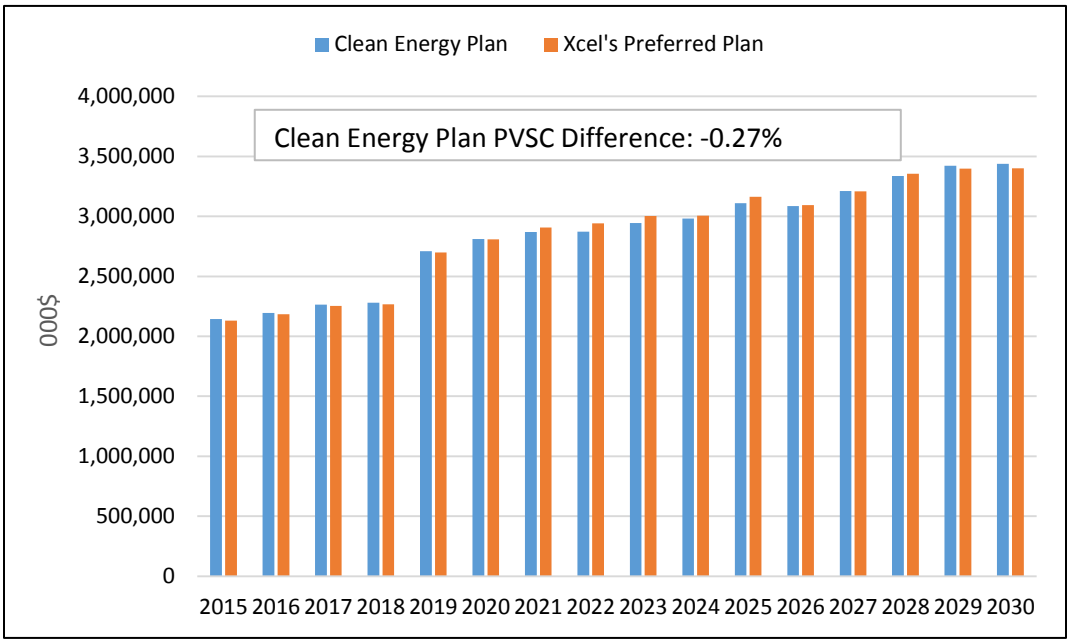

Figure 6. PVSC Difference Between Clean Energy Plan and Xcel's Preferred Plan With Corrected Price of Coal.

When we included the federal government's externality value for GHG emissions (the "social cost of carbon") to the emissions in each plan, the difference started to become significant at over 1.1%. In Figure 7 below, the middle value of the Social Cost of Carbon with a 3% discount rate is applied to CO_2 emissions.

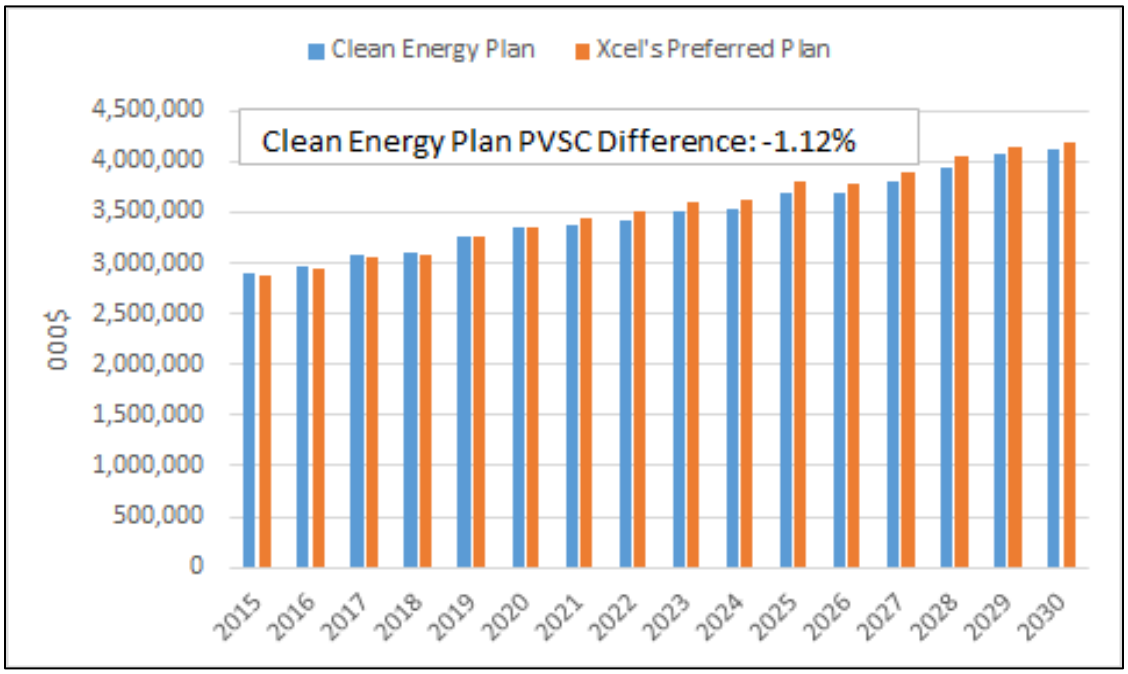

Figure 7. PVSC Difference Between Clean Energy Plan and Xcel's Preferred Plan When Social Cost of Carbon Applied to GHG Emissions.

Xcel's own modeling confirmed that scenarios in which Sherco retires are more cost effective when the true costs of pollution are internalized to the system. According to Xcel's runs, with a federal Social Cost of Carbon at a 3% discount rate, Strategist shows that retirement of both Sherco units saves $538 million as compared to Xcel's Preferred Plan.[11] At the request of the Clean Energy Organizations, Xcel added to this run the additional costs of updated values for criteria pollutants based on the Goodkind/Polasky report.[12] Considering these true costs of pollution as part of the plan, Xcel's model run concludes that a scenario in which Sherco 1 and 2 retire in 2020 is $657 million cheaper than their Preferred Plan.[13]

[11] *See* Supplement, Table 6, comparing Scenario 10 with Scenario 10F in Column P.
[12] *See* Xcel Response to CEO IR 35. Xcel explains that it used the "urban median values" from the Goodkind/Polasky report for High Bridge and Riverside and the 95th percentile rural value from the report for its other plants. Xcel objected to the "appropriateness" of this run and the Goodkind/Polasky figures, but failed to explain why it would be more appropriate to assign a value of zero to SO2 – the value applied in all of its runs -- when the Commission has determined that zero is not the appropriate value.
[13] *Id.*

The Clean Energy Organizations considered other sensitivities as well. For example, high and low cost of solar and wind would change the cost of the plans. However, because the Clean Energy Plan and Xcel's Preferred Plan envision the same amount and timing of renewable purchases, those sensitivities do not change the cost of one plan relative to the other.

In general, across all sensitivities, the Clean Energy Plan and Xcel's Preferred Plan have relatively small differences in present value of societal cost (PVSC). This is not a surprising result, since the alternatives are, broadly, being measured against the operating and maintenance costs of Sherco 1 and 2. None of the runs Xcel performed on its Preferred Plan assumed any major capital investments in Sherco 1 and 2 such as the requirement to install Selective Catalytic Reduction (SCRs). The addition of a major capital expense for continued operation of the coal units would undoubtedly tip the economic equation substantially in favor of the Clean Energy Plan.

II. GENERAL LIMITATIONS OF STRATEGIST MODELING.

The Clean Energy Organizations stress to the Commission that the Strategist model is only a tool to assist the Commission in designing an appropriate 15-year plan. It does not and cannot provide a "right" answer.

There are several limitations to the model that the Commission should consider when evaluating its outputs.

First, as with any model, the results are dependent upon the assumptions fed into it. We note, for example, that Xcel assigned a coal cost in the model that is actually less than the amount it paid for coal in 2014. All kinds of inputs are subject to similar decision and speculation. The costs of operation and maintenance of aging facilities, for example, are subject to speculation. We know from recent dockets involving improvements to Xcel's nuclear fleet

that the company is not always accurate in projecting such expenses. In the IRP planning context, it is unlikely that a utility would err on the side of *over*-estimating the costs of running its existing fleet.

Every assumption, even those one wouldn't consider to be related to cost, can affect the cost of a plan. Xcel assumed, for example, in its modeling that once every **[TRADE SECRET BEGINS… ...TRADE SECRET ENDS]** years, Monticello would go down for refueling for a duration of **[TRADE SECRET BEGINS... ...TRADE SECRET ENDS]** days. However, in practice, Monticello's refueling outages have ranged from 47 to 133 days over the past 10 years. Its most recent refueling outage was modeled in Strategist as starting on **[TRADE SECRET BEGINS... ...TRADE SECRET ENDS]** and ending on **[TRADE SECRET BEGINS... ...TRADE SECRET ENDS].** In actuality, Monticello went down for refueling on April 12, 2015,[14] started to come out of refueling on May 29, 2015[15] and didn't reach full power until June 5, 2015.[16] This means that Strategist tends to produce more generation from Monticello (and therefore less CO_2) than is likely to happen in practice. Again, this is just one example of hundreds, if not thousands, of data points left to Xcel to plug into the model.

Second, Strategist can only select from those generation resources made available to it. In this case, for example, "energy storage," a resource whose cost has come down dramatically in recent months is simply not included in Xcel's modeling. Strategist only knows the reality fed to it.

[14] Power Reactor Status Report for April 12, 2015, United States Nuclear Regulatory Commission (last updated May 11, 2015), http://www.nrc.gov/reading-rm/doc-collections/event-status/reactor-status/2015/20150412ps.html.
[15] Power Reactor Status Report for May 29, 2015, United States Nuclear Regulatory Commission (last updated June 26, 2015), http://www.nrc.gov/reading-rm/doc-collections/event-status/reactor-status/2015/20150529ps.html.
[16] Power Reactor Status Report for June 5, 2015, United States Nuclear Regulatory Commission (last updated June 5, 2015), http://www.nrc.gov/reading-rm/doc-collections/event-status/reactor-status/2015/20150605ps.html.

Third, although Strategist's objective is to develop a "least cost" plan, that plan will necessarily be a product of choices made by the modeler (in this case Xcel) who must narrow the resource choices in addition to defining assumptions. It is easy to assume that the "inputs" into the model are only the assumptions that are normally discussed in IRPs, e.g., the load forecast, fuel prices, etc. But the model's specifications can have just as big if not a bigger impact on the results. The modeler arrives at those specifications through an iterative process considering variables like model run time and whether the chosen specification/representation is close enough to reality to be acceptable. As an example, Xcel limited its modeling so that no solar could be added to any expansion plan after 2030. This was likely done to shorten the model run time and is probably a perfectly fine assumption to make because 2030 is so far out in the future that any expansion plan beyond that timeframe will undoubtedly change and change dramatically. However, if one cared particularly about the portion of the expansion plan after 2030, it would be of vital importance to know that such limitations were used. Understanding Strategist modeling is not as simple as looking at the "High Gas" sensitivity and noticing the difference in PVSC, but rather requires an understanding of which other assumptions also influenced the result.

Fourth, Strategist is deterministic. That means if one specifies that load grows at 0.75% annually, natural gas prices are $4 per MMBtu, CTs costs $1000/kW and solar costs $100 per MWh, it will tell us the least cost plan under all those assumptions, but it cannot tell us the probability that solar costs will remain at $100 per MWh or how much further solar costs would have to drop and/or solar productivity improve in order to change the plan. The latter must be done, if it is done at all, through multiple modeling iterations where the modeler manually changes those inputs.

The Clean Energy Plan was developed within the constraints of many of these limitations. While the Clean Energy Organizations licensed Strategist and were able to conduct independent model runs, those runs are necessarily a product of many of the inputs and specifications Xcel created. We did not have the time or resources, for example, to run scenarios looking at multiple, differing combinations of solar cost and productivity, to produce our own coal price forecast, or to develop alternative resource inputs such as for storage or demand response. If we had, we believe the Clean Energy Plan would perform even better as compared to Xcel's Preferred Plan.

III. PROBLEMS WITH XCEL'S PREFERRED PLAN.

Clean Energy Organizations, through discovery and use of the Strategist model, were able to uncover a number of problems with Xcel's Preferred Plan. The modeling underlying Xcel's Preferred Plan contains several unreasonable and/or erroneous assumptions that make the Plan appear to perform much better than it actually would if implemented. In developing the Clean Energy Plan, we corrected for many of these errors and applied different assumptions. Here, we set out the main problems we discovered in Xcel's modeling and provide justification for the changes we made to the model in developing the Clean Energy Plan.

A. Xcel's Preferred Plan Will Not Achieve The GHG Reductions Claimed.

Xcel maintains that its Preferred Plan would achieve "a 33% CO_2 reduction from 2005 levels" by 2020 and position Xcel to "achieve over 40% by 2030."[17] While we applaud Xcel's interest in trying to meet the state's greenhouse goals, the claim lacks credibility.

Just two years ago the Company's Sherco Life-Cycle Management study concluded that retirement of the Sherco units would be required in order to meet statewide GHG reduction

[17] Page 10 of March 16, 2015 Supplement.

goals. In that docket, the Minnesota Pollution Control Agency (MPCA) found that "only in the scenario where both [Sherco 1 and 2] are retired does Xcel Energy meet their Next Generation Energy Act glide slope[18] for emissions reductions after 2023."[19]

Indeed, as Figure 8 demonstrates, in the Sherco Life-Cycle Management study Xcel concluded that system CO_2 emissions would remain over 20 million tons for many years absent the retirement of Sherco 1 and 2.

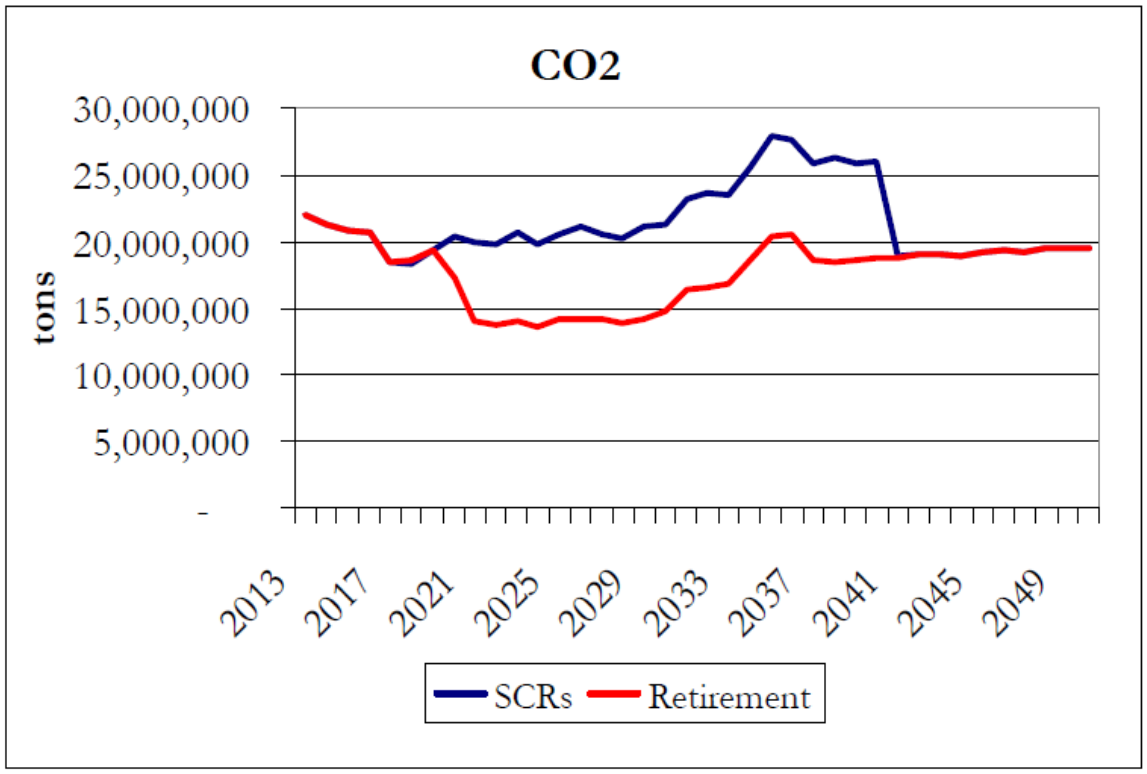

Figure 8. Figure from Xcel's July 2013 LCM study comparing system emissions of "retirement" (in 2020/2023) to installation of SCRs (retirement in 2040).

The emissions profile from the Lifecycle Management Study stands in stark contrast to the March 16, 2015 supplement. The difference in 2030 between the 2013 LCM study and the current IRP is approximately 3.625 million tons of CO_2.

[18] The linear interpolation between reduction goals, e.g., the linear line between 15% below 2005 levels in 2015, 30% below in 2025, 80% below in 2050.
[19] MPCA's comments in Docket No. E002/RP-13-368, p. 3.

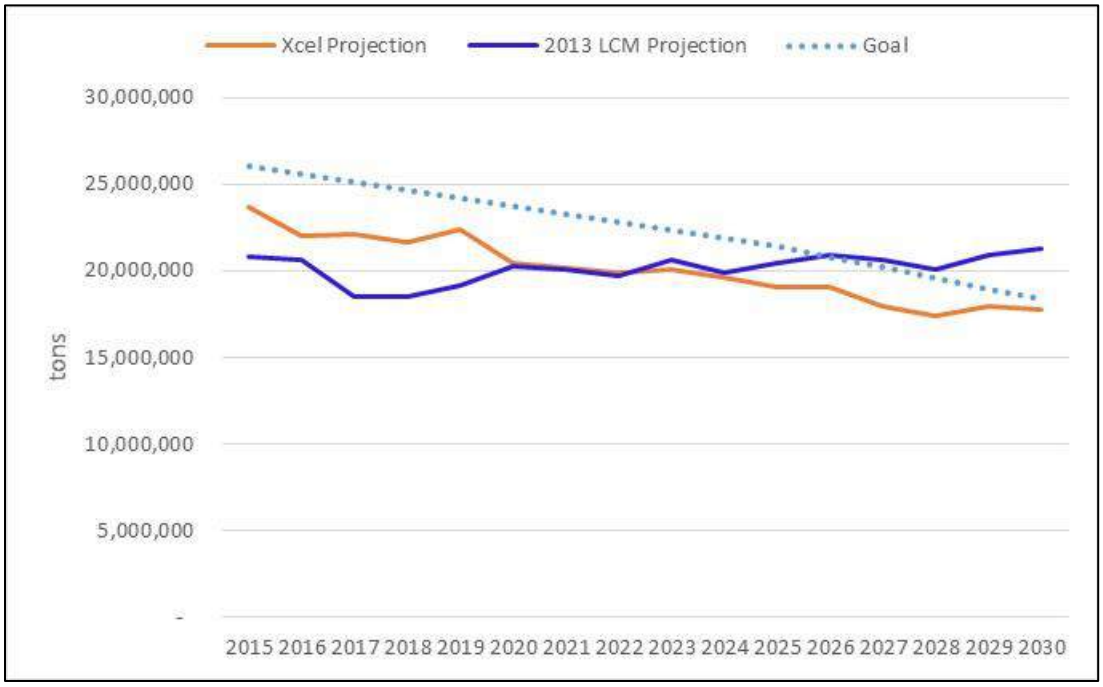

Figure 9. In contrast, in 2015 Xcel projects that system emissions will decrease significantly to 17.791 million tons in 2030 or some 3.625 million tons less than Xcel projected in the 2013 LCM study.

Such a large reduction in emissions would be equivalent to reducing the output of Sherco 1 by almost 75%.[20] And yet Xcel is neither proposing to retire either Sherco unit before 2030 nor restrict their operation.

Xcel claims that this reduction arises from the addition of "approximately 3,700 MW of new renewables during the 2020-2030 time period."[21] As it says in response to CEO IR 51, "During the Resource Plan's 15-year planning period, we are projecting that CO_2 emissions from NSP's coal fleet (King Plant and Sherco Units 1, 2, and 3) will be nearly 32 million tons lower because of the addition of significant renewable resources (wind and solar)." Unfortunately, these reductions are neither real nor permanent and Xcel-related CO_2 emissions are likely to be higher--much higher--than Xcel projects.

[20] Sherco 1 emitted 4.906 million tons of CO_2 in 2014.
[21] Page 10 of March 16, 2015 Supplement.

Clean Energy Organizations have identified at least three inaccurate and unreasonable assumptions built into Xcel's modeling for its Preferred Plan that result in a large exaggeration of the Plan's purported GHG emission reductions: (1) the assumption that Xcel's modeling accurately reflects how its units will interact with the MISO system, (2) the handling of "dump energy," and (3) the failure to account for MISO purchases. In addition, the choice of methodology used to calculate the Company's baseline emissions as well as project future emissions matters greatly. Xcel's emissions projection places a premium on its ability to sell power and subtract the related CO_2 emissions from its own total. It is not reducing real CO_2, but rather moving CO_2 into columns other than its own.

1. **Xcel's future coal fleet emissions will be dictated by the fleet's interaction with MISO and not solely based on how the fleet interacts with other Xcel generators to serve Xcel's load.**

Most of Xcel's modeling was conducted with the MISO market representation "off." This means that Xcel could neither consume energy from MISO nor sell energy into MISO. Clean Energy Organizations have no objection to conducting modeling runs with this specification since it provides a picture of the utility's ability to supply its own demand; however, it should be understood that such runs will not accurately portray the way that a utility's units will operate in practice. Every day, Xcel offers its units to MISO for dispatch, MISO considers the offers from these and other units and the demand from all load (not just Xcel's) and the constraints on the system (transmission or otherwise), and then MISO tells each unit when and how much energy to generate.

Given this reality, in order for Xcel's Strategist modeling to accurately project unit dispatch and therefore emissions, the relationship between unit dispatch and demand in Strategist would have to also exist on the MISO system. In this case, it would have to be true that load

grows slowly enough and renewable energy generation quickly enough that Xcel's coal units would be dispatched downward. Moreover, it must be Xcel's coal units that are less frequently utilized as a result of those additional renewables, not simply any coal unit in the MISO system.

There is very good reason to believe that looking exclusively at Xcel's system will *not* give a realistic picture of how its coal fleet will interact with the MISO system. First, there is, to our knowledge, no reason to think that the growth in renewables and load projected in Xcel's Preferred Plan will be true across the MISO system. But even if one assumes that significant, additional renewables come online, the Department of Commerce and the Minnesota electric and transmission companies concluded that there would be "no significant difference in coal unit commitment or dispatch"[22] in their Minnesota Renewable Energy Integration and Transmission Study (MRITS) issued on October 31, 2014. Notably, four Xcel staff were part of the technical staff and/or review team on this study including Xcel's Director of Market Operations and Manager of Real Time Planning. The study team assumed 40% penetration of wind and solar in Minnesota and 15% in MISO as a whole.[23]

To correct for the unrealistic way in which Xcel's Strategist modeling backed down the coal from Xcel's system, Clean Energy Organizations applied an adjustment to the outputs based on the generation pattern observed in the beginning years of the model run when few resources are added.[24] The adjustment resulted in 11% more generation from Xcel's coal units between 2020 and 2030 than what is represented in the Preferred Plan.

[22] Minnesota Renewable Energy Integration and Transmission Study at page 7-5, Docket No. E999/CI-13-486

[23] The Clean Energy Organizations agree that increases in renewable penetration can reduce reliance on coal units, but the relationship is more complicated than assumed in Xcel's modeling. MRITS, for example, does find that even higher levels of Minnesota and MISO-wide renewable penetration *would* result in reductions in coal generation though it does not specify whether those reductions would be felt equally across all coal units in MISO or simply at the more costly units.

[24] Because Clean Energy Organizations did not have the time or resources to try to modify the Strategist modeling in order to reflect the interaction between Xcel's coal fleet and MISO, we attempted to quantify the impact of this relationship through ex post facto adjustments. Coal generation from Xcel's coal fleet seems to vary from year to

It is very likely that the modeled displacement of coal generation, specifically displacement of coal generation from Xcel's fleet, by new renewables makes up the majority of the claimed 32 million ton reduction over the planning period in Xcel's Preferred Plan. Unfortunately, this reduction is highly unlikely to materialize. It is predicated on the idea that it would be Xcel's coal units and only Xcel's coal units that back down when new renewables are added. In a market with over 66 GW of coal capacity,[25] we find such a suggestion improbable at best. Instead, it seems likely that Xcel's coal fleet will emit 2 million plus *additional* tons per year than Xcel's Preferred Plan projects.

2. Xcel's calculation of its GHG emission reductions is exaggerated by the incorrect treatment of "dump energy."

Xcel inappropriately inflates the emissions savings in its Preferred Plan through its treatment of something called "dump energy." Dump energy, as represented in Strategist, is a term for the energy that must be produced by those units with minimum loading levels (coal and nuclear units) but which cannot be simultaneously consumed by the system because there is not enough demand. For example, Sherco 1 has a minimum loading level of **[TRADE SECRET**

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year in part due to maintenance schedules. **[TRADE SECRET BEGINS...**

...TRADE SECRET ENDS]

Because of this and because Sherco 3 was on an extended outage from November 2011 to October 2013, simply using recent, historical generation by Xcel's coal fleet would have painted an inaccurate picture of future performance. In the Strategist modeling, we noticed that the backing off of Xcel's coal units largely seemed to happen starting in 2020. Therefore we held the coal generation in Xcel's Preferred Plan constant through 2019 in both our projection of emissions under Xcel's plan as well as the Clean Energy Plan since there are no material differences between the two that would impact how the coal fleet is dispatched by MISO. As Strategist continues to add renewables, there is no load or wholesale market to absorb the coal fleet's generation in Xcel's Plan, so beginning in 2020 when 600 MW of wind is added, we assumed that the coal fleet would produce generation in the same three year pattern that it did between 2017 and 2019. A dispatch model with 8760 hourly representation of all plants and load in MISO would give a better idea of future coal generation under Xcel's Preferred Plan. Absent that, we think this methodology gives a reasonable approximation.

[25] MISO 2014 State of the Market Report: https://www.misoenergy.org/Library/Repository/Report/IMM/2014%20State%20of%20the%20Market%20Report.pdf

BEGINS... ...TRADE SECRET BEGINS ENDS] MW.[26] If only 50% of that is needed to serve Xcel's load then the excess becomes "dump energy" in Strategist and is treated as a sale of energy with an attendant reduction in emissions.

Xcel reasons that because it is connected to the MISO system, in practice this excess energy would not be "dumped" but rather sold into MISO (see Section III.C. for more details on how this assumption impacts the economics of Xcel's Preferred Plan). Because some other utility is taking ownership of that generation, Xcel subtracts the CO_2 emissions associated with that generation from its total.[27]

The problem with Xcel's calculation, however, is that it assigns a greater value to the emissions that are "dumped" than it should given its system emissions rate. The number Xcel assigns to these off-system sales is the average emissions rate in the U.S. portion of the Midwest Reliability Organization in 2009, i.e., 1,624 lbs per MWh. That is, for every MWh of "dump energy," Xcel's modeling considers 1,624 pounds of CO_2 to be "reduced" from its system. This would only make sense if Xcel's system mirrored the emissions rate of the Midwest Reliability Organization. It does not. Indeed, under the Preferred Plan, we think it is likely that Xcel's average system emissions rate in 2030 would be **[TRADE SECRET BEGINS... ...TRADE SECRET ENDS]** pounds per MWh – less than half that of the Midwest Reliability Organization. Unless Xcel can somehow connect energy sales to specific, CO_2-intensive units, there's no reason to think that sales would result in greater reductions per MWh than Xcel's system average of emissions. Changing this rate increases Xcel's emission projection for the year 2030 by about half a million tons of CO_2.

[26] See response to CEO IR 65.
[27] It's our understanding that this adjustment for "dump" energy is a change from prior Xcel modeling.

Thus, the treatment of "dump energy" in Xcel's IRP inappropriately lowers the company's projected GHG emissions under its Preferred Plan.

3. Failing to account for market purchases depresses Xcel's GHG emissions calculation further.

The modeling convention of ignoring MISO purchases further biases Xcel's modeling results related to GHG emissions. As Figure 10 below demonstrates, MISO sales and purchases have historically had a non-trivial role to play in Xcel's system mix.

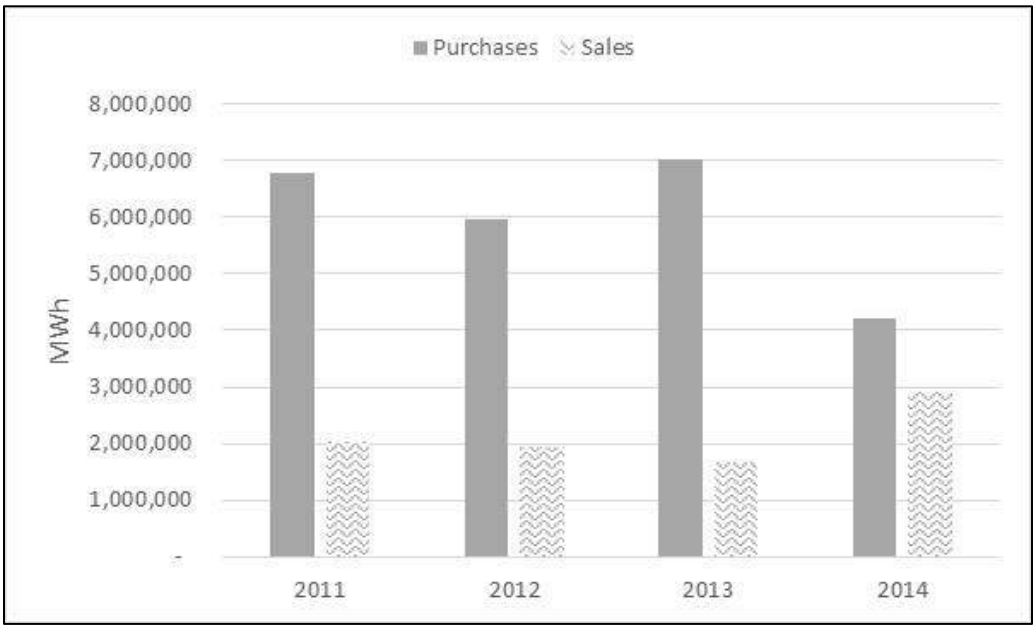


Figure 10. Xcel MISO Sales and Purchases, 2011-14

Xcel has historically purchased large quantities of electricity from MISO – and has, in the last four years, been a net purchaser of electricity from MISO. This dynamic matters because as discussed above, Xcel has a lower average rate of CO_2 emissions than does MISO. As a result, as the balance of purchases and sales changes from year to year, Xcel's ability to meet the GHG goal will also likely change.

4. Under correct assumptions, Xcel's Preferred Plan fails to achieve GHG reductions required to meet the statutory GHG reduction goal.

In order to gauge the level of GHG reductions Xcel's Preferred Plan could actually achieve, the Clean Energy Organizations reviewed the plan under more realistic assumptions based on the three issues identified above. We increased the amount of generation from Xcel's coal units based on the likelihood that the MISO system will call upon Xcel's coal fleet more than Xcel's modeling suggests; we corrected for the error in "dump energy" emission accounting; and we included emissions from MISO purchases, offset partly by MISO sales. Recognizing the variability in these factors, we sought to represent a range of likely emissions scenarios.

Figure 11 shows that the realistic range of projected emissions under Xcel's Preferred Plan is significantly higher than Xcel calculated and, moreover, that the Plan does not satisfy the state's GHG reduction goals. The high end of the "Realistic" range assumes purchases equal to the greatest number of megawatt-hours purchased from MISO by Xcel in the past four years, but balanced out with sales so that energy need is exactly met. The lower range assumes only the corrected emissions accounting for sold dump energy as well as emissions from likely coal generation. Figure 11 demonstrates that those factors over which Xcel has little control, i.e., how much generation its coal fleet produces and how much energy is purchased from and sold into MISO, can materially impact the Company's ability to comply with the GHG goal.

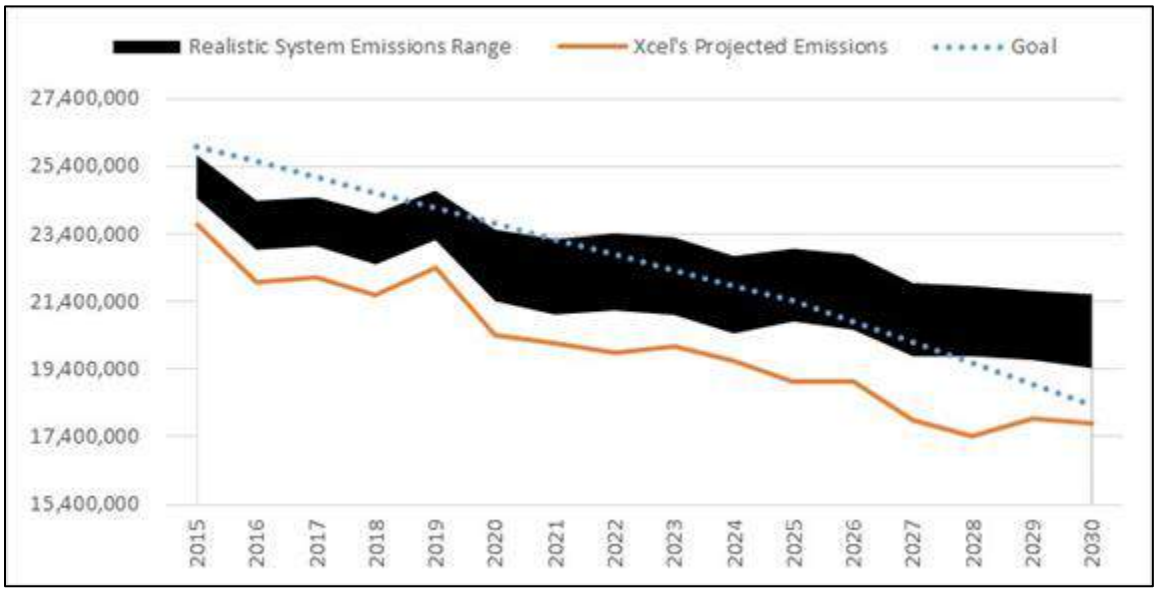


Figure 11. Realistic System Emissions, Including Adjustments to Xcel's Coal Fleet Emissions, the Dump Energy Emissions Rate, and Wholesale Purchases and Sales Mean that Xcel Could Fail to Meet the Next Energy Generation Act GHG Glide Slope[28]

In contrast, when Sherco 1 and 2 are retired as they are under the Clean Energy Plan, it is very likely that Xcel will achieve more significant reductions and assist the state in meeting its statutory GHG reduction goal (Figure 12).

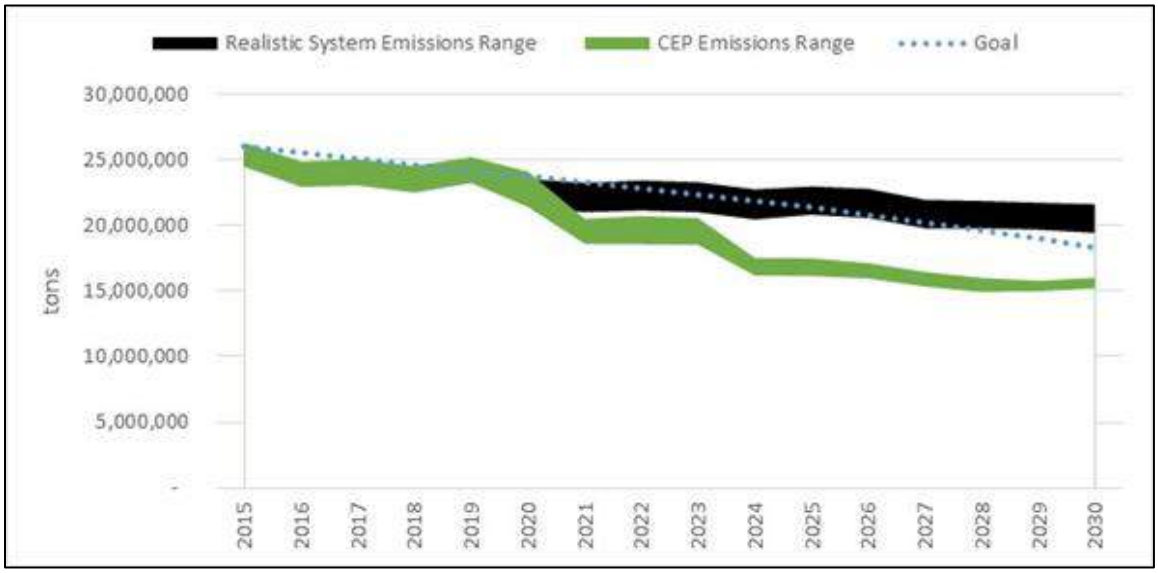


Figure 12. Range of GHG emission reductions under Xcel's Preferred Plan and the Clean Energy Plan.

[28] Because Xcel performed no run combining the assumptions in its emissions projection (orange line) with the market "on", we used our version of Xcel's Preferred Plan run to create the Realistic System Emissions projection. This includes higher levels of energy efficiency than Xcel proposes which would tend to depress CO_2 emissions.

5. Different emission accounting assumptions lead to different results, but still show that Xcel's Preferred Plan is not on track to meet the state's goals.

The emissions accounting methodology in Figures 11 and 12 above is the one used by Xcel and includes emissions associated with purchases and sales of wholesale power and generation across NSP's entire system (i.e., includes Minnesota, Wisconsin, North Dakota, and South Dakota).

The Minnesota Pollution Control Agency (MPCA) uses a different emissions accounting methodology to measure the state's compliance with the statutory GHG reduction goals. The statute establishing the goal defines "statewide greenhouse gas emissions" to include all emissions "emitted by anthropogenic sources within the state and from the generation of electricity imported from outside the state and consumed in Minnesota."[29] In other words, the Legislature elected to include all emissions for all sources within the state as well as any emissions from sources that produce electricity outside of the state but used by Minnesotans. Under this definition Xcel's 2005 baseline would be 27.25 million tons[30] rather than the 30.6 million tons used in Xcel's calculations and the previous two graphs.

Using the MPCA's approach Xcel's Preferred Plan fails to comply with the state's GHG reduction goals even without making any of the Clean Energy Organizations' changes to Xcel's assumptions. Figure 13 shows GHG emissions from Xcel's in-state units over the planning period. (Because Minnesota generation exceeds Minnesota consumption, no purchases or sales are considered.) Also represented in Figure 13, the Clean Energy Plan clearly helps the state to meet the statutory goals under MPCA's accounting method.

[29] Minn. Stat. § 216H.02, subd. 1 (2014).
[30] MPCA Comments filed October 1, 2013 in Docket No. E002/RP-13-368.

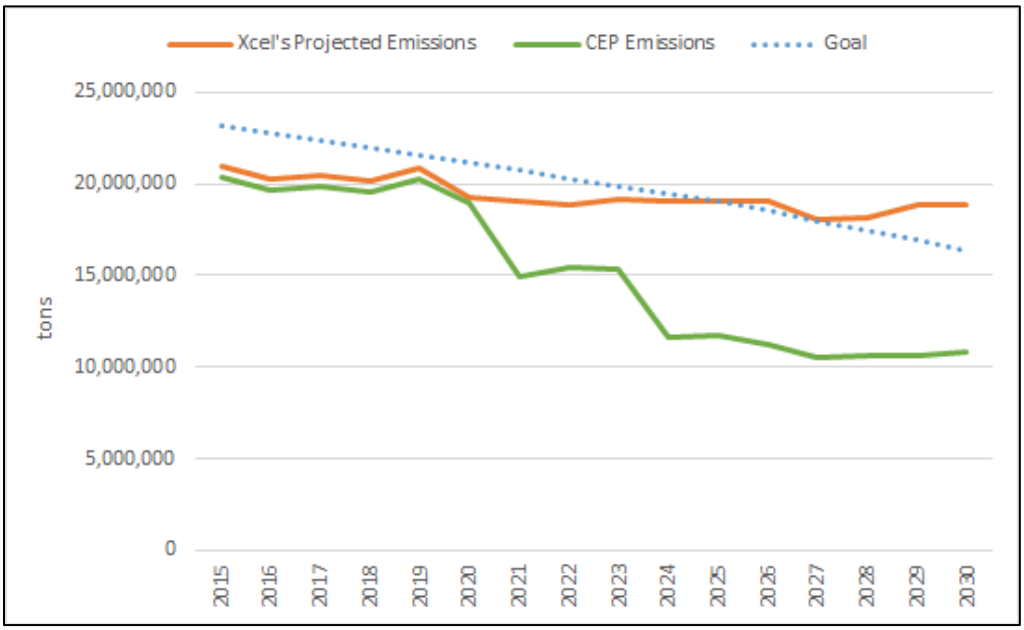


Figure 13. GHG emissions under the Preferred Plan (without any changes in assumptions), and the Clean Energy Plan compared to statewide GHG reduction goal using MPCA's methodology.

If one considers the more realistic scenario under the Preferred Plan in which Xcel's coal units are dispatched no differently by MISO, the Preferred Plan performs even worse based on MPCA's methodology.

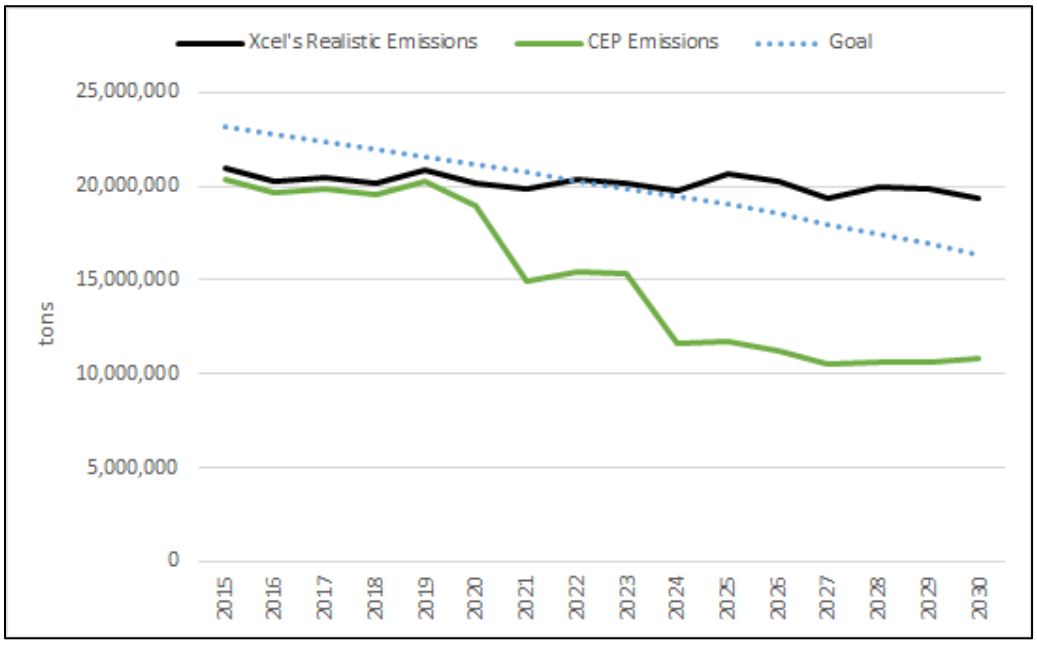


Figure 14. GHG emissions under the Preferred Plan (with more realistic coal generation), and the Clean Energy Plan compared to statewide GHG reduction goal using MPCA's methodology.

Nothing about the operation of Xcel's coal fleet has changed since the 2013 LCM Study. Instead, Xcel is asking this Commission to believe that renewables added to its system directly result in reduced coal generation at Xcel's fleet specifically and that it will always balance MISO purchases and sales such that it won't exceed the greenhouse gas goal. As a result, Clean Energy Organizations believe that the reductions in Xcel's CO_2 emissions will, in practice, be insufficient and impermanent. It is only through the retirement of Sherco 1 and 2, that real and permanent reductions in CO_2 emissions can be achieved.

B. The Preferred Plan Does Not Achieve All Cost Effective Energy Efficiency.

1. Xcel has a legal obligation to achieve all cost-effective energy efficiency.

Minnesota law clearly establishes a legal obligation for Xcel to plan to achieve all cost-effective energy efficiency. Minnesota Statutes Section 216B.2401 declares that "cost-effective energy savings are preferred over all other energy resources" and "should be procured systematically and aggressively." In Section 216C.05 the Legislature asserts "that continued growth in demand for energy will cause severe social and economic dislocations, and that the state has a vital interest in providing for increased efficiency in energy consumption . . . wherever possible"[31] The state as a whole is to achieve annual energy savings equal to *at least* 1.5% of annual retail energy sales through efficiency efforts.[32]

Minnesota's Conservation Improvement Program provides that a utility must achieve the level of efficiency established by the Commissioner.[33] The only exception to meeting an established energy-savings goal is if a utility demonstrates that conservation efforts are not cost

[31] Minn. Stat. § 216C.05, subd. 1 (2014).
[32] Minn. Stat. § 216B.2401 (2014).
[33] Minn. Stat. § 216B.241, subd. 1c (2014).

effective.[34] Read as a whole, Minnesota law establishes a clear preference for all cost-effective energy efficiency. At a minimum, this should require achieving savings equal to at least 1.5% of retail sales. Despite this, Xcel's IRP models achievement of only 1.3% after 2020.

2. Xcel's assumptions about DSM achievability and price are not justified.

Energy efficiency plays a declining role in Xcel's IRP as the Company assumes that changes in standards due to the Energy Independence and Security Act of 2007 (EISA) will greatly diminish its ability to save kilowatt-hours through its EE programs. EISA will undoubtedly have a large impact on lighting savings since it largely moves the residential lighting market from a minimum efficiency equivalent to a halogen light bulb to that of a compact fluorescent bulb by 2020. However, it does not foreclose the possibility of achieving savings in residential or commercial lighting through utility sponsored EE. There are and will remain significant opportunities to achieve efficiency savings in the future.

Much of Xcel's assumptions regarding future EE cost and savings are driven by a potential study conducted by KEMA. That study has changed over time in a number of ways, but has generally been offered by Xcel as evidence that there will be diminishing and more expensive energy efficiency opportunities in the future.

During its 2013 Life-Cycle Management Study, Xcel used the results of the 2011 version of KEMA's study to estimate energy efficiency impacts. Since that time, the study has become more optimistic about the potential for savings on Xcel's system.

[34] Minn. Stat. § 216B.241, subd. 1c(f) (2014).

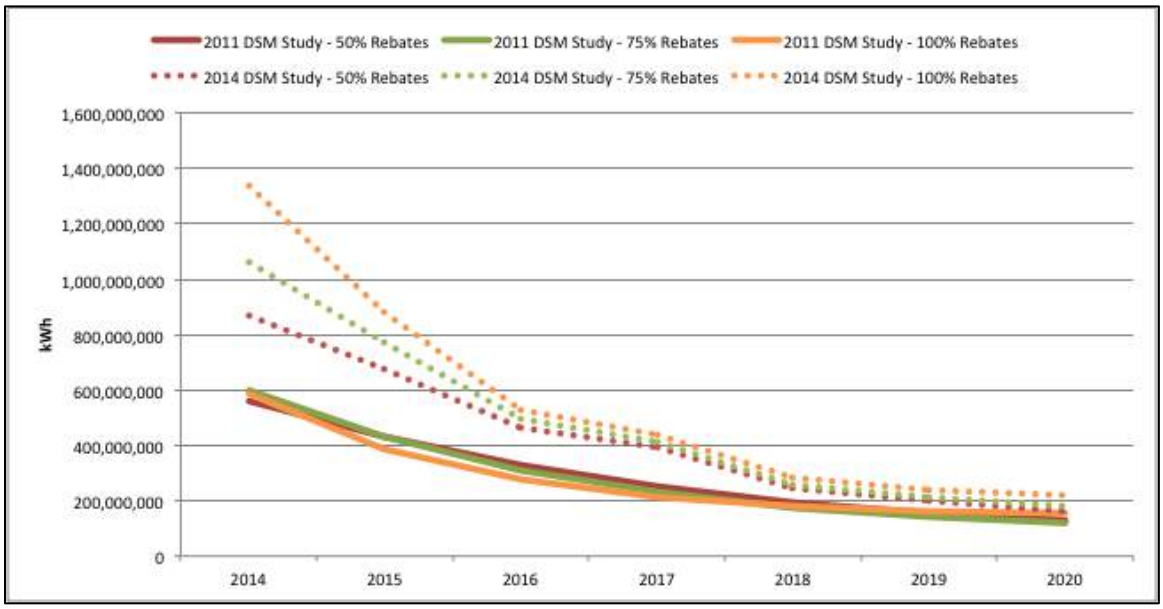


Figure 15. Current Potential Study Savings Estimates are Much Higher than in the Sherco LCM Study

As Figure 15 shows, the current study includes significantly more savings – a total of 961 to 1,967 GWh worth of additional savings depending on the scenario.

At the same that more savings have materialized, they have also gotten cheaper on a first-year cost basis.

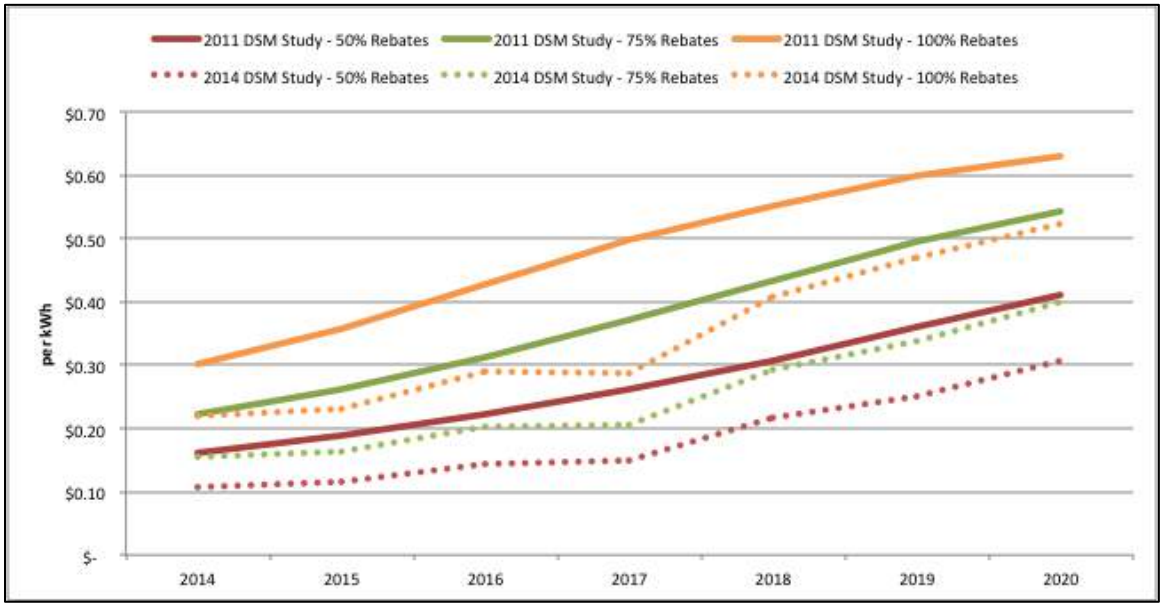


Figure 16. KEMA's Cost Predictions Have Changed Greatly from its Prior Study

The first-year cost of energy efficiency (defined as incentive, marketing and administrative expenditures divided by savings achieved in the first year of a measure's life) is now estimated to be much lower than previously thought regardless of how much of the incremental cost is rebated. These trends raise doubt about the predictive powers of the DSM potential studies upon which Xcel relies. Whether the differences are due to unforecasted decreases in measure costs, underestimating achievable potential and/or some other factor, the ability of these studies to predict costs and savings is certainly questionable.

In the 2013 LCM Study, Xcel evaluated a "stretch" DSM scenario that would have taken the company from its proposed 1.4% scenario to achieving 1.6% savings annually. Though depicted as difficult to reach, Xcel has so far exceeded the savings in this "stretch" scenario and done so at lower cost.

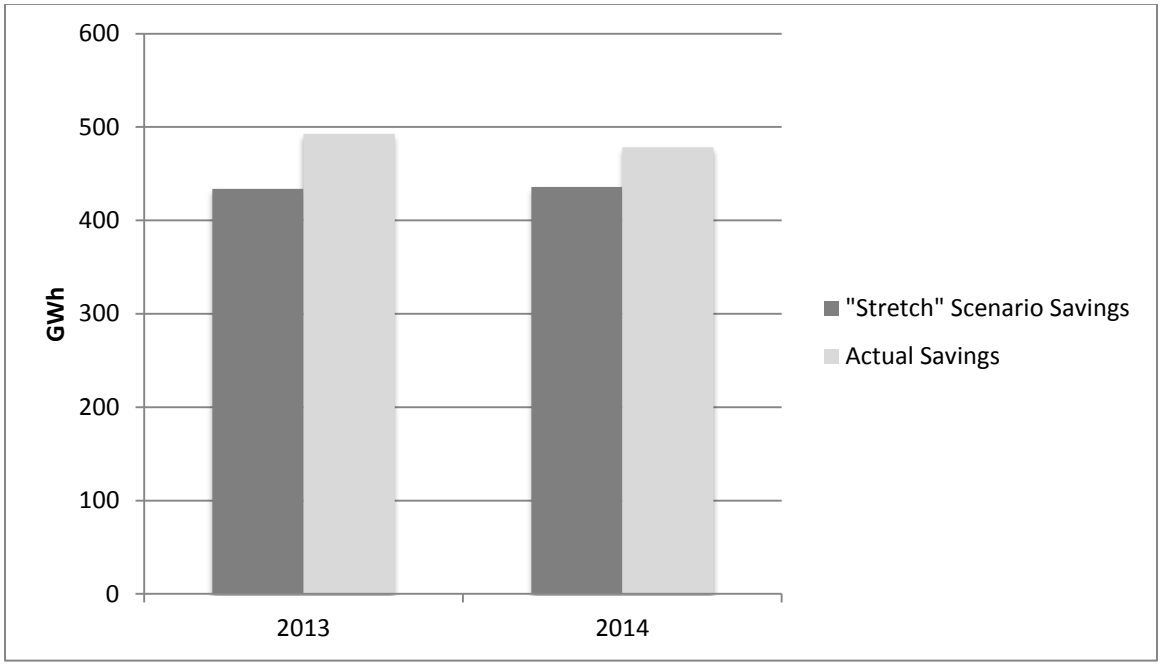


Figure 17. Xcel's "Stretch" DSM Scenario in the 2013 LCM has Turned Out to be Well Within Reach

Xcel's actual savings have so far exceeded its "Stretch" scenario and done so with a comfortable margin; it saved 492 and 478 GWh in 2013 and 2014 compared to the 435 GWh in the "Stretch" scenario.

Not only did Xcel save more, but it did so without stretching financially.

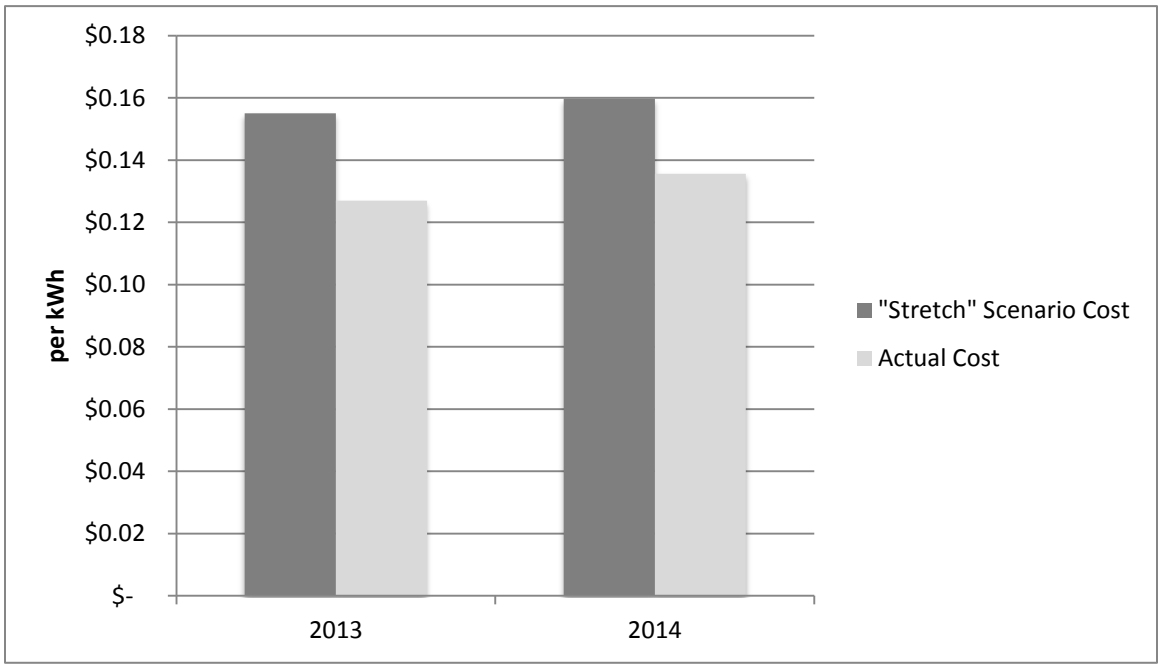


Figure 18. Xcel's Savings Came at Much Lower Cost than it Predicted

Xcel predicted that it would cost about $.16 per first-year kWh to achieve the "Stretch" savings. In reality, that cost was $.13 to $.14 per kWh.

Just as it has taken little effort to "stretch" to achieve 0.2% more savings than in its 2013 LCM Study, we think it is likely that an additional 0.2% savings is reasonable and achievable now and into the future.

Our Base Case Modeling includes savings somewhat higher than in the "Stretch" scenario but no higher than Xcel has historically been able to achieve. In fact, starting in 2022,

those savings fall to *below* the level of savings Xcel has been able to achieve in the past (Figure 19).

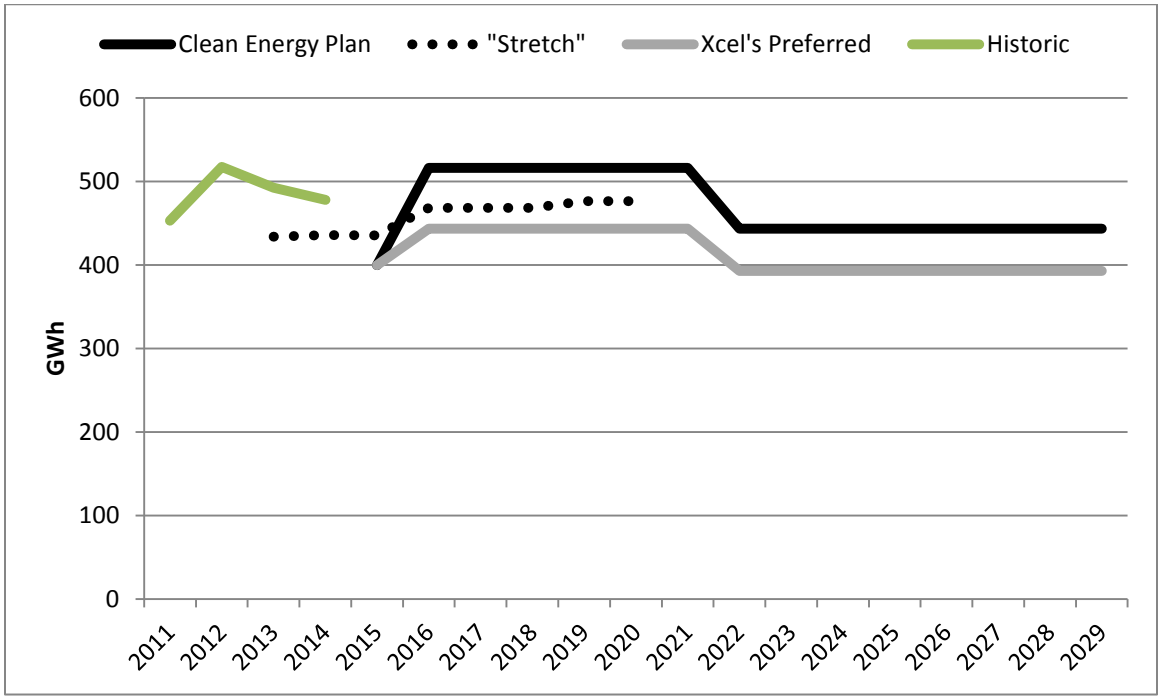


Figure 19. Clean Energy Plan Savings are Well Within Reach

We also think, partially due to Xcel's history of success in this regard, that savings can be achieved at costs well below what Xcel predicts.

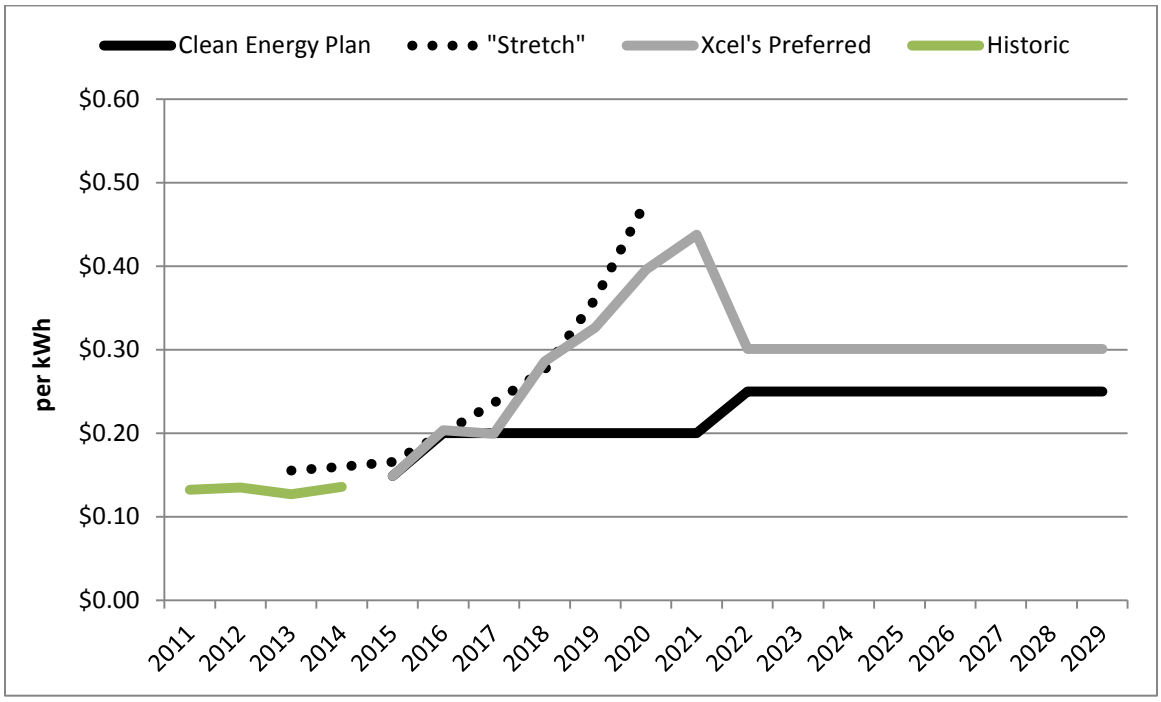


Figure 20. The Clean Energy Plan's Efficiency Costs are Conservatively High, While Xcel's Cost Assumptions are Unrealistically High

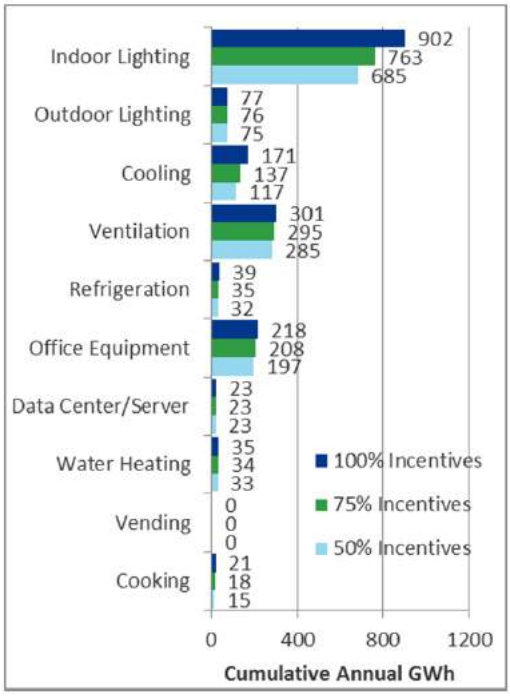
As Figure 20 shows, despite the initial ratcheting down of EISA lighting standards between 2012 and 2014, Xcel's cost of efficiency has remained relatively unchanged. Xcel's Preferred Plan costs rise dramatically in part because Xcel assumes that it would have to pay a much higher percentage of incremental cost (jumping from 30% to 50+% on average) in order to get *fewer* savings that it has achieved in the past. The Clean Energy Plan assumptions, which jump from historic cost levels of $.13 to $.14 per kWh to $.20 per kWh from 2016 to 2021 (*a 43% increase*) and then $.25 per kWh from 2022 to 2029 (*a further 25% increase*) should be viewed as conservatively high assumptions rather than the unrealistically and unreasonably high numbers Xcel uses.

When asked why, given its stable history of efficiency cost and savings, Xcel would assume such large increases in cost, it stated that changes in codes and standards would require it

to "intensify" its pursuit of DSM and that "This increased pursuit of savings will require greater program administration expenditures and payment of higher rebates to customers to incent them to action. The KEMA DSM potential study is the best available source to estimate those costs…"[35]

As discussed above, the KEMA DSM study has not shown particularly good predictive powers and we suspect that the current version is no different.

For example, despite the lighting changes in the EISA, lighting remains an important component of the KEMA DSM potential study. Figures X and X below show that lighting remains by far the largest end-use in which to achieve savings for commercial customers and the second largest end-use for residential customers. For example, in terms of cumulative, achievable savings by the year 2023, KEMA estimated that lighting in the commercial sector would nearly exceed savings available from all other major end-uses.



[35] Response to CEO IR 48.

Figure 21. KEMA Estimated Commercial Sector Achievable Potential by End-Use (2023)

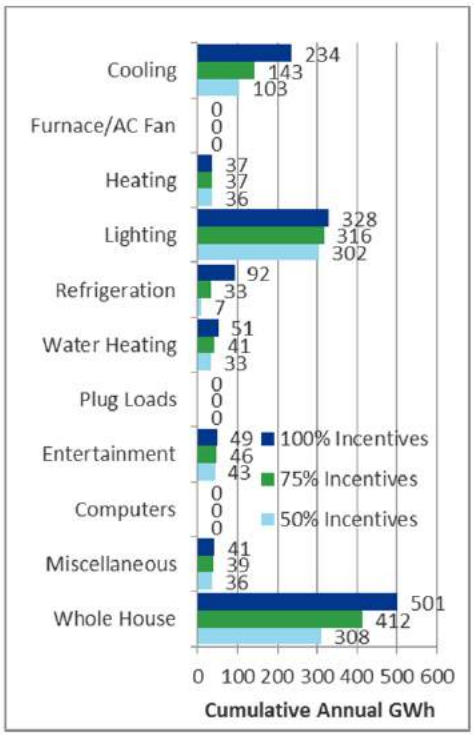


Figure 22. KEMA Estimated Residential Sector Achievable Potential by End-Use (2023)

Importantly, KEMA's potential study did not consider most LED lighting measures in the commercial sector to be economic or achievable. KEMA's list of measures upon which Figures x is based, therefore, largely leaves out commercial LED measures despite the fact that Xcel already rebates those measures.

Because the potential for LED savings exceeds that of fluorescent lighting in most applications and because LED costs are projected to fall and fall faster than KEMA assumed in the potential study, the exclusion of so many LED measures from the achievable potential likely results in both an underestimation of potential savings. And because LEDs have already

declined in price far below what is assumed in KEMA's potential study, costs are also overestimated.

In addition to LED measures, there exists significant, cost-effective potential for savings from Conservation Voltage Reduction (CVR). CVR is a technology that stabilizes distribution voltage so that end-use appliances consume less energy. Xcel has estimated that the technology is suitable for approximately 80% of its system, would save 5,200 GWh over 20 years and would cost $45 million to install.[36] There would be ongoing O&M of $6 million per year. Not including the O&M expense, this equates to a first-year cost of $.16 per kWh, including the first year's worth of O&M this figure rises to $.18 per kWh.

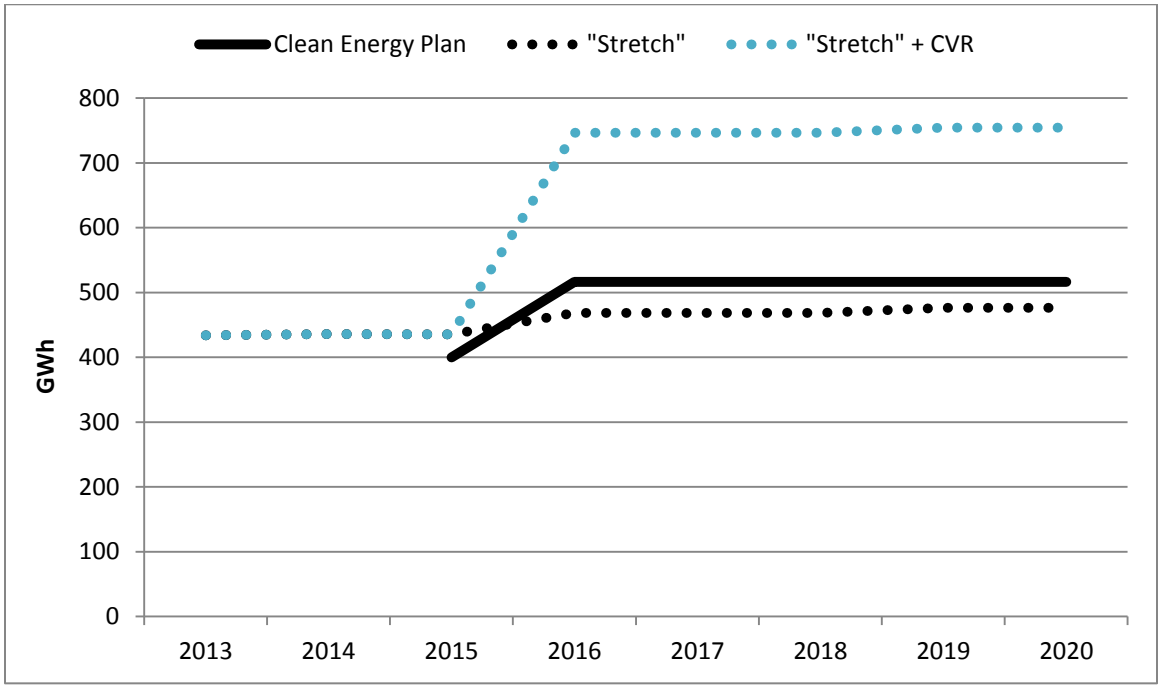


Figure 23. Conservation Voltage Reduction Would Make it Likely that Xcel Could Exceed the Clean Energy Plan Efficiency Savings

The addition of CVR to Xcel's system would save as much as 278 GWh each year, more than half of what Xcel currently achieves through its CIP programs. The technology is not

[36] Response to CEO IR 39.

included at all either with the KEMA potential study or Xcel's Preferred Plan and represents a large, cost-effective pool of savings that the Company has not yet tapped.

In several instances in its IRP and throughout discovery, Xcel claims that the net benefits of energy efficiency are declining.[37] Indeed, it goes so far as to suggest that the claimed declining net benefits mean that achieving additional savings is "not cost-effective."[38] However, this claim is entirely dependent on Xcel's unrealistically high cost assumptions.

Table 1 shows what Xcel believes would be the net benefit of differing levels of energy efficiency.

Table 1. Under Xcel's EE Cost Assumptions, Achieving Higher Levels of EE Reduces the Net Benefit (Millions) to Customers

2015 – 2029 Program Years				
EE Scenario	**1.5% '16-'21 1.3% '22-'29**	**1.5% '16-'21 1.5% '22-'29**	**1.7% '16-'21 1.5% '22-'29**	**1.7% '16-'21 1.7% '22-'29**
Utility Cost Test Net Benefit	**$2,118**	**$1,866**	**$1,452**	**$1,116**

The cost trajectory in Figure 20 shows just the first year costs for the first column in this table. In other words, Xcel's Preferred Plan assumes 1.5% savings through 2021 and then 1.3% through 2029. Xcel's assumptions about cost for the other EE scenarios are very different and much higher.

[37] See, for example, Table 3 of Appendix G of the IRP or the response to CEO IR 21.
[38] See response to CEO IR 21.

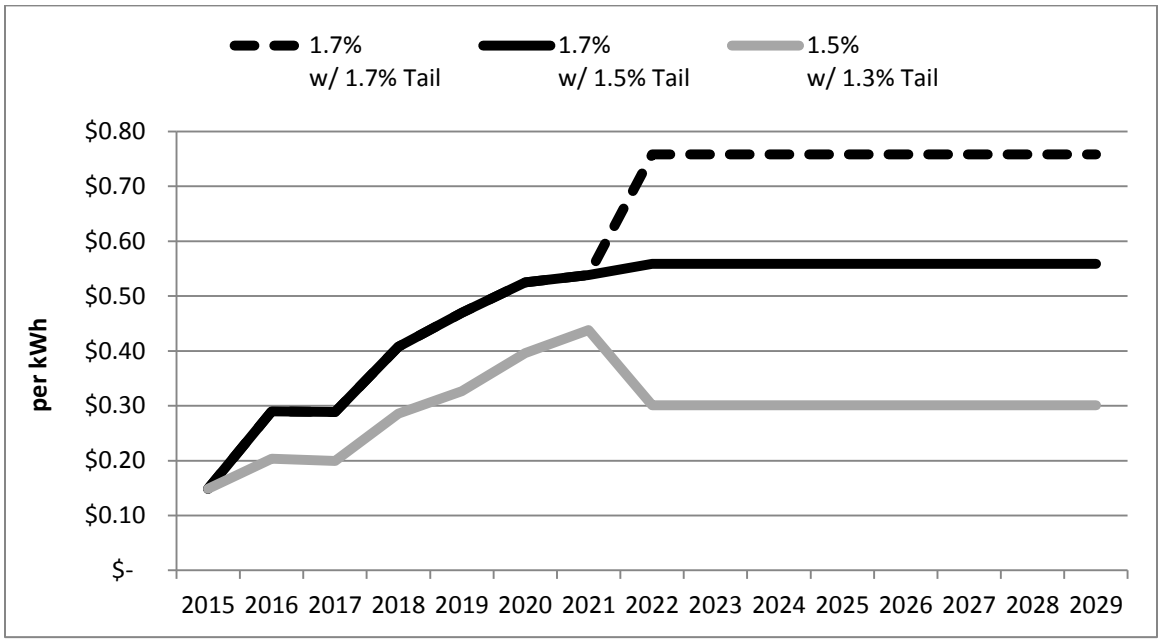


Figure 24. Xcel's EE Cost Assumptions are Unreasonably High not Just in its Preferred Plan (1.5% w/ 1.3% Tail) but also in its Alternative EE Scenarios

When CEO's conservatively high EE costs are substituted for Xcel's, then it becomes clear that higher levels of EE are indeed cost-effective.

Table 2. Under CEOs' EE Cost Assumptions, Achieving Higher Levels of EE Increases the Net Benefit (Millions) to Customers

	2015 – 2029 Program Years			
EE Scenario	**1.5% '16-'21 1.3% '22-'29**	**1.5% '16-'21 1.5% '22-'29**	**1.7% '16-'21 1.5% '22-'29**	**1.7% '16-'21 1.7% '22-'29**
Utility Cost Test Net Benefit	**$2,412**	**$2,507**	**$2,677**	**$3,195**

In Table x, we simply substituted our first year cost projections for Xcel's. Bringing costs to a more reasonable level gives the intuitive result – that Xcel should maximize its efficiency savings now and into the future.

C. Xcel's Treatment OF "Dump Energy" Inappropriately Reduces THE Cost OF Xcel's Preferred Plan.

Xcel's Preferred Plan appears less costly in relation to plans that retire Sherco 1 and 2 in part because of the way "dump energy" is modeled. As described in Section III.A., Xcel views dump energy (the energy produced at minimum loading levels that cannot be consumed by load) as an off-system sale – this despite the fact that Minnesota utilities generally do not model their system with the ability to sell energy. The characterization of dump energy as a sale for which the company receives revenue also sets up an apples to oranges problem. Xcel's units generate energy for sale not only when the units *must* operate but are not needed to serve load; they also generate energy for sale when the MISO price is competitive with the units' operating costs, even when that energy cannot be consumed by Xcel's load. While it is somewhat more straightforward to estimate the additional CO_2 emissions from this energy as we did in Section III. A. 2., it is much more difficult to estimate revenue since it depends on a changing relationship between unit cost and MISO price. Therefore, in order to equalize the treatment of all energy, we changed Strategist so that no sales revenue could be generated from dump energy or the energy generated by these plants when MISO dispatches them based on price even though Xcel's load has been satisfied.

D. Xcel's Assumptions About Coal Prices Are Not Justified.

Clean Energy Organizations' review of Xcel's Strategist modeling revealed that the actual coal expenses Xcel incurred in 2014 were appreciably higher than what is in Xcel's Strategist modeling. In CEO IR 72, we asked Xcel to explain why there was a difference and why the value in Strategist would still be an appropriate estimate of coal prices - Sherco's actual 2014 coal expense was $2.387 per MMBtu but Xcel's Strategist assumption is **[TRADE SECRET BEGINS... ...TRADE SECRET ENDS]**. Xcel simply stated that,

"We based our forecasted costs on existing firm contracts and expected spot market purchase amounts and costs." Attachment A to CEO IR 72 reveals that Xcel's coal price forecast includes **[TRADE SECRET BEGINS... ...TRADE SECRET ENDS]** spot market purchases and assumes that coal prices are made up only of **[TRADE SECRET BEGINS...**

...TRADE SECRET ENDS]. Actual prices as reported to the Federal Energy Regulatory Commission (FERC) also include **[TRADE SECRET BEGINS...**

...TRADE SECRET ENDS].[39] Nor do these categories of cost appear to be reflected in the estimated O&M expense for Sherco and AS King. Thus, it seems that the cost of continuing to operate Sherco 1 and 2 is greatly underestimated.

We created a sensitivity that examined an alternative trajectory of coal prices that starts at the cost actually experienced in 2014, i.e., $2.387 per MMBtu, and then moves year-to-year in the same way as was assumed in Xcel's forecast. Figure 25 compares our Sherco price trajectory with Xcel's base and high Sherco coal prices.

[39] See response to CEO IR 74.

[TRADE SECRET BEGINS...

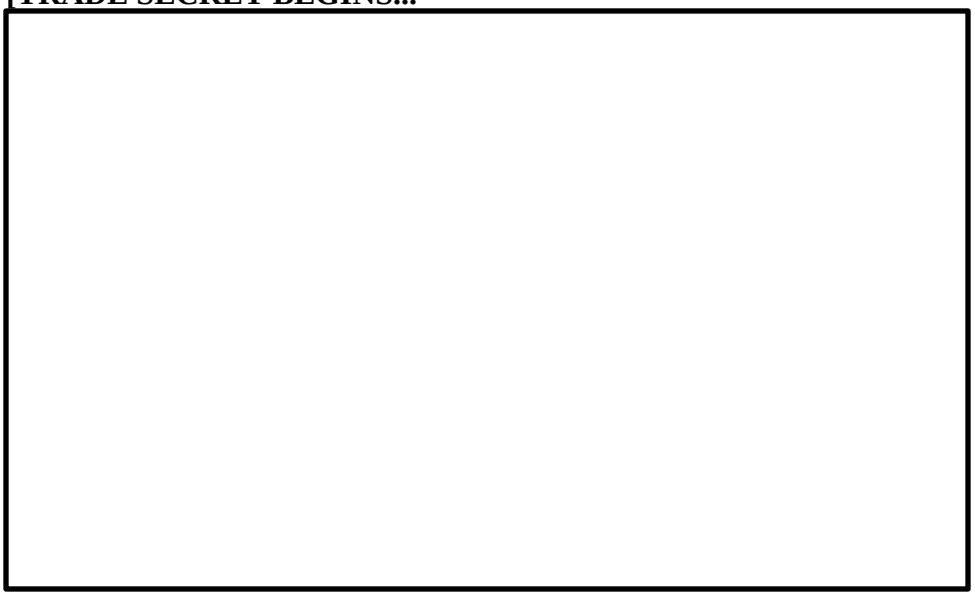


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Figure 25. Xcel's "High" Sherco Coal Price is Below the CEO Alternative Until 2022.

Even Xcel's "High" forecast of coal prices is, for several years, below an alternative based upon *actual* costs experienced by Sherco. The impact of this change alone means that the retirement of Sherco 1 and 2 is 0.27% cheaper than their continued operation (see Figure 25 above).

E. The PVSC Should Be Calculated Over a 15-Year Period Rather Than a 40-Year Period.

Although Xcel identifies its planning period as the years between 2015 and 2030, all of the Present Value of Societal Cost (PVSC) numbers, e.g., Table 7 of the March 16, 2015 Supplement, are calculated over the period 2015-2053. We noticed that looking at the PVSC through the planning period (i.e., through 2030) often dampens already small differences between plans. Therefore, all cost related figures in these comments show data only through 2030. The period from 2030-2053 is characterized by more uncertainty in everything from the cost of resources to the cost of fuel to the availability of renewables and energy efficiency and as

such it does not make sense to allow the modeling results from that period to have an undue influence on the result.

F. Xcel's Preferred Plan Does Not Demonstrate Compliance With The Statutory Goal To Achieve 10% Of Retail Sales From Solar Energy By 2030.

Clean Energy Organizations commend Xcel for its recent investments in solar and its commitment to meet and exceed the 1.5%-by-2020 solar energy standard. However, Minnesota Statutes Section 216B.1691, subdivision 2f, also states that it is the "energy goal of the state of Minnesota that, by 2030, ten percent of the retail electric sales in Minnesota be generated by solar energy." It is unclear from the information in the IRP how much progress Xcel's Preferred Plan would make toward this goal. The Clean Energy Organizations intend to continue to explore this issue through discovery and will provide further analysis on whether the Preferred Plan is consistent with Section 216.1691, subdivision 2f in reply comments.

G. Retirement Of At Least One Sherco Unit In 2020 Leads To The Most Cost-Effective Plan.

Despite the Commission's February 27, 2014 Order instructing Xcel to include in this IRP an analysis "retiring Sherco Units 1 and 2 in 2020 and thereafter," the company's IRP filed in January 2015 contained no scenario in which either of the Sherco Units were retired in 2020. Instead, the earliest retirement date considered was in 2023 and 2025.

When asked about the lack of a 2020 retirement scenario, Xcel stated: "In order to retire 750 MW or 1500 MW of generating capacity at Sherco, the generating capacity to replace the retirement(s) needs to be in service beforehand. We estimate that the earliest new generation could be put in place is 2023-2025 and have included scenarios reflecting that timeframe… We do not believe it is feasible to replace generation at Sherco by 2020."[40]

[40] Response to CEO IR 4.

Xcel's assumptions are incorrect. In fact, retirement of one unit at Sherco in 2020 can be accomplished relying on already-approved capacity additions along with additional wind. As discussed above and shown in the Clean Energy Plan, no new thermal units are required to retire a Sherco unit in 2020. And, even more importantly, Strategist runs show that it is ***less expensive to retire a unit in 2020*** than retiring at a later date.

That a Sherco unit can be retired without the addition of thermal capacity is shown in Xcel's own modeling, which it provided in the March supplements after CEO's request. Scenario 10D is the company's preferred plan with retirement of Sherco 1 in 2020. The output of that Scenario shows that no combined cycle capacity is needed until after 2030.[41] Thus, while the Clean Energy Organizations agree with Xcel that "there are several steps necessary to put new [thermal] generation in place" which will take time, those steps are not required to retire one unit of Sherco because no additional thermal unit is required.

Additionally, the Strategist runs show that retirement of at least one unit in 2020 is less expensive than delaying retirement until 2023 or 2025. For example, Table 7 of the March 16 Supplement shows that retiring one unit in 2020 (Scenario 10D) is cheaper than retiring one unit in 2025 (Scenario 10B).[42]

IV. XCEL'S CONTINUED RELIANCE ON COAL IN THE PREFERRED PLAN PUTS THE UTILITY AND ITS CUSTOMERS AT RISK GIVEN REGULATORY UNCERTAINTY.

Clean Energy Organizations generally agree with Xcel's summary of the many pending environmental regulations relevant to the Commission's decision on its resource plan. We disagree, however, with the Company's conclusion that a business-as-usual approach to coal

[41] One CT is added in 2021 but that capacity is only necessary if the CAPCON units are not allowed to contribute to Xcel's planning margin requirement (PRM). This is Xcel's assumption in the majority of its modeling.
[42] See the column for Sensitivity "R" which is the only run Xcel did including the CAPCON units' capacity prior to 2025. We do not believe the Commission would approve a CC and CT with the intent that those units cannot contribute to the Company's PRM.

mitigates or limits the significant risks associated with this uncertain regulatory environment. In fact, the significant environmental compliance risks associated with the continued operation of coal-fired power plants weighs heavily *against* maintaining the Sherco units 1 and 2. By retiring those two units, the Company could avoid nearly all of that regulatory risk while also minimizing adverse environmental impacts.[43]

A. The Risk Of Further Regulation Increasing The Costs Of Coal Is Significant.

To continue operating Sherco Units 1 and 2 throughout the planning period, as Xcel proposes, the Company will likely face significant environmental compliance costs. There are at least four relatively well understood and predictable regulations that will increase the cost of running the older Sherco units that are not accounted for in any of the modeling supporting Xcel's Preferred Plan. Those regulations involve (1) the regulation of GHG emissions under Section 111(d) of the Clean Air Act or otherwise, (2) revised National Ambient Air Quality Standards (NAAQS), (3) regional haze, and (4) the true cost of pollution docket. While forecasting the compliance costs associated with complex and, in some cases, uncertain environmental regulations can be difficult, the assumption that these regulations will impose zero or nominal costs throughout the planning period is, in our view, unreasonable. Prudent planning requires electric utilities and other stakeholders to use a reasonable estimate of those costs, on a reasonable timeline, when evaluating resource investment decisions that span multiple decades.

B. Xcel Fails To Properly Evaluate The Risk That It Will Be Required To Install Selective Catalytic Reduction Technology To Control Nitrogen Oxide Emissions At Sherco.

Although Xcel correctly identifies several environmental regulations that may impact Sherco, the Company underestimates the likelihood that it will be required to install Selective

[43] Minn. R. 7843.0500, Subp. 3.

Catalytic Reduction ("SCR") technology to comply with the Clean Air Act's National Ambient Air Quality Standards ("NAAQS") or visibility protection provisions and did not fully evaluate that scenario. Given that the Company's own regulatory analysis concludes that SCR could be required as early as 2020, it is unfortunate that the only SCR scenario provided was on the reference case.[44]

The cost to install and operate SCR is significant. Although each installation is unique and depends on a number of factors, the capital cost to install SCR at both Sherco 1 & 2 could exceed $400 million, with significant additional annual costs.[45] Such a large capital expense would certainly tip the Strategist modeling toward the retirement scenarios, including the Clean Energy Plan.

1. Clean Air Act visibility provisions.

While Xcel summarizes the Clean Air Act's visibility program, it understates the likelihood that Sherco will be required to install SCR at one or more units within the planning period. Under the Clean Air Act's visibility provisions, states must develop state implementation plans ("SIP") that include enforceable emission limits at major sources of haze-causing pollution to ensure "reasonable progress" toward the goal of achieving no man-made pollution in each national park or wilderness area by 2064.[46] As one means of achieving that goal, states must impose "best available retrofit technology" ("BART") pollution controls at many of the largest and oldest individual sources of pollution affecting the parks and

[44] While Xcel included a single scenario in its Supplement that assumes the installation of SCR at both Sherco units in 2024 and 2025, the company's analysis fails to evaluate scenarios in which Xcel is required to install SCR on a more expedited timeline. Nor did Xcel evaluate the potential for SCR on all three Sherco units. A full evaluation of the myriad scenarios involving the installation of SCR is essential because the costs and cumulative risk associated with additional nitrogen oxide ("NOx"), particulate matter ("PM"), ozone, and haze regulation is so high. Indeed, as Xcel recognizes, any one of these regulations has the potential to impose significant additional costs at Sherco.
[45] *See* 2009 MN SIP, App'x 10.1 at 902; Life Cycle Management Study at 49-54.
[46] 42 U.S.C. § 7491(b)(2); 40 C.F.R. § 51.308(d).

wildernesses. BART means an "emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant," and applies to major emission sources, like Sherco 1 & 2, which were put into operation between 1962 and 1977, and reasonably contribute to visibility impairment in one or more Class I areas.[47]

As Xcel notes, several environmental organizations challenged EPA's 2012 approval of Minnesota's 2009 regional haze SIP on numerous grounds, including the state's failure to adopt enforceable, source-specific BART emission limits for Sherco 1 & 2 despite significant evidence in the record that such limits were cost effective and would result in significant visibility benefits to several Class I areas. Indeed, in 2009, EPA itself had submitted comments regarding the Minnesota Regional Haze Plan, stating "the available evidence indicates that Xcel Energy's Sherburne County facility. . . should add selective catalytic reduction (SCR) to the recommended nitrogen oxide combustion controls."[48] EPA further noted that SCR would be cost-effective at a NOx emission rate of 0.05lb/MMBtu which EPA believes is achievable.[49] The National Park Service, which shares authority with EPA for implementing the Clean Air Act's visibility program, agreed that BART for NOx should be based on SCR.

MPCA, on the other hand, had concluded that Sherco only need install low quality NOx control technology to meet a NOx emission rate of 0.15 lb/MMBtu, despite evidence that such controls were not as effective as SCR. Moreover, following EPA's adoption of the Cross State Air Pollution Rule ("CSAPR") in 2011, Minnesota concluded that compliance with the CSAPR trading program in addition to its more lenient NOx emission limits would satisfy the Clean Air Act. Despite its previous findings related to SCR and significant evidence in the record that SCR would achieve significantly more visibility benefits that CSAPR, EPA agreed and approved the

[47] 40 C.F.R. § 51.301.
[48] June 6, 2011 letter from EPA to MPCA at 2.
[49] *Id*.

state SIP. The environmental organizations' challenge to that approval is still pending in the Eighth Circuit. If EPA's decision is reversed, Xcel would almost certainly be required to install SCR at Sherco 1 & 2 to comply with BART.

Even if EPA's approval stands, however, Sherco 1 & 2 face significant risk of further regulation under the regional haze program. In 2018, the state will be required to revise its SIP to reconsider all additional source-specific emission reductions available to ensure reasonable progress toward achieving natural visibility in Class I areas by 2064. If a state will not meet the goal of restoring natural visibility conditions by 2064, the state must demonstrate that it considered regulating all sources of visibility impairment, and that despite application of BART and other controls, it is unreasonable to meet the deadline of clean air in parks and wilderness by 2064.[50]

The 2018 SIP revision is very likely to require SCR for Sherco 1 & 2 because Minnesota admits that, with current emissions, it will not, and cannot, achieve the rate of progress necessary to achieve natural visibility by 2064. Indeed, Minnesota's 2009 SIP acknowledged that it would not attain natural visibility conditions in Boundary Waters until 2093, and in Voyageurs National Park in 2177—many years after the goal for natural visibility has passed.[51] Moreover, Minnesota's 2014 regional haze progress report makes clear that despite statewide reductions in SO_2 over the past five years, nitrogen emissions have remained constant and are the primary cause of visibility impairment at Boundary Waters.[52] As a result, Minnesota will be required to reevaluate all available source-specific NOx emission reductions that may make reasonable progress toward achieving natural visibility.

[50] 40 C.F.R. §§ 51.308 (d)(3)(iv)-(v); 51.308(d)(ii).
[51] 2009 SIP at 107.
[52] MPCA, Five-Year Regional Haze Progress Report State Implementation Plan at 17-19 (Dec. 2014).

Given that Xcel's own modeling shows that installation of SCR at Sherco Units 1 and 2 would significantly improve visibility in both Voyageurs and Boundary Waters,[53] and in light of EPA's previous determinations that SCR is cost-effective, there is a significant likelihood that Minnesota's 2018 SIP revision will require SCR at Sherco to remedy NOx pollution and ensure further reasonable progress toward natural visibility. Thus, the risk associated with the continued operation of units 1 & 2 is significant.

2. National Ambient Air Quality Standards.

EPA's proposed revision to the National Ambient Air Quality Standards ("NAAQS") for ozone poses additional risks to all three Sherco units. Ozone is formed from the reaction of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) in the presence of sunlight. Over 70% of annual NOx emissions in the United States come from two source sectors: mobile sources and coal fired power plants.[54]

In 2009, EPA announced that it would reconsider the 2008 ozone NAAQS because, according to EPA's panel of science advisors, the eight-hour 75 ppb standard not sufficiently protective of public health. Primary NAAQS must be set at a level "requisite to protect the public health" with "an adequate margin of safety."[55] Secondary NAAQS, by contrast, must protect the public welfare from any known or anticipated adverse effects of air pollution.

In November 2014, EPA proposed to set both the primary (public health) and secondary (public welfare) ozone NAAQS as 8-hour standards within a range of 65 ppb and 70 ppb. EPA

[53] Xcel's modeling showed that installation of SCR at Sherco Units 1 and 2 along with the already installed combustion controls would improve visibility by, on average, 0.9 deciviews at Boundary Waters Class I area, with similar improvements at Isle Royale National Park. See October 25, 2006 Best Available Retrofit Technology Analysis for Sherburne County Generating Plant Units 1 and 2, Table 17, at 50. Notably, EPA has found similar, and even smaller, visibility improvements sufficient to require additional controls to ensure reasonable progress. *See, e.g.*, 79 Fed. Reg. 74,818, 74,881 (requiring flue gas desulfurization retrofits that result in .03-.1 deciview improvement).
[54] U.S. EPA, 2011 National Emission Inventory, *available at* http://www.epa.gov/ttnchie1/net/2011inventory.html.
[55] *Id.* § 7409(b)(1).

requested comment on levels for the primary ozone NAAQS as low as 60 ppb. Because the Clean Air Act explicitly distinguishes between primary NAAQS, which are required to be protective of public health, and secondary NAAQS, required only to protect human welfare and the environment, there is a significant possibility that the primary ozone NAAQS will be set substantially lower than the secondary NAAQS.

If EPA adopts as its primary ozone NAAQS a 60 ppb standard, it is likely that several counties in Minnesota, including Sherburne County, will be designated as non-attainment. Even if EPA adopts the slightly more lenient 65 ppb standard, there is a significant risk that Sherco would be included in a non-attainment area. Indeed, as illustrated in Figure 26 below, using monitored ozone design values from EPA's Air Quality System Database, Sherburne County will likely be designated non-attainment.

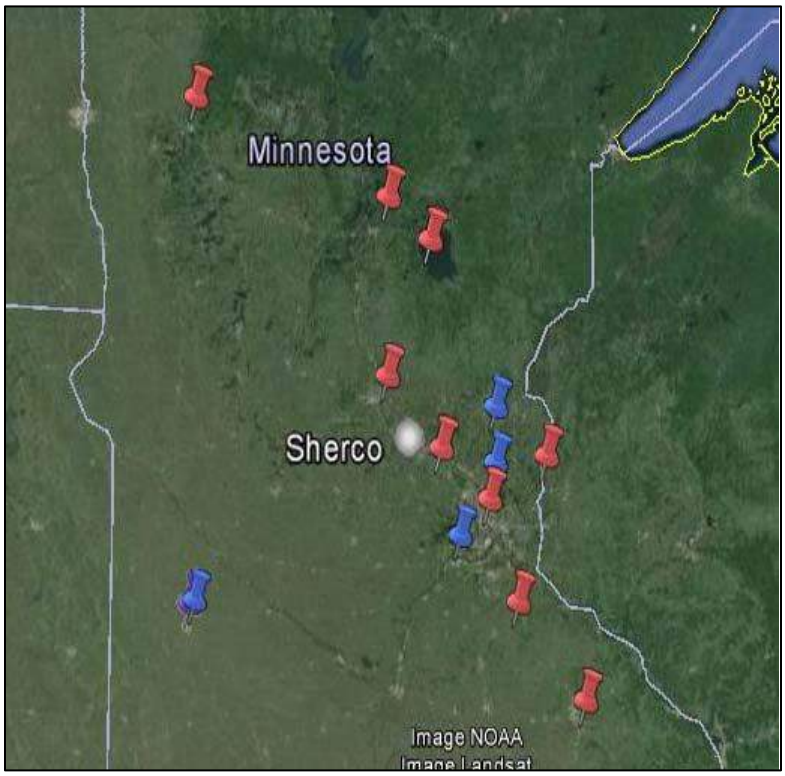

Figure 26. The design values of the Minnesota ozone monitors that would exceed either the 60 ppb standard (red) or the 65 ppb standard (blue). [56]

If Sherco is included in a non-attainment area or found to contribute to nonattainment, it will almost certainly be required to install *all* "reasonably available control technology" as expeditiously as practicable .[57] For ozone, SCR technology is routinely recognized as "reasonably available control measure" necessary to attainment.

With this in mind, the ozone risk associated with the continued operation of units 1 & 2 is significant. Xcel's business-as-usual plan and supporting analysis fail to account for this risk,

[56] Attainment with proposed standard is determined using the 3-year average of 4th highest 8-hour daily maximum. This figure reflects the most recent available data from 2012-2014. Notably, there are no ozone monitors in the direct vicinity of the Sherco facility, so this figure is likely a conservative estimate of potential NAAQS violations.
[57] 42 U.S.C. 7502(c)(1).

while Clean Energy Organizations' proposed Clean Energy Plan would avoid these risks altogether.

C. Failure To Retire Aging Coal Plants Presents Risk In The Face Of Carbon Regulation.

While Xcel modeled the Commission's existing regulatory value for coal ($21.50/ton beginning in 2019) there is still significant risk that the expense associated with carbon emissions will, in fact, exceed that value.

As the Commission is aware, the Supreme Court upheld EPA's endangerment finding and EPA has issue proposed rules regulating GHG emissions from both new and existing power plants.[58] It is now clear that there is no basis whatsoever to assume zero costs associated with the federal regulation of carbon throughout the planning period as Xcel does in its "North Dakota" scenario. How much cost to assign to a ton of emissions, is less clear, however.

[58] On December 7, 2009, EPA issued a formal finding that the current and projected concentrations of six key greenhouse gases in the atmosphere, including carbon dioxide (CO_2), threaten the public health and welfare of current and future generations. 74 Fed. Reg. 66496. Under the Clean Air Act, that finding requires EPA to regulate the emission of CO_2 from existing sources of pollution.

Figure 27 below aggregates several independent studies that have attempted to quantify the costs of compliance.[59] As can be seen, there is a wide range of costs, some which far exceed the $21.50/ton value used in Xcel's analysis. Indeed, this value appears to be fairly low across all of the studies, indicating that the risk of a higher value—and the risk to Xcel and its ratepayers under the Preferred Plan—is not insignificant.

[59] *See* e.g., Synapse Energy Economics, 2015 Carbon Price Forecast (Mar. 3, 2015), *available at* http://www.synapse-energy.com/sites/default/files/2015%20Carbon%20Dioxide%20Price%20Report.pdf; Larsen et al., Remaking American Power: Potential Energy Market Impacts of EPA's Proposed GHGH Emission Performance Standards for Existing Electric Power Plants (CSIS and Rhodium Group 2014), *available at* http://csis.org/publication/remaking-american-power; Gelbaugh et al., Critical Mass: An SNL Energy Evaluation of Mass-based compliance under the EPA Clean Power Plan (2014), *available at* http://center.snl.com/Resources/Whitepaper.aspx?id=4294973757; Energy Ventures Analysis, EPA Clean Power Plan: Costs and Impacts on US Energy Markets. Energy Ventures Analysis for National Mining Association (2014), *available at* http://www.countoncoal.org/assets/Executive-Summary-EPA-Clean-Power- Plan-Costs-Impacts.pdf; MISO, "GHG Regulation Impact Analysis – Initial Study Results" (Sept. 17, 2014), *available at* http://www.eenews.net/assets/2014/09/18/document_ew_01.pdf; Sotkiewics, Paul and Abdur-Rahman, Muhsin, "EPA's Clean Power Plan Proposal Review of PJM Analyses Preliminary Results." PJM Members Committee Webinar (Nov. 17, 2014), *available at* http://www.pjm.com/~/media/documents/reports/20141117-epas-clean-power-plan-proposal-review-of-pjm-analyses-preliminary-results.ashx; Ameren, Ameren's Alternative to the EPA's proposed Greenhouse Gas Rules (2014), *available at* https://www.ameren.com/- /media/Corporate-Site/Files/aboutameren/amerens-alternative-ghg-white-paper.pdf?la=en; NERA Economic Consulting, Potential Energy Impacts of the EPA Proposed Clean Power Plan, *available at* http://americaspower.org/sites/default/files/NERA_CPP%20Report_Final_Oct%202014.pdf.

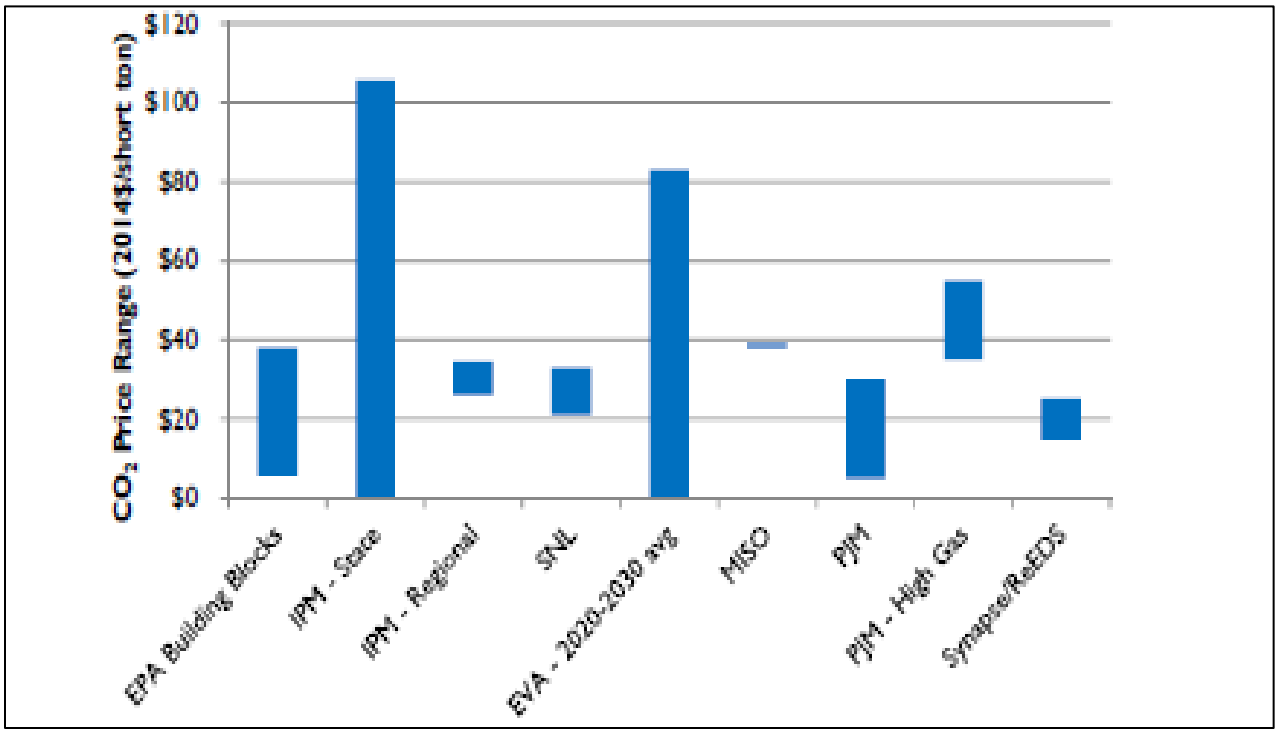

Figure 27. Synapse Energy Economics, 2015 Carbon Price Forecast Summary

D. Xcel Failed To Account For The Risk Of Higher Externality Values Resulting From The Commission's Open Externalities Docket.

Xcel notes that the Commission granted a petition filed by several environmental petitioners to update and reestablish its externality values for NOx, SO_2, and PM2.5, along with CO_2,[60] but omitted from its modeling sensitivities any consideration of higher externality values for the criteria pollutants.[61] Given the Commission's order re-opening the docket, Xcel's decision to ignore a risk of higher values seems inappropriate, especially as it applies to SO_2.

Xcel's modeling assigns zero cost to SO_2 pollution throughout the 15-year planning period despite the Commission's unequivocal intent to establish a value for SO_2 in the contested case hearing referred to the ALJ in this docket. Xcel's omission of any externality cost

[60] NOTICE AND ORDER FOR HEARING. *In the Matter of the Investigation into Environmental and Socioeconomic Costs Under Minn. Stat. § 216B.2422, Subd. 3*. Docket Nos. E999/CI-00-1636 and E999/CI-14-643. October 15, 2014.
[61] Xcel IRP App'x D at 41.

associated with SO_2 emissions for the entire planning period is not only an unrealistic assumption, but significantly underestimates the cost of continuing to operate Sherco 1 & 2. As with SCR costs, if the true costs of SO_2 pollution were considered, they would weigh in favor of retiring the older coal units.

In sum, Xcel provided a thorough list of the likely regulations that could affect generation on its system. But it failed to adequately assess the level of risk regulation poses to the continued operation of the older coal units. Each of the pending or expected regulations presents a risk to Xcel's ratepayers and weighs against continued operation of these units.

V. THE CLEAN ENERGY PLAN SHOULD BE ADOPTED BY THE COMMISSION.

The Commission must evaluate any alternative to a utility's preferred plan based on the public interest.[62] The Commission's public interest determination "must include whether the resource plan helps the utility achieve the greenhouse gas reduction goals under section 216H.02, the renewable energy standard under section 216B.1691, or the solar energy standard under section 216B.1691, subdivision 2f."[63] In addition, in deciding upon an alternative or in constructing its own preferred plan the Commission considers the resource options' and plans' ability to:

- maintain or improve the adequacy and reliability of utility service;
- keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints;
- minimize adverse socioeconomic effects and adverse effects upon the environment;
- enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations; and
- limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control.[64]

[62] Minn. R. 7843.0300, subp. 11 (2005).
[63] Minn. Stat. 216B.2422, subd. 4 (2014).
[64] Minn. R. 7843.0500, Subp. 3 (2005).

The Clean Energy Plan is in the public interest in light of these criteria.

A. The Clean Energy Plan Is Preferable To Xcel's Preferred Plan Because It Helps Achieve Minnesota's GHG Reduction Goals.

The Clean Energy Plan far outpaces Xcel's Preferred Plan in helping to achieve Minnesota's GHG reduction goals. Importantly, those goals call for reductions in *statewide* GHG emissions, meaning that overall emissions from all sectors of the economy are to be reduced by at least 15% below 2005 level by 2015, at least 30% by 2025, and at least 80% by 2050.[65] According to the MPCA's most recent assessment Minnesota is *not* on track to meet even the near-term 2015 goal, let alone the much more significant 2025 and 2050 goals.[66] In the 2015 report, the MPCA states that 2012 emission (the most recent available) were 7% below 2005 levels, but notes that the 2012 levels won't persist because they were heavily influenced by the outage of Sherco unit 3.[67] The statement shows both the importance of making more progress toward meeting the goals, and the significance of electric utilities, especially coal plants, in achieving significant reductions.

Within Minnesota's economy, the electric utility sector remains the largest single contributor to GHG emissions.[68] It is also the sector from which the largest emission reductions can be achieved at the lowest costs. Indeed, the Clean Energy Plan confirms that millions of tons of GHG emissions can be eliminated from Xcel's system at no additional cost as compared to Xcel's Preferred Plan. This reaffirms the findings of the Center for Climate Strategies in its study conducted for Minnesota's inter-agency Climate Solutions and Economic Opportunities initiative. The initial findings of that analysis concluded that three different scenarios –

[65] Minn. Stat. 216H.02, subd. 1 (2014).
[66] MPCA, Greenhouse Gas Emissions Reduction 1 (Jan. 2015).
[67] *Id*.
[68] *Id*. at 2.

retirement of both units; repowering of both units; retirement of one and repower of the other – were all very cost effective GHG reduction strategies.

As Table 3 from the CSEO analysis shows, Sherco's emissions can be eliminated through retirement or repowering for less than a nickel per ton.

Table 3. Center for Climate Strategies Analysis of Cost of Sherco Retirement. [69]

ES-2: Repower Sherco

	2030 GHG reductions (Tg CO_2e):	2015 – 2030 cumulative reductions (Tg CO_2e):	Net present value of societal costs, 2015 – 2030 (million $2014):	Cost effectiveness ($2014/ t CO_2e):
Scenario 1	5.5	67.1	$2.4	$0.04
Scenario 2	5.7	62.1	$2.0	$0.03
Scenario 3	5.6	65.5	$2.2	$0.03

What is clear is that if Minnesota is going to come anywhere close to meeting its statewide GHG reduction goals, the utility sector is going to have lead the way and reduce emissions by far greater levels than called for in the statute. The Clean Energy Plan puts Xcel on a path to do just that. In this way, the Clean Energy Plan best fulfills the criterion of helping the state achieve its GHG reduction objective.

B. The Clean Energy Plan Maintains And Improves Adequacy And Reliability.

[69] Available at http://www.environmental-initiative.org/our-work/environmental-policy/climate-solutions-economic-opportunities/technical-information-cseo-stakeholder-engagement.

The Clean Energy Plan will maintain and improve the adequacy and reliability of Xcel's service. As set out above, the Strategist runs of the Clean Energy Plan show that it maintains adequate and reliable energy and capacity on Xcel's system. Indeed, the Clean Energy Plan improves on these metrics because of the system benefits accrued through greater reliance on energy efficiency and renewable generation that is distributed on Xcel's system. By setting a firm retirement date for Sherco Units 1 and 2, the Clean Energy Plan also provides Xcel, MISO operators, and other stakeholders certainty around which to plan for any transmission system impacts and related concerns Xcel identified in its IRP regarding the retirement of these units.

Despite the Commission's 2012 order explicitly directing Xcel to study the "feasibility" of retiring the Sherco generators, the company has failed to provide any such analysis. The Commission directed Xcel explicitly to provide "an analysis of how the cessation of operations at either of the two oldest Sherco generators . . . would affect the reliability of Xcel's entire system."[70]

Instead, the company waited until March 2015—nearly two and a half years after the Commission's order, and more than three months after the company submitted its IRP—to begin the process of formally evaluating the feasibility of retirement. The delay has effectively precluded any meaningful evaluation of these issues here.

In an about-face from the Life-cycle Management Study, Xcel in the IRP offers several conclusory assertions casting doubt on the feasibility of retirement. The company comments on the need to conduct further reliability studies and identifies various policy considerations related to reliability, including balancing generation flow, maintaining system stability, participating in

[70] Xcel 2010 IRP, E-002/RP-10-825, November 30, 2012 Order, p. 8.

the Company's black start program, and providing steam supply to a nearby paper company.[71] Clean Energy Organizations acknowledge that these issues should be evaluated before actually retiring the Sherco units, but Xcel provides absolutely no technical analysis—or any support whatsoever—for its assertion that retirement is "likely infeasible."[72]

In any event, based on existing information, CEOs do not believe that any of the issues identified by Xcel preclude planning for retirement on the timeframe envisioned by the Clean Energy Plan.

1. The miso study does not and cannot prevent retirement in the timeframe proposed.

Since 2012, MISO has required generators to notify the system operator if it intends to retire a generation unit.[73] This notice triggers a study period, in which MISO determines "whether all or a portion of the resource's capacity is necessary to maintain system reliability."[74] If so, the generator is designated a "System Support Resource" ("SSR"), and MISO may order the generator to continue operating.

The MISO Tariff makes clear, however, that the SSR designation may only be used for a "short-term reliability need" and as "a last-resort measure to meet short-term reliability needs."[75] Before ordering a generator to operate to maintain reliability, MISO must: (1) ensure that there are "no other alternatives can be found that are more economic to mitigate reliability issues"; (2) file a report with FERC explaining what alternatives were evaluated; and (3) *demonstrate that*

[71] Supplement at 18.
[72] Supplement at 20.
[73] Order Conditionally Accepting Tariff Revisions and Requiring Compliance Filings, 140 FERC ¶ 61,237 (Doc. No. ER-12-2302-000) (Sept. 21, 2012).
[74] *Id*. at 2. The MISO Tariff also provides that a generator may request a non-binding Attachment Y-2 study, under which MISO will evaluate and determine within 75 days whether the generator is necessary to maintaining reliability.
[75] *Id*. at 4-5; *see also id*. at 40 (The Commission "approved the SSR program as a back-stop measure only and therefore expect the contracting for SSRs to be limited and of short duration.").

the SSR agreement is only limited to the amount of time needed to address the reliability issue.[76] In approving revisions to the MISO Tariff regarding reliability, FERC required MISO to include additional language to the tariff providing that an SSR designation and order to run "must not exceed a one-year term except in exigent circumstances."[77] Thus, whatever the outcome of Xcel's requested Y-2 reliability study, MISO cannot order Sherco 1 & 2 to continue operating indefinitely. Contrary to Xcel's unsupported suggestions, nothing about MISO membership or system reliability precludes Xcel from planning to retire Sherco 1 & 2 in 2021 and 2024, respectively.

2. Xcel's own 2013 analysis makes clear that the retirement of Sherco 1 & 2 will not impact system reliability.

Xcel also contends that it is necessary to conduct an independent, third-party ananlysis to study the effects of the potential phased retirement of Sherco 1 & 2 within the planning period. The Company neglects mentioning, however, that it *already* conducted such an analysis. Indeed, as part of its 2013 Life Cycle Management Study, the Company "hired a consultant to analyze" the reliability impacts of retiring Sherco 1 & 2.[78] The study was conducted using the MISO generator interconnection study model, and makes no mention of the possibility of any thermal overloads on the transmission system. Indeed, it "did not identify any concerns regarding dynamic or voltage stability" at all.[79] Rather, "[a]ll conditions were within the reliability requirements."[80] Although the study suggests additional scenarios and conditions should be studied, the Company's own findings—and the only substantive analysis of reliability in the record—suggests that Sherco 1-2 can be retired without serious reliability impacts.

[76] *Id*. at 40-43.
[77] *Id*. at 43.
[78] Life Cycle Management Study at 57-58.
[79] *Id*. at 58.
[80] *Id*.

3. Xcel's other concerns do not preclude retirement.

Xcel identifies a number of other policy concerns relating to the potential retirement of Sherco 1 & 2. None of those concerns preclude retirement, or even relate to system reliability. Two issues, however, warrant a brief response. First, with respect to Liberty Paper, Xcel admits that a back-up connection to unit 3 would allow service to continue, even if units 1 & 2 are off-line at the same time.[81] Second, with respect to the Company's black start capability concerns, Xcel provides no explanation as to why Sherco 3 could not be used to replace Sherco 1 & 2 for that purpose. In sum, the company provides no analysis or support for the notion that reliability concerns preclude the commission from approving a resource plan that retires Sherco 1 and 2 in 2021 and 2024.

C. The Clean Energy Plan Keeps Rates As Low As Practicable, Given Regulatory And Other Constraints.

The Clean Energy Plan outperforms Xcel's preferred plan in terms of overall system expense. As shown above, several assumptions in Xcel's modeling biased the results in favor of maintaining Sherco 1 and 2; when those assumptions were changed, retirement is slightly cheaper. This, of course, does not account for other biases in the model that likely benefit Xcel's preferred plan.

By requiring additional energy efficiency, the Clean Energy Plan significantly reduces costs. As Discussed in Section II.B.2. the energy efficiency contained in the Clean Energy Plan is achievable and cost effective. Moreover, it is likely to provide a multi-billion dollar benefit to ratepayers over the next 15 years.

[81] *See* Xcel, Informational Filing, Agreement Between Liberty Paper, Inc. and Northern States Power Co., Docket No. E002/M-93-1253 (June 18, 2014).

The Clean Energy Plan also protects ratepayers by greatly reducing the risk of exposure to the costs of future regulation as well as increasing fuel (coal) costs. As described in Xcel's filing, significant regulations affecting coal burning power plants are expected during this 15-year planning period. Those include the Clean Power Plan, which will require significant reductions in GHG emissions, as well as new NAAQS for ozone, new requirements to make progress toward the elimination of regional haze, and various new standards under the Clean Water Act. The Clean Energy Plan, by retiring Xcel's oldest coal-fired units eliminates significant risk of expense due to these regulations going forward. The Clean Energy Plan offers 11-12% greater reduction in CO_2 emissions than Xcel's Preferred Plan – a benefit to ratepayers given regulatory risks.

D. The Clean Energy Plan Minimizes Adverse Socioeconomic Effects And Adverse Effects Upon The Environment.

The Clean Energy Plan significantly out-performs Xcel's Preferred Plan with regard to pollutant emissions. By retiring old coal generation, the plan eliminates significant amounts of CO_2 as well as criteria pollutants. The pollutants that are causing the damaging impacts of climate change, lung disease, heart disease, and premature death are all reduced by retiring Sherco 1 and 2. There is simply no question that the Clean Energy Plan is far preferable in considering adverse effects on the environment and human health.

But the Clean Energy Plan also promotes innovation and the development of jobs and industries in the growing clean energy sector.

For example, as compared to Xcel's Preferred Plan, the Clean Energy Plan requires the company to continue to achieve energy savings at historical levels and maintains this important industry. According to the Department of Commerce, energy efficiency efforts in the state employ nearly 10,000 workers at 445 businesses. The number of jobs has increased by 49%

since 2000. The annual wage in the efficiency sector is $73,500.00 as compared to an overall average wage in the state of $50,100.00. Minnesota is 12th among all states in the number of energy efficiency related patents it has registered. And annually, the state was saving an equivalent of the consumption of 180,000 homes in 2012.[82] While Xcel's preferred plan cuts back on savings from efficiency efforts, the Clean Energy Plan continues to promote this sector. By advancing from a largely emergency response demand side management program to fully realizing the opportunity for Xcel and its customers to utilize demand side management as a resource, Xcel has the opportunity to create a win-win program that creates flexibility in demand, lowers customer bills, and engages a workforce in designing and implementing the programs. During stakeholder engagement sessions, Xcel began to outline a plan to capture this underutilized resource.

The Clean Energy Plan's reliance on renewable energy sources such as wind and solar has similar positive socioeconomic impacts for the company, its customers and the state as a whole. In 2014, wind power employed nearly over 1,700 workers in good-paying jobs at 124 businesses. The wind industry brought $7.6 billion in investments to local Minnesota communities between 2004 and 2013.[83] Likewise, commitments to solar bring an expanding industry with excellent jobs to the state. The number of Minnesota workers in the solar industry has grown by 130% since 2000, the number of business by 180%.[84]

The Clean Energy Plan benefits Xcel and the State by ensuring maintained growth of the clean energy industry and jobs and revenue that come with it. Likewise, the Clean Energy Plan makes Xcel and the State less reliant on coal, a fuel source that Minnesota has to import. By

[82] Minnesota's Clean Energy Economy, Minnesota Department of Employment and Economic Development (Oct. 2014), http://www.mn.gov/deed/data/research/clean-energy.jsp
[83] *Id.*
[84] *Id.*

building clean energy expertise, Xcel and Minnesota are well positioned to benefit as the transition away from fossil fuel sources spreads throughout the country and internationally.

E. The Clean Energy Plan Enhances Xcel's Ability To Respond To Changes In The Financial, Social, And Technological Factors Affecting Its Operations.

The Clean Energy Plan, especially as compared to Xcel's Preferred Plan, enhances the utility's ability to respond to the changing environment in which electricity utilities must operate. Xcel's Preferred Plan, at least with regard to its aging coal fleet, is business as usual. Xcel's reliance on old coal units in its Preferred Plan does nothing to help it respond to the rapid changes underway in the utility sector.

The financial sector has already taken note that coal is on its way out. Indeed, Xcel Energy's CEO Ben Fowke said in a public forum in January 2015 that "coal is going away. It's just a matter of time."[85] His prediction is matched by Goldman Sachs who declared "thermal coal has reached its retirement age"[86] and Bloomberg New Energy Finance which declared "the beginning of the end"[87] of coal burning for electricity in the United States. In addition, Axa, one of the world's largest insurers, is divesting from coal while increasing investments in renewables.[88] The Rockefeller Brothers Fund has committed to divest from coal while committing up to 10% of their endowment to sustainable development with a priority on clean energy technologies.[89] The Norwegian government confirmed on June 5, 2015, it would divest its holdings in companies with over 30% of their business in coal burning or mining from the

[85] The Future of Energy Regulation In Minnesota | Policy Opportunities and Innovations, Center for Energy and Environment (Jan. 27, 2015), http://www.mncee.org/Innovation-Exchange/Events-And-Webinars/The-Future-of-Energy-Regulation-in-Minnesota-Polic/
[86] Thermal Coal Reaches Retirement Age, Heat Sensor (Jan. 23, 2015), http://www.eenews.net/assets/2015/02/13/document_cw_01.pdf.
[87] Medium-Term Outlook for US Power: 2015 = Deepest De-Carbonization Ever, Bloomberg New Energy Finance (Apr. 8 2015), http://about.bnef.com/content/uploads/sites/4/2015/04/BNEF_2015-02_AMER_US-Power-Fleet-De-Carbonisation-WP.pdf.
[88] Axa to Ditch Coal Investments By The End of 2015, FastFT, http://www.ft.com/intl/fastft/327832/french-insurer-axa.
[89] Divestment Statement, Rockefeller Brothers Fund (Sep. 2014), http://www.rbf.org/content/divestment-statement.

Norwegian Government Pension Fund Global.[90] Norway's largest pension fund, KLP, announced plans to shift nearly $70 million in investments from coal to renewable last year.[91]

Xcel's customers as well as Minnesotans throughout the state support the transition away from coal. To date, over 10,000 Minnesotans have weighed in with the Commission in support of a transition plan for Sherco 1&2 through the Sherco Life Cycle Management Study and Xcel's 2010 resource plan dockets. According to an August 2014 statewide survey, super majorities of Minnesotans support wind (85%), solar (93%) and energy efficiency (95%). [92]

No one denies Sherco units 1&2 will eventually need to be retired; rather, it's a matter of when. Determining a transition plan for these units in this resource plan creates the certainty necessary for all parties. By making a decision now to retire these units in 2021 and 2024 the Commission will provide time for Xcel and impacted stakeholders such as employees and the affected community to plan a responsible economic transition.

The Clean Energy Plan responds to current trends – financial, social, and technological – moving away from coal and toward reliance on innovation and clean energy resources.

F. The Clean Energy Plan Limits The Risk Of Adverse Effects On The Utility And Its Customers From Financial, Social, And Technological Factors That The Utility Cannot Control.

[90] Norway Confirms $900bn Sovereign Wealth Fund's Major Coal Divestment, The Guardian (June 5, 2015, 9:44 AM), http://www.theguardian.com/environment/2015/jun/05/norways-pension-fund-to-divest-8bn-from-coal-a-new-analysis-shows.

[91] Benjamin Hulac, Coal: Fossil Fuel Divestment Campaign Has Mixed Results, But Coal Company Stocks Are Heading South, E&E Publishing, LLC (Feb. 13, 2015), http://www.eenews.net/stories/1060013442.

[92] Polling data referenced herein came from a statewide landline and wireless telephone poll of 421 randomly-selected registered Minnesota voters, conducted July 26 – August 3, 2014, for the Minnesota Environmental Partnership by the bipartisan research team of Fairbank, Maslin, Maullin, Metz & Associates and Public Opinion Strategies. The margin of sampling error for the full statewide samples is 4.9 percentage points, plus or minus; margins of error for subgroups within the sample will be larger."

By relying less on aging coal plants and more on energy efficiency and newer more efficient technologies, the Clean Energy Plan limits the risk of adverse consequences from factors outside Xcel's control.

As already discussed in these comments Xcel's proposal to continue to rely on the aging Sherco 1 & 2 units over the 15-year planning period poses a significant risk to ratepayers. Many of those risks are because of factors beyond Xcel's control and include:

- Risks that future regulations will negatively impact coal plants. As shown above these risks are real and come from a number of sources.
- Risk, in particular, that the regulation of CO_2 emissions will add costs. At over one ton emitted per MWh, any cost per ton resulting from GHG regulation will significantly affect the economics of the Sherco units.
- Risks of increases in coal fuel costs.
- Risks of the sufficient transport of coal. Last winter's coal supply shortage became so dire that several Minnesota utilities were required to build additional railroad tracks or ship coal in by truck, significantly increasing the cost of service to ratepayers.
- Risks of environmental consumables price volatility. As the electric utility sector consumes more reagents and other materials to ensure compliance with environmental regulations, the costs of those materials continues to rise.
- Risks of increases in operation and maintenance expenses as Sherco 1 and 2 near 50 years old.

The Clean Energy Plan, in contrast, mitigates the risk of all of these factors by establishing a clear path for Xcel to retire, in a reasonable timeframe, a substantial portion of its coal capacity. As noted above, the Clean Energy Plan as modeled in Strategist relies on more natural gas CT capacity than Xcel's Preferred Plan. This, in turn, could expose the company to more risk from natural gas fuel costs. But there are many strategies for mitigating that risk, including extension of the Manitoba Hydro contract and investment in technologies such as storage and solar that, over time, are very likely to be cost competitive with CT capacity. With regard to risks outside Xcel's control, the Clean Energy Plan poses far fewer than Xcel's Preferred Plan.

In sum, the Clean Energy Plan is in the public interest. It promises GHG reductions that are far more certain to help the state meet its GHG reduction goals, it maintains and improves adequacy and reliability, it keeps rates as low as practicable, it limits adverse effects on society and the environment, and it limits the risk of adverse consequences from factors outside the company's control. The Clean Energy Plan satisfies all these factors and should be selected by the Commission.

CONCLUSION

Xcel's IRP presents the Commission with a choice that pits the future against the past. This is a policy decision, not one that can be decided by the costs or the Strategist model. The Preferred Plan and the Clean Energy Plan both offer sufficient, reliable electricity service to Xcel's customers over the next 15 years; both do so at the same, reasonable costs.

But the Preferred Plan holds on to last century's polluting technology. It's a plan that continues to send millions of Minnesota dollars to coal companies out of state, send millions of tons of CO_2 into the atmosphere, and cause billions of dollars in long-term damages.

The Clean Energy Plan, in contrast, starts Xcel on a path to a future without coal – a future even Xcel's CEO recognizes is just around the corner. Without costing anything more, it frees Xcel's customers from the burden of 1500 MW of last-century's technology. Instead of investing in old coal units, the Clean Energy Plan invests in the transition to an electricity system that reflects current realities and mitigates foreseeable risks, one that achieves high levels of efficiency and uses of the state's own renewable energy resources like wind and solar to build a home-grown clean energy economy that sustainably meets the state's energy needs.

The Clean Energy Organizations respectfully submit that the decision before the Commission is an easy one. The State of Minnesota has been very clear about its policy

priorities. It seeks to eliminate environmental impact. It seeks to promote the public health. It seeks to encourage all cost-effective energy efficiency. It seeks to achieve significant GHG reductions. It seeks to provide reliable electricity service. Because the Clean Energy Plan does all of this far superior to Xcel's Preferred Plan at a price that is essentially the same, it is the clear choice.