APPENDIX L

Load Forecast and Conservation Program

Lyon County Generating Station Project
Combined Application
MPUC Docket Nos. E002/CN-25-145, G002/GS-25-154,
E002/TL-25-161 & G002/GP-25-163
May 2025

This Appendix discusses the methodology Xcel Energy used to develop the energy and demand side resource forecasting discussed in this Application. It also provides information regarding Xcel Energy's conservation programs.

A. Executive Summary

The outlook and methodology summarized in this appendix is based on the Company's Fall 2024 energy and demand forecast. The Company relies on econometric models and other statistical techniques to develop these forecasts. The econometric energy sales models relate our historical electric sales to demographic, economic, and weather variable data. Xcel Energy uses projections of economic activity for our various service areas that are provided by IHS Markit Inc. (formerly IHS Global Insight, Inc.). Based on this and other inputs, we develop sales forecasts for each major customer class, in each state of our service area. The individual class forecasts for each state are summed to derive a total system sales forecast.

We develop the peak demand forecast using a new process referred to as an "8760" method[1] that builds hourly models of each specific load component (Base Demand, Electric Vehicles, Beneficial Electrification, DG Solar, Large CI Data Centers, and Energy Efficiency). These hourly forecasts are then aggregated to system level and the peak demand and peak hour are then identified.

The forecast methodology, including all pre and post-modeling adjustments to the data, the methodologies' strengths and weaknesses, and all input data and sources are discussed in greater detail below.

The Company projects energy requirements (gross of rooftop solar) to increase by nearly 16,000 GWh by 2030, from about 43,000 GWh in 2024 to 59,000 GWh in 2030. The increase is primarily driven by new load from data center customers beginning operations in the 2027-2029 timeframe. Peak demand (gross of rooftop solar) is expected to increase by about 2,000 MW by 2030. Figures 1 and 2 chart the projected energy requirements and peak demand. Table 1 compares the current outlook to the Company's most recent Resource Plan assumptions.

[1] This same process for peak demand forecasting was used in the Company's most recent IRP (Minnesota Docket No. E002/RP-24-67)

Figure 1: NSP System Total Net Energy

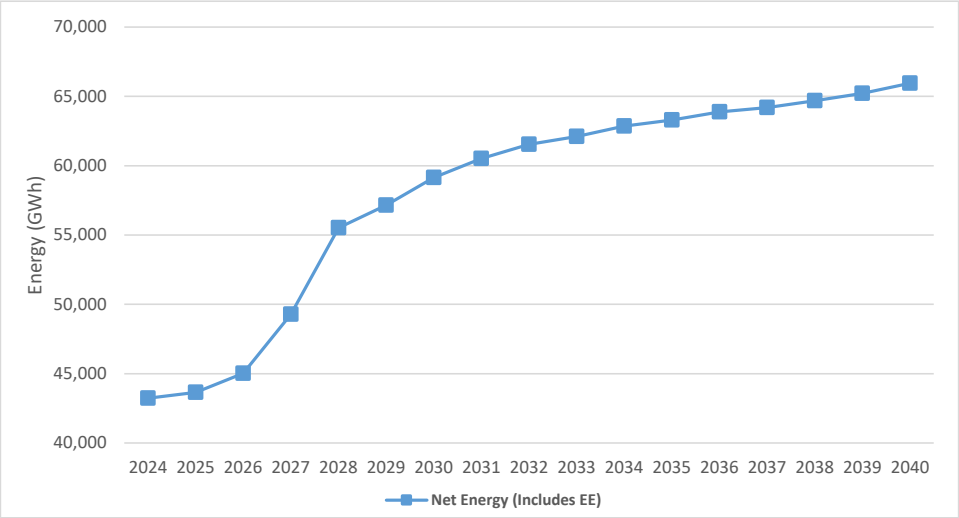


Figure 2: NSP System Summer Peak Demand

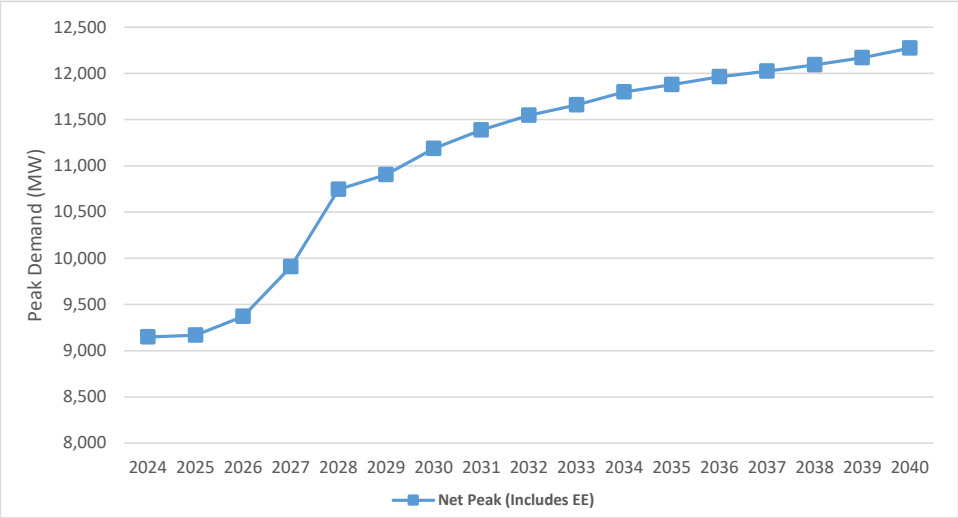


Table 1: NSP Energy Requirements and Summer Peak Demand

2024 IRP (Fall 2023 Forecast)		
Year	Peak Forecast	Energy Requirements
2024	9,309	43,823
2025	9,328	44,308
2026	9,650	46,524
2027	9,922	47,973
2028	10,029	48,170
2029	10,112	48,339
2030	10,207	48,866
2031	10,354	49,436
2032	10,574	50,305
2033	10,748	51,291
2034	11,065	52,555
2035	11,312	53,763
2036	11,563	55,302
2037	11,768	56,674
2038	11,987	57,934
2039	12,218	59,222
2040	12,414	60,215

Fall 2024 Forecast		
Year	Peak Forecast	Energy Requirements
2024	9,148	43,225
2025	9,167	43,655
2026	9,372	45,030
2027	9,907	49,283
2028	10,745	55,529
2029	10,904	57,143
2030	11,187	59,146
2031	11,389	60,524
2032	11,546	61,531
2033	11,660	62,107
2034	11,799	62,851
2035	11,879	63,295
2036	11,965	63,889
2037	12,025	64,194
2038	12,094	64,690
2039	12,170	65,216
2040	12,275	65,953

B. Forecast Methodology

Overall Methodological Framework

The NSP System serves five jurisdictions. Minnesota, North Dakota, and South Dakota are served by Northern States Power Company, a Minnesota corporation (NSPM). Wisconsin and Michigan are served by Northern States Power Company, a Wisconsin corporation (NSPW). The NSPM and NSPW Systems operate as an integrated system. Each class in each jurisdiction is modeled using econometric regression analysis or a historical average:

1. ***Econometric Analysis*** – Xcel Energy uses econometric analysis to develop jurisdictional MWh sales forecasts at the customer meter for the following sectors:
   a. Residential without Space Heating;
   b. Residential with Space Heating;
   c. Small Commercial and Industrial;
   d. Large Commercial and Industrial (NSPM);
   e. Public Street and Highway Lighting (Minnesota);
   f. Other Sales to Public Authorities (Minnesota);
   g. Total System MW Demand Forecast.

Inputs to these models include: economic and demographic series specific to the jurisdiction being modeled, weather variables (Heating Degree Day or "HDD" and Temperature-Humidity Index or "THI"), class customer counts, and binary variables. The historical sales series for NSPM are adjusted to remove the effects of DSM and DG Solar prior to modeling, and the resulting forecast series are then adjusted to include these effects. Sales are also adjusted to include the predicted impacts of EV adoption, BE, and new or lost LCI loads.

2. ***Historical Average*** is used for "Other" MWh sales sectors, which includes Public Street and Highway Lighting (all states except Minnesota), Other Sales to Public Authorities (Michigan, North Dakota, and Wisconsin), Interdepartmental (Michigan, Minnesota, and Wisconsin), and Large Commercial and Industrial (Michigan and Wisconsin).

3. ***Line Loss Calculation*** - since some energy is lost, mostly in the form of heat created in transmission and distribution conductors, we use loss factors to convert the sales forecasts into energy production requirements at the generator. The forecasted loss factors are developed by modeling actual historical loss factors and estimating losses for the first forecast year (2024). These factors are held constant over the forecast period. Native energy requirements at the generator are calculated by grossing the sales forecast at meter for line losses using a loss factor specific to each jurisdiction.

4. ***Peak forecasting*** - The peak forecast methodology was recently updated to better account for the potential peak shifting due to future adoption of Distributed Solar Generation (DG Solar), managed and unmanaged Electric Vehicle (EV) charging, and Beneficial Electrification (BE). These technologies will gradually change the overall NSP load shape and shift the peak hour later in the day or into the early morning due to managed EV charging. The prior monthly peak modeling approach could not account for time shifting; therefore, the static assumption would be that NSP will continue to peak at the same time as the historical series being modeled.

The new "8760" peak modeling approach uses Metrix LT to construct and forecast value for each hour of the forecast timeframe. Base energy, EV, BE, DG Solar, Large CI Data Centers, and Energy Efficiency hourly profiles are scaled using monthly energy assumptions for each specific component and on a state-by-state basis.[2] All component curves are then aggregated, and the maximum hourly load by month is calculated. The resulting peaks largely align with the Company's old monthly modeling process for the first few years of the forecast timeframe. However, adoption of rooftop solar generation and increased EV penetration eventually pushes summer peaks later into the evening.

Methodology Strengths and Weaknesses

The strength of the process Xcel Energy uses for this forecast is the richness of the information obtained during the analysis. Xcel Energy's econometric forecasting models are based on sound economic and statistical theory. Historical modeling and forecast drivers are based on economic and demographic variables that are easily measured and analyzed. The use of models by

[2] The Base energy curve is also scaled to include a Base monthly peak demand outlook that assumes no new technologies and no change in customer behavior from the present.

class and jurisdiction gives greater insight into how the NSP System is growing, thereby providing better information for decisions to be made in the areas of generation, transmission, marketing, conservation, and load management.

With respect to accuracy, forecasts of this duration are inherently uncertain. Planners and decision makers must be keenly aware of the inherent risk that accompanies long-term forecasts. They must also develop plans that are robust over a wide range of future outcomes.

Modeling Data

Xcel Energy uses internal and external data to create its MWh sales and MW peak demand forecast.

Historical MWh sales are taken from Xcel Energy's internal company records, fed by its billing system. Historical coincident net peak demand data is obtained through company records. The load management estimates are added to the net peak demand to derive the base peak demand.

Monthly weather data is collected for the Minneapolis/St. Paul, Fargo, Sioux Falls, and Eau Claire metropolitan areas. The heating degree-days and THI degree-days are calculated internally based on this weather data.

Economic and demographic data is obtained from the Bureau of Labor Statistics, U.S. Department of Commerce, and the Bureau of Economic Analysis. Typically, they are accessed from IHS Markit, and reflect the most recent values of those series at the time of modeling.

C. Corporate Forecast Adjustments

The Company sponsors demand-side management ("DSM") programs in the Minnesota and South Dakota jurisdictions. There are no Company-sponsored DSM programs in the North Dakota, Michigan, or Wisconsin jurisdictions. For Minnesota and South Dakota, the regression model results for the Residential and Commercial and Industrial classes are reduced to account for the expected impacts of DSM programs.

The DSM methodology utilizes a transparent method for projecting the impacts of energy efficiency and load management on sales forecasts. There are three distinct steps to this process:

- Collect and calculate historical and current effects of DSM on observed sales;
- Project the forecast using observed data with the impact of DSM removed (i.e. increase historical sales to show hypothetical case without DSM);
- Adjust the forecast to show the impact of all planned DSM in future years.

The first step involves collecting data involving any measure that would cause an impact on the time period utilized in the sales forecast. In the Fall 2024 modeling, the Company used the time period from Jun 2009 to May 2024 and therefore the historical DSM would include any measure that results in decreased sales in any (or all) years from Jun 2009 through May 2024. Since the vast majority of DSM measures have a lifetime greater than one year (exceptions include but are not limited to behavioral energy savings programs), the impact on sales will include the year that a

measure is installed as well as any years that follow until the measure has reached the end of its useful life. For example, a residential lighting measure that was installed in 2008 and has a life of 6 years will result in a sales reduction from 2008 to 2013 (6 full calendar years). Though a measure may be installed in June of 2008 and would persist until May of 2013, the Company believes that the simplifying case in which all measures are installed for the entire calendar year is sufficient.

In response to the establishment of a Solar Energy Standard (SES) by the Minnesota Legislature an increased emphasis has been placed on distributed solar generation. A forecast of the expected impact on demand and energy has been developed based on new programs designed to meet goals established for the SES. Impacts of customer sited behind-the-meter solar installations on the NSP system were extracted from this forecast and used to develop adjustments to reduce the class level sales for Minnesota and the NSP System peak demand forecast.

Xcel has calculated and metered the historical impact of distributed solar generation on customer sales and peak demands.

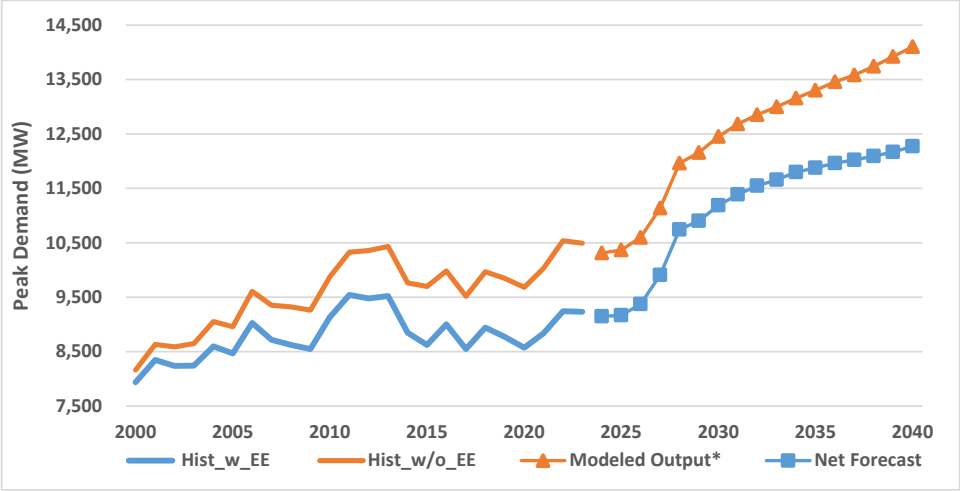
Once the total impact of DSM in effect and distributed solar generation is calculated for each year, a hypothetical sales data set is created. This series consists of the observed sales from June 2009 through May 2024 plus the effective DSM calculated for all DSM measures installed in that year as well as achieved savings from programs in prior years that are still within the useful measure life, plus the historical distributed solar generation.

In the second step, the hypothetical sales data is used to generate a sales forecast that has entirely excluded the impacts of Company-sponsored DSM and distributed solar generation. It is important to note that customer-initiated DSM or DSM due to codes and standards (naturally occurring DSM) is not calculated as part of the CIP. The methodology to account for codes and standards changes is described below.

In the third step, once the sales forecast based on hypothetical sales has been generated, the Company adjusts the forecast to account for future DSM and future distributed solar generation. The forecast of future distributed solar generation is developed by Xcel Energy's Load Research Department. A monthly forecast of the impact of new DSM programs (excluding Saver's Switch) is developed by Xcel Energy's DSM Strategy and Policy Department. The future DSM sales volumes are combined with the continuing impacts of historical DSM measures and future solar generation and used to reduce the class level sales forecasts that result from the regression modeling process to determine the DSM and solar-adjusted sales. Impacts from all program installations through May 2024 are assumed to be imbedded in the historical data, so only new program installations and the continuing impact of historical programs are included in the DSM-solar generation adjustment. The source for Company-sponsored DSM adjustments is based on the CIP Plan in effect at the time of the forecast.

Figure 3 below demonstrates how energy efficiency is effectively "backed out" of the history prior to modeling to create an outlook with no energy efficiency impacts, and how those impacts are then applied in the forecast timeframe to create an outlook inclusive of energy efficiency.

Figure 3: Illustration of EE Adjustment – NSP System Demand



The Company's Saver's Switch program results in short-term interruptions of service designed to reduce system capacity requirements rather than permanent reductions in energy use, so it is not considered here.

D. Additional Forecast Adjustments

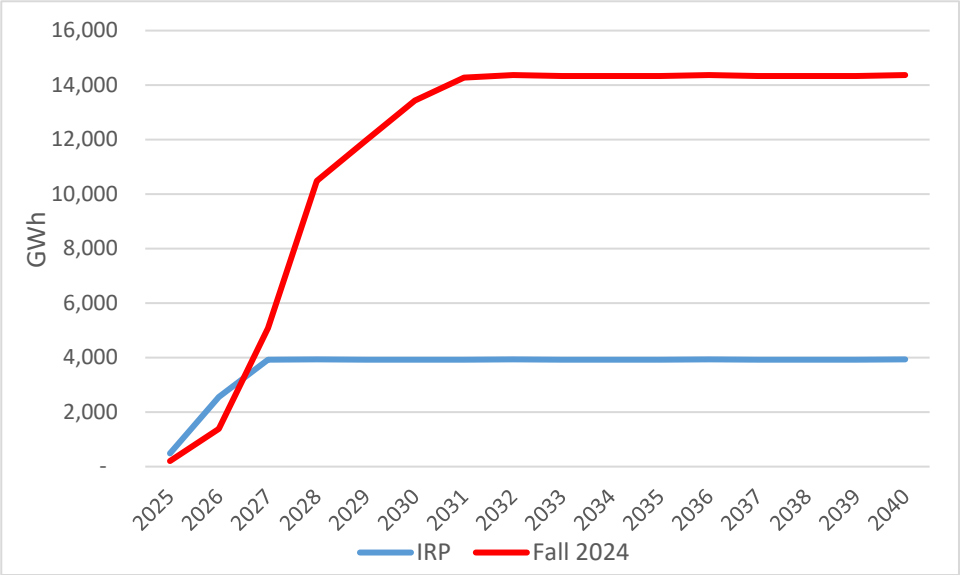
1. Weather Adjustments. Xcel Energy adjusts calendar month weather data to reflect billing month schedules before using the series to model monthly billing cycle sales.

2. Demand Forecast Wholesale Adjustment. An adjustment to account for terminating firm wholesale customer contracts was incorporated into the development of the peak demand forecast. Estimated historical coincident peak demand and energy for all firm wholesale customers were removed from the regression model data to create a consistent data series for retail demand and energy.

3. The sales and peak demand series were adjusted to account for recent or planned future changes in production and/or customer owned generation for several large customers. This includes expected increases in demand by new data center customers. The energy consumption by new data center customers[3] assumptions under the IRP and the Fall 2024 forecast are shown below in figure 4. These assumptions are developed by the Company's Economic Development team by coordinating closely with data center customers to estimate probable timing and magnitude of new facilities.

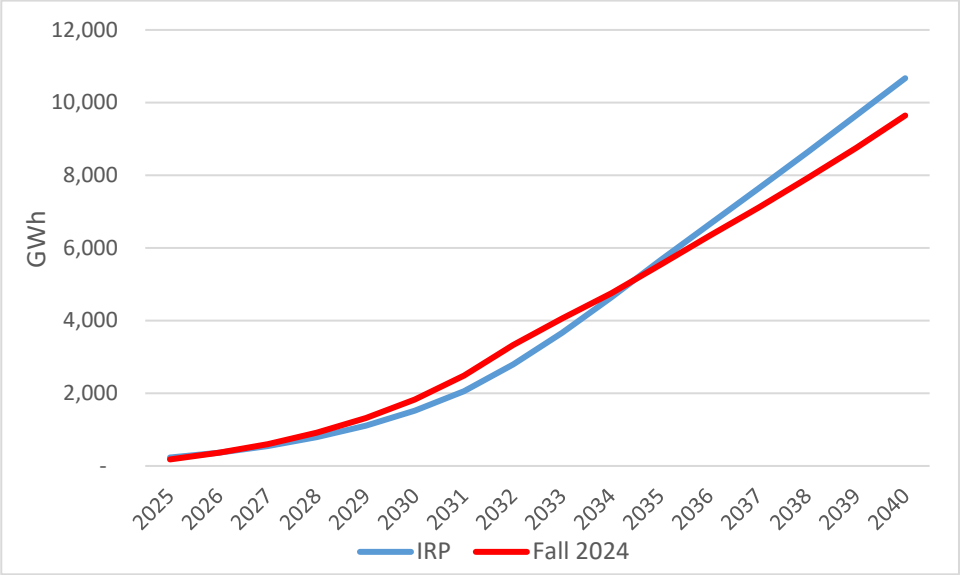
[3] Gross of line losses, i.e. at generation

Figure 4: Data Center Energy Consumption



4. Electric Vehicle Adjustments - the penetration of electric vehicles in Xcel Energy's service territory has been increasing over the past few years and is expected to continue increasing. Because this trend of increasing electric vehicle penetration is expected to continue, the Residential sales forecasts have been adjusted for to account for future electricity usage from home charging of electric vehicles. In addition, the Small Commercial and Industrial and Large Commercial and Industrial sales forecasts have been adjusted to account for future electricity usage from the charging of medium-duty and heavy-duty electric vehicles. The energy consumption by electric vehicles[4] assumptions under the IRP and the Fall 2024 forecast are shown below in figure 5.

Figure 5: Electric Vehicle Consumption



[4] Gross of line losses, i.e. at generation.

Assumptions and Special Information

The data used in Xcel Energy's forecasting process has already been discussed in a general way. Descriptions and citations of sources for the data sets have been mentioned within this documentation under different sections.

Xcel Energy believes that its process is a reasonable and practical one to use as a guide for its future energy and load requirements. The underlying assumptions used to prepare Xcel Energy's median forecast are as follows:

1. Demographic Assumption. Population or household projections are essential in the development of the long-range forecast. The forecasts of customers are derived from population and household projections provided by IHS Markit, and reviewed by Xcel Energy staff. Xcel Energy customer growth mirrors demographic growth over the forecast period.

2. Weather Assumption. Xcel Energy assumes "normal" weather in the forecast horizon. Normal weather is defined as the average weather pattern over the 20-year period from 2004-2023. The variability of weather is an important source of uncertainty. Xcel Energy's energy and peak demand forecasts are based on the assumption that the normal weather conditions will prevail in the forecast horizon. Weather-related demand uncertainties are not treated explicitly in this forecast.

3. Loss Factor Assumptions. The loss factors are used to convert the at meter sales forecast to an at generator energy requirements figure. Xcel Energy uses regression modeling to analyze line losses for each jurisdiction and then projects a typical forecast year's loss factor.

E. Conservation Programs

Minnesota Rule 7849.0290 requires a Certificate of Need application to provide information related to an applicant's energy conservation and efficiency programs and a quantification of the impact of these programs on the forecast information required by Minn. R. 7849.0270. Within Xcel Energy, the Program Policy team is responsible for filing our conservation and efficiency programs at Xcel Energy. Jessica Peterson is the individual who submits these details to the DOC-DER for approval.

Xcel Energy requested an exemption from this content requirement, explaining Xcel Energy requested an exemption from this content requirement, explaining that the Project here is needed to provide replacement firm dispatchable resources to continue to reliably serve customers after the retirement of the Company's remaining coal-fired units, and that conservation could not meet that need. Instead, Xcel Energy proposed to provide substitute information related to its conservation programs in Minnesota as relied upon by the Commission in the Firm Dispatchable and 2024 IRP dockets, similar to other exemptions approved by the Commission[5]

[5] *See, e.g., In the Matter of the Application for a Certificate of Need for the Iron Range – Benton County - Big Oaks Transmission Project*, MPUC Docket No. E-015, ET-2/CN-22-416, Order Approving the Requested Exemptions and the Notice Plan (June 21, 2023); *In the Matter of the Application for a Certificate of Need for the Big*

DOC-DER recommended approval of Xcel Energy's requested exemption, with the provision of alternative data. Consistent with its exemption request, Xcel Energy provides the summary below of the conservation information in the most recent IRP and CIP/ECO filings. Of note, we acknowledge the change from the Conservation Improvement Program (CIP) to the Energy Conservation and Optimization (ECO) program as a result of the 2021 ECO Act adjusting the Minnesota conservation programs to allow for extended opportunities in efficiency, efficient fuel switching and load management in Minn. Stat. §216B.241.

For decades, Minnesota has been a national leader in energy efficiency. The state's utility-sponsored energy efficiency programs are among the longest-standing in the country, and Minnesota is the only Midwestern state that is consistently ranked in the top ten on the American Council for an Energy Efficient Economy's (ACEEE) State Energy Efficiency Scorecard. Minnesota utilities' energy savings achievements through demand side management (DSM) have saved billions of dollars for customers and avoided millions of tons of greenhouse gas and other pollutants while creating and supporting jobs in the state.[6] Indeed, based on 2023 data, the Company has saved nearly 13,071 GWh of energy and 4,535 MW of demand and 21.4 million MCF of natural gas savings, since 1990. Xcel Energy's electric CIP portfolio has surpassed the statewide target of 1.5 percent every year since 2011, with a peak of electricity savings of 2.48 percent in 2023.[7]

Xcel Energy's 2024-2026 ECO Triennial Plan provides a description of specific energy conservation and efficiency programs the applicant has considered.[8] A list of specific energy conservation and efficiency programs implemented can be found in the Executive Summary of our ECO Status Reports. The Company provides these in detail on our Xcel Energy website.[9] A review of ongoing new measures is conducted as new technologies are identified and reviewed compared to the cost- effective analysis required by the Department of Commerce. All additional programs reviewed and their approvals can be found in Docket No. E,G002/CIP-23-92 as required by the Department of Commerce through a "Modification Approval." Xcel Energy continued to strive to provide customers with a wide variety of options for saving energy.[10] The Triennial Plan proposed ambitious goals of saving 1,871 GWh, 672 MW, and 3,532,624 Dth over the three-year period and at a cost of $587 million.

The proposed electric savings goals also aligned with Company's DSM commitments in the IRP. In reviewing the Triennial Plan, the Department concluded:

- "[B]usiness, residential, and low-income customers all appear to have opportunity to participate in the Company's CIP. [T]he Company proposes a variety of program

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Stone South –Alexandria –Big Oaks Transmission Project, MPUC Docket No. E-017, ET-2, E-002, ET-10, E-015/CN-22-538, Order Approving Notice Plan Petition, Requested Exemptions, and Variance (Apr. 19, 2023); MNEC CN Exemption Order.

[6] *See* Docket No. E,G002/CIP-23-92. 2024-2026 Xcel Energy ECO Triennial Plan (January 29, 2024). ("Triennial Plan") at 2.

[7] *See* Docket No. E,G002/20-473. 2023 CIP Status Report (April 1, 2023).

[8] *See* Docket No. E,G002/CIP-23-92. 2024-2026 Xcel Energy ECO Triennial Plan (January 29, 2024). ("Triennial Plan").

[9] https://www.xcelenergy.com/company/rates_and_regulations/filings/minnesota_demand-side_management.

[10] Xcel Energy's next Triennial Plan will be submitted on June 1, 2026.

delivery approaches and measures that should provide participation opportunities across market segments."[11]

- "Xcel's 2021-2023 overall energy savings goals are generally aligned with the overall results from the 'Minnesota Energy Efficiency Potential Study.'"[12]

- "Staff recognize the positive efforts the Company has put forth to update its programs."[13]

In its 2023 CIP Status Report, Xcel Energy stated that, for more than a decade, it had exceeded the State of Minnesota's energy targets. Specifically, in 2023, the electric portfolio met and surpassed the state's new energy savings target of 1.75 percent,[14] achieving nearly 689 GWh of electric savings, or 2.48 percent of sales.[15] Xcel Energy spent a total of $134 million to achieve its savings results, including $115 million on electric programs and $20 million on natural gas programs.[16]

Likewise, Xcel Energy's IRP filing included energy efficiency (EE) and demand response (DR) investments.[17] In the Commission's April 21, 2025 Order, the Commission directed Xcel Energy to achieve an annual level of at least 580 GWH of programmatic energy savings. The Company's current 2024-2026 Triennial Plan meets these requirements.

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[11] *See* Docket Nos. E,G002/CIP-20-473, G7034,E7032/CIP-20-483, G7036,E7035/CIP-20-480, E7030/CIP-20-485, G7033,E7031/CIP-20-481. Decision (Nov. 25, 2020). ("CIP Decision") at 32.
[12] CIP Decision at 35.
[13] CIP Decision at 57.
[14] Minn. Statute §216B.214
[15] *See* Docket No. E,G002/CIP-20-473 2022. CIP Status Report (April 1, 2023) ("CIP 2022 Status Report") at 9.
[16] CIP 2022 Status Report at 5.
[17] See Docket No. E002/RP-24-67.