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Direct Testimony and Schedules
John M. Goodenough

Before the Minnesota Public Utilities Commission
State of Minnesota

In the Matter of the Application of Northern States Power Company for Authority to Increase Rates for Natural Gas Service in Minnesota

Docket No. G002/GR-23-413
Exhibit___(JMG-1)

Gas Customer and Throughput Forecast

November 1, 2023

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Schedules

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND OCCUPATION.

A. My name is John M. Goodenough. I am the Director of the Sales, Energy, and Demand Forecasting department for Xcel Energy Services Inc. (XES), which is the service company subsidiary of Xcel Energy Inc. (XEI).

Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I graduated from the University of Delaware with a Doctor of Philosophy degree in Economics. I also hold a Master of Arts degree in Economics from the University of Delaware and a Bachelor of Arts degree in Economics from the University of Maryland. I have worked in a sales forecasting role since 2007. I began my career in forecasting as a Regulatory Affairs Analyst at Pepco Holdings, Inc. from 2007–2010, followed by a role as a Principal Analyst at Baltimore Gas and Electric from 2010–2014. I worked as an Energy Markets Specialist at Southern California Edison from 2014–2016 and as a Manager, Energy and Revenue Forecasting and Analysis at Arizona Public Service from 2016–2019. I started my prior role as Manager, Energy Forecasting for Xcel Energy in October 2019 and was promoted to my current role as Director of Sales, Energy, and Demand Forecasting in May 2022. My resume is included as Exhibit___(JMG-1), Schedule 1.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I support the forecast of natural gas customers and throughput for Northern States Power Company – Minnesota (NSPM or the Company), d/b/a Xcel Energy for the test year period of January 1, 2024 through December 31, 2024. This forecast forms the basis for the Company's revenue forecast in this proceeding. I also support the Company's proposed one-time sales true-up that would use actual weather-normalized sales data for purposes of setting rates for the 2024 test year.

Q. PLEASE EXPLAIN WHAT THE TERM "THROUGHPUT" MEANS.

A. The Company provides both gas sales and transportation services. Gas sales include customers who purchase their natural gas supply from the Company. Gas Transportation customers purchase their gas from third-party suppliers, and that gas is then shipped across the Company's distribution system. Total throughput includes all gas shipped across the Company's distribution system.

Q. HOW ARE CUSTOMER AND THROUGHPUT FORECASTS USED IN THIS PROCEEDING?

A. The customer and throughput forecasts are used to calculate the following:

1) The monthly and annual natural gas supply requirements;
2) Test year revenue under present rates; and
3) Test year revenue under proposed rates.

Q. PLEASE EXPLAIN THE IMPORTANCE OF ACCURATE CUSTOMER AND THROUGHPUT FORECASTS IN A RATE CASE PROCEEDING.

A. We share an interest with our customers in having accurate forecasts. An accurate forecast in a rate case allows the Company to recover its costs, no more and no less. In addition, forecasts are used for purposes other than setting rates, such as gas capacity planning, where it is important that the Company has sufficient resources to meet customer needs over time.

Q. HAS THE COMPANY COMPLIED WITH ALL PREFILING COMPLIANCE REQUIREMENTS RELATED TO THE CUSTOMER AND THROUGHPUT FORECAST IN THIS PROCEEDING?

A. Yes. In Docket No. E-002/GR-05-1428, the Minnesota Public Utilities Commission (Commission) ordered the Company to make a filing providing the data used in its test year sales forecasts at least 30 days in advance of the date of its next natural gas and electric general rate case filings. The Company complied with this requirement by filing the required information on September 29, 2023 in this docket. The information was e-filed through the Commission's electronic filing system.

Q. ARE THERE DEFINED TERMS YOU PLAN TO USE IN YOUR TESTIMONY?

A. Yes. The definitions of terms that are included in my testimony are provided in Exhibit___(JMG-1), Schedule 2.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. My testimony presents the natural gas customer count and throughput forecast for the 2024 test year. As I explain further below, our test year forecast indicates that both the overall number of natural gas customers and overall natural gas throughput is expected to increase in 2024 as compared to 2022 actual sales levels. Specifically, the Company projects 2024 total throughput to increase by 9.9 percent from 2022 levels of 108,053,647 dekatherms (Dkt) to 118,778,662 Dkt due primarily to an increase in Interdepartmental transport volumes. The number of customers are expected to increase by 2.1 percent over the same period. My testimony also discusses the Company's proposed one-time sales true-up that would use actual weather-normalized sales data for purposes of setting rates for the 2024 test year.

My testimony also discusses the methodology used to develop this forecast. As I discuss, the Company's forecast is based on sound statistical methodologies and provides a reasonable estimate of 2024 Dkt throughput and customer counts, supports the Company's revenue projections, and should be adopted for the purpose of determining the revenue requirement and final rates in this proceeding. Finally, I discuss the weather normalization of the sales forecast, the preparation of data used in the forecasting process, how unbilled and calendar month sales are calculated, and adjustments made to the test year forecast.

II. CUSTOMER, SALES, AND THROUGHPUT TRENDS

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. The purpose of this section of my Direct Testimony is to provide relevant background regarding the Company's natural gas service territory, natural gas customer categories, and historical customer and Dkt sales and throughput trends from 2017 to 2022.

Q. WHAT GEOGRAPHICAL AREA DOES THE COMPANY'S NATURAL GAS THROUGHPUT FORECAST REFLECT?

A. My Direct Testimony and exhibits reflect natural gas throughput and customers in Xcel Energy's Minnesota service territory.

Q. IS THE COMPANY'S GAS SERVICE TERRITORY THE SAME AS ITS ELECTRIC SERVICE TERRITORY?

A. No. The Company's gas service territory is smaller than the electric service territory. As of December 2022, the Company had about 484,000 gas customers and 1.35 million electric customers in the State of Minnesota.

Q. PLEASE DESCRIBE THE CUSTOMER CATEGORIES INCLUDED IN THE COMPANY'S NATURAL GAS CUSTOMER AND THROUGHPUT FORECASTS.

A. The following customer classes comprise the Company's gas forecast:

Residential – residential firm service.

Commercial

Small Commercial – commercial and industrial firm service having annual usage of less than 600 Dkt.

Large Commercial – commercial and industrial firm service having annual usage of 600 Dkt or more.

Demand

Small Demand – firm commercial and industrial service for demand-billed customers having a maximum peak day demand of less than 50 Dkt.

Large Demand – firm commercial and industrial service for demand-billed customers having a maximum peak day demand of 50 Dkt or more.

Interruptible

Small Volume Interruptible – interruptible service to commercial and industrial customers having a maximum peak day demand less than 200 Dkt.

Medium Volume Interruptible – interruptible service to commercial and industrial customers having a maximum peak day demand greater than 200 Dkt and less than 5,000 Dkt.

Large Volume Interruptible - interruptible service to commercial and industrial customers having a maximum peak day demand greater than or equal to 5,000 Dkt.

Interdepartmental Sales – natural gas sales made internally to Xcel Energy facilities for purposes other than the generation of electricity, such as heating Service Centers.

Generation Sales – natural gas sales made internally to Xcel Energy facilities for the generation of electricity.

Transportation

Firm Transportation – firm transportation service for customers whose peak daily demand requirement is 50 Dkt or more per meter location.

Interruptible Transportation – interruptible transportation service with rate based on peak day demand: Small – less than 200 Dkt; Medium – more than 200 Dkt and less than 5,000 Dkt; Large – more than 5,000 Dkt.

Negotiated Transportation – transportation service for commercial/industrial customers for whom physical bypass of the Company's distribution system is economically feasible and practical.

Interdepartmental Transportation – firm transportation service to Xcel Energy facilities for the generation of electricity.

Q. WHAT TRENDS ARE YOU SEEING IN THE COMPANY'S CUSTOMER COUNTS FROM 2017 TO 2022?

A. The Company has seen moderate growth in the number of Minnesota natural gas customers over the past six years. The total number of customers increased at an average annual rate of 1.1 percent from 2017 through 2022. Residential customers, which accounted for 92 percent of total customers in 2022, have averaged 1.1 percent growth per year over the past five years.

Q. WHAT FACTORS HAVE BEEN DRIVING THE GROWTH IN RESIDENTIAL CUSTOMER COUNTS SINCE 2017?

A. Residential customer counts are highly correlated with population and households. The moderate growth rate in the number of Residential customers since 2017 is the result of the growth in population and households over this same time period.

Q. WHAT TRENDS ARE YOU SEEING IN THE COMPANY'S NATURAL GAS THROUGHPUT FROM 2017 TO 2022?

A. The Company's total natural gas throughput has increased on average 1.7 percent per year from 2017 to 2022, after normalizing for weather. Total Retail sales have increased an average of 0.6 percent per year. The largest area of growth has been in the Transportation sector, with total Transportation volumes increasing an average of 4.3 percent per year during this time. The average annual percent change in customers and throughput by customer class from 2017 through 2022 is shown in Table 1.

Table 1

Average Annual Percent Change in Customers and Throughput

Average Annual Change – 2017 to 2022			
Customer Class	**Number of Customers**	**Weather-Normalized Throughput**	**2022 % of Total Throughput**
Residential	1.1%	1.0%	36.1%
Total Commercial	0.7%	2.3%	22.0%
Total Demand	1.5%	1.7%	2.9%
Total Firm	**1.1%**	**1.5%**	**60.9%**
Total Interruptible	-6.0%	-4.9%	7.9%
Total Retail	**1.1%**	**0.6%**	**68.8%**
Total Transportation	3.0%	4.3%	31.2%
Total	**1.1%**	**1.7%**	**100.0%**

Q. PLEASE EXPLAIN WHAT TYPES OF CUSTOMERS ARE INCLUDED IN THE TOTAL TRANSPORTATION CLASS?

A. The Total Transportation class includes Firm Transportation, Interruptible Transportation, Negotiated Transportation, and Interdepartmental Transportation. Due to the small number of customers in each of these classes, I have combined them into the Total Transportation category in my Direct Testimony.

Q. WHAT DROVE THE INCREASE IN TRANSPORTATION VOLUMES FROM 2017 TO 2022?

A. The increase in Transportation volumes from 2017 to 2022 was driven primarily by increases in Interdepartmental Transportation, which are volumes delivered to Xcel Energy facilities for the generation of electricity. An additional customer was added to that class in 2018, and in 2019 volumes were high due to low natural gas prices which resulted in our natural gas plants running more frequently in 2019 compared to prior years. Interdepartmental Transportation volumes declined in 2020 due to increased renewable and nuclear generation, which offset some gas generation. In addition, overall electric system load was lower in 2020 due to the pandemic, which led to lower generation overall and lower gas production. In 2022, volumes declined primarily due to high gas prices.

Q. WHAT FACTORS CONTRIBUTED TO THE INCREASE IN GAS RETAIL SALES FROM 2017 TO 2022?

A. Residential sales, driven by customer growth, contributed to growth in total gas Retail sales from 2017 to 2022. Commercial sales also contributed to the total growth through both customer count growth and use per customer growth.

Residential and Commercial customers increased as a result of population growth. The increasing Commercial use per customer is due to movement of larger usage Interruptible customers to the firm Commercial class.

III. CUSTOMER AND THROUGHPUT FORECASTING METHODOLOGY

Q. PLEASE DESCRIBE IN GENERAL TERMS THE METHODS USED TO FORECAST THROUGHPUT AND CUSTOMER COUNTS FOR THIS RATE CASE.

A. The 2024 test year throughput forecast was completed in the summer of 2023 and was based on actual customers and throughput through May 2023. The Sales, Energy and Demand Forecasting department coordinated the gas throughput and customer forecast preparation using a combination of econometric and statistical forecasting techniques and analyses to develop the throughput and customer forecasts.

Q. HOW WERE THE SALES FORECASTS DEVELOPED FOR THE RESIDENTIAL, COMMERCIAL, SMALL VOLUME INTERRUPTIBLE, AND MEDIUM VOLUME INTERRUPTIBLE CUSTOMER CLASSES?

A. Regression models were developed as the foundation for the sales forecasts of the Residential, Small Commercial, Large Commercial, Small Volume Interruptible, and Medium Volume Interruptible customer classes. The regression models were developed using the Metrix ND[1] software program which is commonly used in the utility industry. Regression techniques are very well-known, proven methods of forecasting and are commonly accepted by forecasters throughout the utility industry. This method provides reliable,

[1] Metrix ND 7.0, Copyright © 1997-2020, Itron, Inc., http://www.itron.com

accurate projections; accommodates the use of predictor variables, such as economic or demographic indicators and weather; and allows clear interpretation of the model. The use of regression modeling is a standard approach in the utility industry, and Xcel Energy has been using these types of regression models since 1991.

Monthly sales forecasts for these customer classes were developed based on regression models designed to define a statistical relationship between the historical sales and independent predictor variables such as economic and demographic indicators, historical number of customers, and historical weather (expressed in heating degree days (HDD)). The modeled relationships were then simulated over the forecast period by assuming normal weather (expressed in terms of 20-year-averaged HDD and the projected levels of the other independent predictor variables.

Q. DOES THE COMPANY USE BINARY VARIABLES IN THE FORECAST MODELS?

A. Yes. Binary variables are used to help the model account for outliers or step changes in the historical data associated with another variable. Generally, a forecast is initially developed without any binary variables; they are added later as deemed advisable to improve the overall model fit or monthly pattern of the forecast. Binary variables have been included in both the Company's and the Department's models used to develop sales and customer forecasts in prior rate cases.

Q. WHAT PROCESS WAS USED TO FORECAST SALES AND VOLUMES IN THE REMAINING CUSTOMER CLASSES?

A. In the Demand, Interdepartmental sales, Large Volume Interruptible, Firm Transportation, Interruptible Transportation, and Negotiated Transportation classes, natural gas use per customer is high, the numbers of customers is small, and the end uses are much more varied. For these customer classes, natural gas sales volumes were forecasted based on an analysis of historical trends by month. The gas volumes test year forecast for Interdepartmental Transportation volumes was an output from the Company's electric production cost model. The forecast for Generation sales is a combination of output from the Company's electric production cost model and a customer-specific forecast for a new Generation customer.

Q. WHAT IS THE COMPANY'S ELECTRIC PRODUCTION COST MODEL AND HOW IS IT USED TO FORECAST GAS VOLUMES FOR A PORTION OF THE TRANSPORTATION CLASS?

A. The model is PLEXOS, which simulates plant dispatch based on the Company's electric forecast. The model then determines the amount of natural gas used at the gas-fired plants based on their expected dispatch.

Q. WERE ANY VOLUMES ASSOCIATED WITH OFF-SYSTEM SALES INCLUDED IN THE FORECAST?

A. No. Xcel Energy has no off-system sales; therefore, no such volumes were included in the forecast.

Q. WHAT PROCESS WAS USED FOR FORECASTING THE NUMBER OF CUSTOMERS?

A. The number of customers by customer class for the Residential and Small Commercial customer classes is forecasted using demographic data in regression models. The number of customers for the remaining customer classes is forecasted based on an analysis of historical trends. The historical number of customers by class is derived from the Company's billing system.

Q. HOW MANY TRANSPORTATION CUSTOMERS ARE EXPECTED IN THE TEST YEAR?

A. There are expected to be a total of 30 Transportation customers in the 2024 test year, including the four Xcel Energy facilities counted as Interdepartmental Transportation customers. This is the same as the number of Transportation customers in May 2023.

Q. WHAT IS THE SOURCE OF WEATHER DATA?

A. Weather data from the National Oceanic and Atmospheric Administration (NOAA) Minneapolis-St. Paul weather station was the data source, and the measure of weather used was HDD. Eight temperature readings per day were obtained, and the average daily temperature was determined by averaging the eight temperature readings. HDD were calculated for each day by subtracting the average daily temperature from 65 degrees Fahrenheit. For example, if the average daily temperature was 45 degrees Fahrenheit, then 65 minus 45, or 20 HDD, were calculated for that day. If the average daily temperature was greater than 65 degrees Fahrenheit, then that day recorded zero HDD. Normal daily HDD were calculated by averaging 20 years of daily HDD using data from 2003 to 2022.

Q. WHAT WAS THE COMPANY'S SOURCE OF ECONOMIC AND DEMOGRAPHIC DATA?

A. Historical and forecasted economic and demographic variables for Minnesota, the Minneapolis-St. Paul metropolitan area, and the U.S. were obtained from IHS Markit, a respected economic forecasting firm frequently relied on by forecasting professionals. These variables include population, households, and real Gross Metropolitan Product. This information is used to determine the historical relationship between customers and sales, and economic and demographic measures. The Company used the most current economic and demographic data available from IHS Markit at the time of modeling.

Q. WHY DID YOU CHOOSE TO USE IHS MARKIT'S DATA RATHER THAN PUBLIC SOURCES?

A. We prefer to use IHS Markit over public sources because IHS Markit provides forecasts of various economic and demographic indicators, while the publicly-available information is available only on a historical basis. The Company is not purchasing free historical data from IHS Markit, but rather is paying for IHS Markit's forecasting service. Obtaining this information from a third-party vendor also mitigates any potential appearance of bias that might exist if the Company developed its own economic and demographic forecasts.

Q. WHAT STEPS HAS THE COMPANY TAKEN TO VALIDATE IHS MARKIT'S DATA?

A. As part of the information provided to the Commission and the Department 30 days prior to filing this general rate case, we included documentation showing how the historical and forecasted economic and demographic variables or indicators for each variable are calculated and derived. In addition, we identified the original source of the data, and, whenever the data was available via the internet compared the historical data provided by IHS Markit to the original source data. In instances where the original source data and the data provided by IHS Markit differed, we worked with IHS Markit to obtain satisfactory explanations for the variances.

IV. STATISTICALLY MODELED FORECASTS

Q. PLEASE DESCRIBE THE REGRESSION MODELS AND ASSOCIATED ANALYSIS USED IN XCEL ENERGY'S STATISTICAL PROJECTIONS OF SALES AND CUSTOMERS.

A. The regression models and associated analysis used in Xcel Energy's statistical projections of sales are provided in Exhibit___(JMG-1), Schedule 4, and the regression models and associated analysis used in Xcel Energy's statistical projections of customers are provided in Exhibit___(JMG-1), Schedule 5. These schedules include, by customer class, the models with their summary statistics and output and descriptions for each variable included in the model.

Q. DID XCEL ENERGY EMPLOY VALIDITY TESTS OR OTHER TECHNIQUES TO EVALUATE THE PLAUSIBILITY OF ITS QUANTITATIVE FORECASTING MODELS AND SALES PROJECTIONS?

A. Yes. We used several quantitative and qualitative validity tests that are applicable to regression analysis.

The coefficient of determination (R-squared) test statistic is a measure of the quality of the model's fit to the historical data. It represents the proportion of the variation of the historical sales around their mean value that can be attributed to the functional relationship between the historical sales and the explanatory variables included in the model. If the R-squared statistic is high, the model is explaining a high degree of the historical-sales variability. The regression models used to develop the sales forecasts demonstrate very high R-squared statistics, ranging between 0.909 and 0.997. The regression models used to develop the customer forecasts demonstrated very high R-squared statistics, ranging between 0.896 and 1.000.

The t-statistics of the variables indicate the degree of correlation between that variable's data series and the sales data series being modeled. The t-statistic is a measure of the statistical significance of each variable's individual contribution to the prediction model. Generally, to be considered statistically significant at the 90 percent confidence level, the absolute value of each t-statistic should be greater than 1.65. This standard was applied in the development of the regression models used to develop the sales forecast. However, including a variable with a lower level of significance is statistically acceptable and does not necessarily make the model invalid or result in an unreliable forecast. The final regression models used to develop the sales forecast tested satisfactorily under the 90 percent confidence level

Q. HOW ELSE DID THE COMPANY EVALUATE THE REASONABLENESS OF ITS QUANTITATIVE FORECASTING MODELS AND SALES PROJECTIONS?

A. We inspected each model for the presence of first-order autocorrelation, as measured by the Durbin-Watson (DW) test statistic. Autocorrelation refers to the correlation of the model's error terms for different time periods. For example, an overestimate in one period is likely to lead to an overestimate in the succeeding period under the presence of first-order autocorrelation. Thus, when forecasting with a regression model, absence of autocorrelation between the residual errors is very important. The DW test statistic ranges between 0 and 4 and provides a measure to test for autocorrelation. In the absence of first-order autocorrelation, the DW test statistic equals 2.0. The final regression models used to develop the sales forecast tested satisfactorily for the absence of first-order autocorrelation, as measured by the DW test statistic.

Graphical inspection of each model's error terms (*i.e.* actual less predicted) was used to verify that the models were not misspecified, and that statistical assumptions pertaining to constant variance among the residual terms and their random distribution with respect to the predictor variables were not violated. Analysis of each model's residuals indicated that the residuals were homoscedastic (constant variance) and randomly distributed, indicating that the regression modeling technique was an appropriate selection for each customer class's sales that were statistically modeled.

The statistically modeled sales forecasts for each customer class have been reviewed for reasonableness as compared to the respective monthly sales history for that class. Graphical inspection reveals that the patterns of the forecast fit well with the respective historical patterns for each customer class. The annual total forecast sales have been compared to their respective historical trends for consistency. Similar qualitative tests for reasonableness and consistency have been performed for the customer level projections.

Q. DID THE COMPANY ADJUST THE 2024 TEST YEAR FORECAST TO ACCOUNT FOR FUTURE EXPECTED DEMAND-SIDE MANAGEMENT (DSM) IMPACTS?

A. No. In the 2017 Gas Utility Infrastructure Costs (GUIC) filing (Docket No. G002/M-17-787), the Commission directed the Company to remove an adjustment for DSM energy impacts. Beginning with the 2018 GUIC Filing

(Docket No. G002/M-18-692), the Company has not included any DSM impacts in the forecast.

Q. DID THE COMPANY ADJUST THE FORECASTS FOR THE IMPACTS OF BENEFICIAL ELECTRIFICATION?

A. Yes, the Residential and Commercial and Industrial forecasts were adjusted to account for the expected impacts of beneficial electrification.

V. 2024 TEST YEAR CUSTOMER AND THROUGHPUT FORECAST

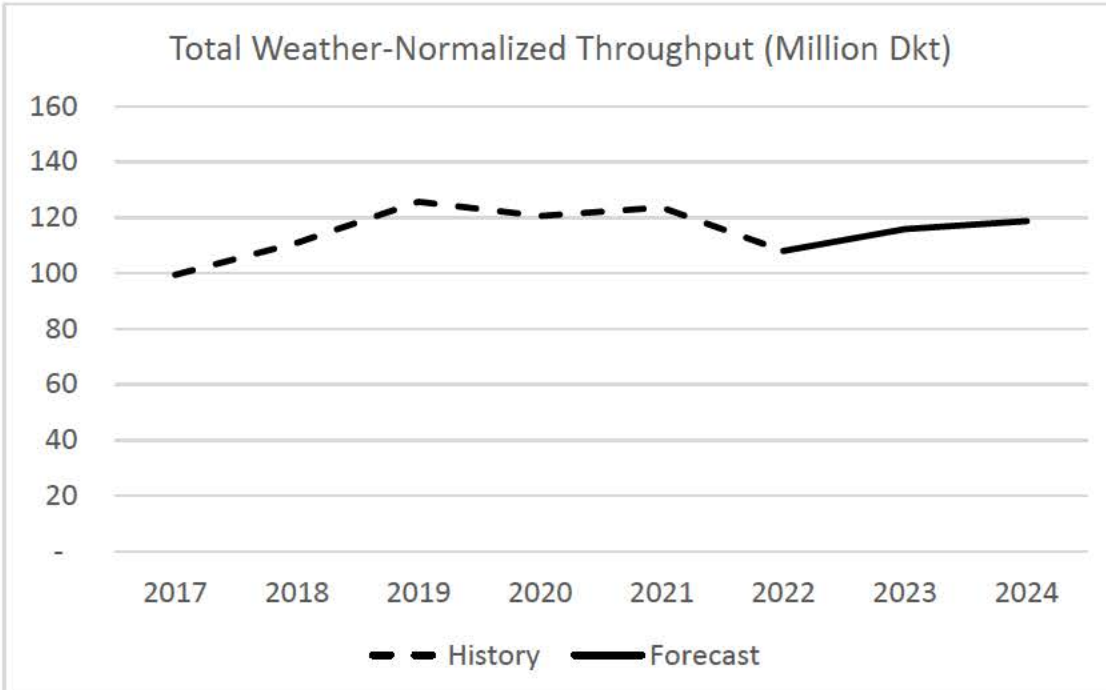
Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. The purpose of this section of my Direct Testimony is to provide the Company's forecast for the 2024 test year for customer counts and total throughput for the various customer classes. The customer and gas throughput forecasts are used by Company witness Michelle Terwilliger to calculate the retail revenue for the 2024 test year.

Q. PLEASE SUMMARIZE THE COMPANY'S CUSTOMER COUNT AND THROUGHPUT FORECAST FOR THE 2024 TEST YEAR.

A. Our forecast indicates that both the overall number of customers and total natural gas throughput is expected to increase during the 2024 test year, as shown in Figure 1 below. Specifically, the Company projects 2024 total throughput to increase by 2.5 percent from projected 2023 levels of 115,916,747 Dkt to 118,778,662 Dkt due primarily to an increase in interdepartmental transport volumes. Customers are expected to increase by 1.0 percent over the same period. Exhibit___(JMG-1), Schedule 3 summarizes monthly Dkt and number of customers for each customer class for the 2024 test year.

Figure 1



Q. GENERALLY SPEAKING, TO WHAT DO YOU ATTRIBUTE THIS INCREASE IN GAS THROUGHPUT FOR 2023 AND 2024?

A. The projected increase in throughput is a result of higher gas Transportation volumes (Figure 2), which account for about 37 percent of the Company's natural gas throughput in 2024. Total Transportation volumes are expected to increase 24.8 percent in 2023 and show a further increase of 5.2 percent in 2024 due primarily to projected increases in gas used for electric generation driven by lower gas prices than 2022. As shown in Figure 3, Retail sales are expected to decline slightly in 2023 and then improve slightly in 2024, with 2024 Retail sales returning to 2022 levels. The decline in 2023 is due primarily to lower sales in the Residential classes. Retail sales in 2024 are expected to increase as Residential gains more than offset declines in other classes. Sales in the Commercial and Demand classes are expected to decrease slightly through 2024, as compared to 2022.

Figure 2

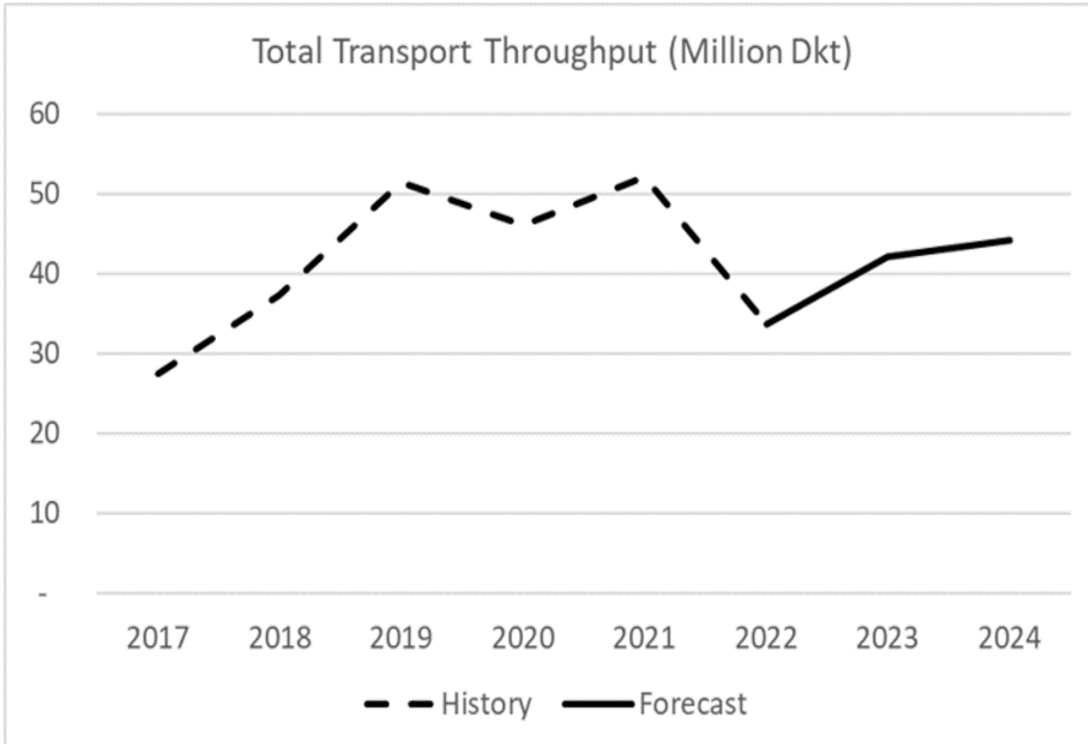
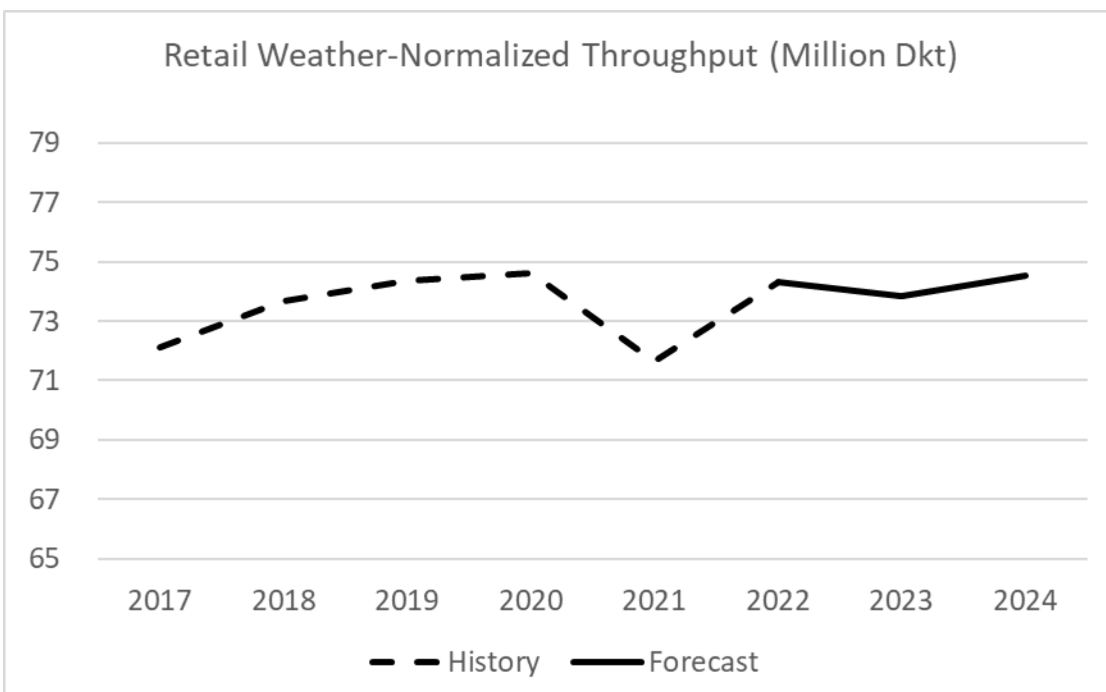


Figure 3



A more detailed discussion of the forecast results is provided in this section of my testimony. The forecast methodology is discussed in Section IV through Section IX of my testimony.

Q. HOW DOES THE 2024 TEST YEAR NATURAL GAS CUSTOMER GROWTH COMPARE WITH HISTORICAL CUSTOMER GROWTH?

A. As shown in Table 1 above, customer growth has averaged 1.1 percent per year from 2017 through 2022. The average annual increase in number of customers over this time was just over 5,050 customers per year. From 2022 to 2024, the number of customers is expected to increase by a total of 9,954 customers, or just under 5,000 customers (1.0 percent) per year.

Q. HOW DOES THE 2024 TEST YEAR NATURAL GAS THROUGHPUT COMPARE WITH 2022 WEATHER NORMALIZED GAS THROUGHPUT?

A. Total natural gas Retail sales and Transportation volumes are expected to increase 9.8 percent during the 2024 test year compared to 2022. The main driver of this increase is a 31.2 percent increase in Transportation volumes. Total firm sales are expected to increase 0.6 percent in the 2024 test year compared to 2022. Within firm sales, Residential sale are expected to increase 1.6 percent while Commercial sales are expected to increase 0.4 percent.

Table 2 provides the Company's weather-normalized Retail sales and Transportation volumes by customer class for 2022 and the test year 2024, and the growth rate for 2024 as compared to 2022.

Table 2

Weather-Normalized Throughput by Class (Dkt)

Customer Class	2022 Actual Throughput	2024 Test Year Throughput	2024 % Change	Average Annual % Change
Residential	39,048,335	39,670,184	1.6%	0.8%
Total Commercial	23,757,531	23,667,033	-0.4%	-0.2%
Total Demand	3,107,075	2,968,555	-4.5%	-2.3%
Total Firm	**65,913,940**	**66,305,772**	**0.6%**	**0.3%**
Total Interruptible	8,507,738	8,218,865	-3.4%	-1.7%
Total Retail	**74,421,678**	**74,524,637**	**0.1%**	**0.1%**
Total Transportation	33,721,246	44,254,025	31.2%	14.6%
Total	**108,142,924**	**118,778,662**	**9.8%**	**4.8%**

Q. WHAT IS DRIVING THE INCREASE IN TRANSPORTATION VOLUMES IN THE 2024 TEST YEAR?

A. The increase in Total Transportation volumes is driven by an increase in Interdepartmental Transportation volumes, which are forecasted to increase by **[PROTECTED DATA BEGINS…**

…PROTECTED DATA ENDS] in 2024 as compared to 2022. The higher volumes are driven primarily by lower gas prices in 2024 as compared to 2022 and the closure of one of the Company's coal generation plants at the end of 2023.

Q. WHAT IS DRIVING THE INCREASE IN RESIDENTIAL SALES IN THE 2024 TEST YEAR AS COMPARED TO 2022?

A. The increase in Residential sales in 2024 is driven by two main factors. First, 2024 is a leap year, which adds about 0.5 percent to annual gas sales. Second, the number of Residential customers is expected to grow by 2.2 percent from

2022 to 2024. Offsetting these two factors is an expected decline in Residential use per customer due to the continued trend of more people returning to the workplace and spending less time at home.

Q. IS THE COMPANY PROPOSING A TEST YEAR SALES TRUE-UP IN THIS PROCEEDING TO USE ACTUAL WEATHER-NORMALIZED SALES DATA FOR SETTING RATES FOR THE 2024 TEST YEAR?

A. Yes. Consistent with the Commmission-approved Settlement Agreement in the Company's last gas rate case (Docket No. G002/GR-21-678), the Company proposes to use actual weather-normalized sales data for setting rates for the 2024 test year. This sales true-up would use the same methodology employed by the Company in its last gas rate case.

VI. WEATHER NORMALIZATION OF SALES FORECAST

Q. HOW DID XCEL ENERGY ADJUST ITS SALES FORECAST FOR THE INFLUENCE OF WEATHER ON SALES?

A. Residential, Small Commercial, Large Commercial, Small Volume Interruptible, and Medium Volume Interruptible sales projections were developed through the application of quantitative statistical models. For each of these classes, sales were not weather-adjusted prior to developing the respective statistical models. The respective regression models used to forecast sales included weather, measured in terms of HDD as an explanatory variable. In this way, the historical weather impact on historical consumption for each class was modeled through the respective coefficients for the HDD variable included in each class' model. Forecasted sales were then projected by simulating the established statistical relationships over the forecast horizon, assuming normal weather.

Forecasts for the Demand, Large Volume Interruptible, Interdepartmental sales, Firm Transportation, Interruptible Transportation, and Negotiated Transportation classes were developed using a trend modeling approach, and, therefore, do not use HDD as an explanatory variable. With the exception of the Demand class, these customers' primary use of gas is not for space heating, and so many other factors contribute to these volumes. As a result, the weather impact due to deviation from normal weather is indistinguishable from other variables. The Demand class sales are correlated with HDD, but not with other explanatory variables that could be used to develop a forecast, and, therefore, a trend modeling approach was determined to be more appropriate.

Q. HOW WAS NORMAL WEATHER DETERMINED?

A. Normal daily weather was calculated based on the average of historical HDD for the 20-year time period 2003 to 2022. Xcel Energy's method for calculating normal weather using a 20-year period of actual data has been accepted by the Commission in several previous rate cases.[2] These normal HDD were related to the forecasted billing month in the same manner as were the actual HDD.

Q. WHAT WAS XCEL ENERGY'S MEASURE OF WEATHER, AND WHAT WAS THE SOURCE?

A. As I explained previously, the measure of weather used was HDD, using a 65-degree temperature base. This information was obtained from NOAA, as measured at its Minneapolis-St. Paul International Airport weather station.

[2] Docket Nos. E002/GR-92-1185, G002/GR-97-1606, G002/GR-04-1511, E002/GR-05-1428, G002/GR-06-1429, E002/GR-08-1065, G002/GR-09-1153, E002/GR-10-971, E002/GR-12-961, E002/GR-13-868, and E002/GR-15-826.

Q. IS IT APPROPRIATE TO USE THE MINNEAPOLIS-ST. PAUL WEATHER STATION TO REPRESENT XCEL ENERGY'S MINNESOTA SERVICE TERRITORY?

A. Yes, it is. 76 percent of Xcel Energy's Minnesota gas customers reside within the 15-county Minneapolis-St. Paul metropolitan area. An additional 13 percent reside less than 100 miles from Minneapolis-St. Paul.

The coefficients for the HDD variables included in each class's model were determined based on the historical relationship between sales throughout Xcel Energy's Minnesota service territory and Minneapolis-St. Paul weather. Therefore, the coefficients accurately reflect the distribution of customers geographically within the Minnesota service territory. Since this geographic distribution is not expected to change during the 2024 test year, it is appropriate to use this historical relationship and Minneapolis-St. Paul weather.

Q. DID THE WEATHER REFLECT THE SAME BILLING-CYCLE DAYS AS THE SALES DATA?

A. Yes. The HDD were weighted by the number of times a particular day was included in a particular billing month. These weighted HDD were divided by the total billing-cycle days to arrive at average daily HDD for a billing month.

Q. HOW DOES THE WEATHER NORMALIZATION METHODOLOGY USED IN THIS CASE COMPARE WITH THE METHODOLOGY USED PREVIOUSLY?

A. The methodology we are using for this case is the same as the final methodology used in previous rate cases and GUIC filings. The weather response coefficients and normal weather values have been updated based on more current actual sales, customer counts, and weather, but no other changes have been made.

VII. DATA PREPARATION

Q. PLEASE DESCRIBE THE DATA AND DATA SOURCES XCEL ENERGY USED TO DEVELOP THE SALES AND CUSTOMER FORECASTS.

A. Historical billing-month sales and number of customers were obtained from Xcel Energy's billing system reports, using monthly historical data from June 2008 through May 2023.

Q. WERE ANY ADJUSTMENTS MADE TO HISTORICAL SALES TO ADDRESS BILLING ERRORS?

A. Yes. In the Company's last two prior natural gas rate case, Docket No. G002/GR-09-1153 and GR-21-678, the Company adjusted historical gas sales to address billing errors resulting from mechanical failures of some meter-reading modules, problems with another type of meter-reading module, and errors in pressure correction factors. These same adjustments were made to the billing data in this case and included adjustments through June 2009. No additional billing errors were identified.

Q. WERE ANY OTHER ADJUSTMENTS MADE TO HISTORICAL SALES?

A. Yes. The Company has removed sales for **[PROTECTED DATA BEGINS… … PROTECTED DATA ENDS]** took service under both the Medium Volume Interruptible and Negotiated Transportation rates during that period of time, but since May 2017 it takes all service under Negotiated Transportation. The Company has removed sales from the Medium Volume Interruptible class in order to not overstate the sales history for that class. The Company has also removed **[PROTECTED DATA BEGINS… … PROTECTED DATA ENDS]** sales from the Medium Volume Interruptible class for the period of January 2012 to January 2017, due to the erroneous billing for that customer in that period. The Company removed **[PROTECTED DATA BEGINS… …PROTECTED DATA ENDS]** sales from the Medium Volume Interruptible class for the period of December 2022 to May 2023. **[PROTECTED DATA BEGINS… …PROTECTED DATA ENDS]** took service under the Large Demand class until December 2022 when it moved under Medium Volume Interruptible. The sales were removed in order to not overstate the forecast for this class. The Company removed **[PROTECTED DATA BEGINS… … PROTECTED DATA ENDS]** sales from the Large Demand class as well for the period starting when the customer-level data was available, January 2017 to November 2022. The sales were removed in order to not overstate the sales history for this class. Another adjustment to historical sales was made in the Large Commercial class for **[PROTECTED DATA BEGINS… …PROTECTED DATA ENDS]**. This customer moved from Firm Transport to Large Commercial in April 2023 and shut down shortly after. The Company has removed sales from the Large Commercial class in April and May 2023 in order to not have this customer reflected in the forecasted sales. Finally, a reclassification of the Company's Commercial customers occurred in September 2015. As a result, the historical sales used as inputs to the Commercial regression models were adjusted for the time period June 2008 through September 2015 by allocating a share of sales and customers to Small and Large Commercial classes based on a continuation backwards of a trend in the split between the two classes. This trend is calculated based on historical shares beginning in September 2015, after the final reclassification. The Company adjusted the Commercial sales in order to predict future sales more accurately for these classes.

VIII. UNBILLED SALES

Q. CAN YOU EXPLAIN THE TERM "UNBILLED SALES"?

A. Yes. Xcel Energy reads gas meters each working day according to a meter-reading schedule based on 21 billing cycles per billing month. Meters read early in the month mostly reflect consumption that occurred during the previous month. Meters read late in the month mostly reflect consumption that occurred during the current month. The "billing-month" sales for the current month reflect consumption that occurred in both the previous month and the current month. Thus, billing-month sales lag calendar-month sales. Unbilled sales reflect volumes of natural gas consumed in the current month that are not billed to the customer until the succeeding month.

Q. WHAT IS THE PURPOSE OF THE UNBILLED SALES ADJUSTMENT?

A. The purpose is to align the projected revenues with the relevant projected expenses, which have been estimated on a calendar-month basis.

Q. IS XCEL ENERGY REFLECTING UNBILLED REVENUE ON ITS BOOKS FOR ACCOUNTING AND FINANCIAL PURPOSES?

A. Yes. Xcel Energy adopted this practice during fiscal year 1992 and it has been accepted by the Commission in all past rate cases.

Q. HOW WERE THE ESTIMATED MONTHLY NET UNBILLED SALES VOLUMES DETERMINED?

A. Xcel Energy determined its projected monthly net unbilled sales as the difference between the estimated monthly calendar-month sales and the projected billing-month sales. The projected billing-month sales were created using the statistical models and other forecasting methods previously described.

IX. CALENDAR-MONTH SALES DERIVATION

Q. HOW WERE THE ESTIMATED MONTHLY CALENDAR-MONTH SALES DETERMINED?

A. For the Residential, Small Commercial, Large Commercial, Small Demand, Large Demand, Small Volume Interruptible, and Medium Volume Interruptible classes, Xcel Energy calculated the test year calendar month sales based on the projected billing month sales. The forecasted calendar month sales were calculated in terms of the sales load component that is not associated with weather (base load), and the sales load component that is influenced by weather (total weather load). The weather was measured in terms of normal HDD, as described above. The base load sales and the total weather sales components were calculated for each class. The two components were then combined to provide the total calendar-month volumes.

The calendar-month base load component was calculated as follows:

Step 1 The billing-month total weather load was calculated. This was accomplished by multiplying the billing-month sales weather-normalization regression coefficients (defined in terms of billing-month HDD and number of customers), times billing-month normal HDD times the projected number of customers.

Step 2 The billing-month base load was calculated by taking the difference between the projected total billing-month sales and the billing-month total weather load (as calculated in Step 1).

Step 3 The billing-month base load sales per billing day was determined by dividing the billing-month base load sales (from Step 2) by the average number of billing days per billing month.

Step 4 The calendar-month base load sales were then calculated by multiplying the billing-month base load sales per billing day (from Step 3) times the number of days in the calendar month.

The calendar-month total weather load component was calculated the same way the billing-month total weather load was calculated (as described in Step 1 above). However, the calculation was performed by substituting the calendar-month sales weather-normalization regression coefficient (defined in terms of calendar-month HDD and number of customers) and the calendar-month normal HDD.

The calendar-month total sales were calculated by combining the calendar-month base load and calendar-month total weather load components.

For the Large Volume Interruptible class, Xcel Energy calculated the test year calendar month sales based on historical calendar month sales. For this class, there are no total weather load sales.

The Interdepartmental sales, Generation sales, and Transportation classes are billed on a calendar month basis. Therefore, for these classes the calendar month volumes equal the billing month volumes.

X. COMPLIANCE REQUIREMENTS

Q. PLEASE DESCRIBE THE SALES FORECAST INFORMATION PROVIDED ON SEPTEMBER 29, 2023.

A. As I discussed previously, on September 29, 2023 the Company filed the data used in the test year sales forecast in compliance with the Commission's order in Docket No. E-002/GR-05-1428. The information provided is extensive, and includes all customer count, throughput, weather, economic and binary data used to develop the test year forecast, as well as the following items:

1) An explanation of the source and work papers supporting the derivation or calculation of each of these data series, as well as a description and justification for each binary variable used.
2) All regression models and results, and a description of methods used and the results for the forecasts that are not based on a regression methodology.
4) An explanation of any exogenous adjustment made to the forecast.
5) An explanation of the unbilled sales estimation process for the test year and historical time period and all data necessary to recreate the conversion, including a description of the weather response coefficients and all data necessary to recreate the coefficients, and an explanation of the calculation of calendar month weather response coefficients.
6) All data necessary to weather normalize historical calendar month sales.

7) A reconciliation between different sources for historical billing-month sales.

XI. CONCLUSION

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. The Company's goal is to produce an accurate throughput forecast to support its rate request. The Company's forecast is based on sound methodologies and provides a reasonable estimate of 2024 Dkt throughput and customer counts. Therefore, the Company's forecast can be relied on for the purpose of determining the revenue requirement and final rates in this proceeding. In addition, I also recommend that the Commission approve the continued use of the Company's sales true-up mechanism as described in my testimony.

I have presented the Company's forecasts of throughput and customers for the January 1, 2024 to December 31, 2024 time period. I also presented details of the methods used to develop the Dkt throughput and customer forecast and the results. I have described the steps the Company has taken to comply with all requirements resulting from the previous rate case, as well as agreements the Company has made in the past to provide particular forecasting data in advance of the filing of a base rate case.

Q. IN YOUR OPINION, DOES THE COMPANY'S THROUGHPUT AND CUSTOMER FORECAST PROVIDE A REASONABLE BASIS FOR ESTABLISHING RATES IN THE CASE?

A. Yes. The forecast data is a reasonable estimate of 2024 throughput and customer counts and supports the Company's revenue projections. I recommend the Commission adopt my forecasts of throughput and customers, as reflected in Exhibit___(JMG-1), Schedule 3, for the purpose of determining the revenue requirement and final rates in this proceeding.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

JOHN GOODENOUGH, PHD

EDUCATION

PhD in Economics, University of Delaware **2012**
Dissertation: *Economic Welfare Impacts of Real-Time Pricing and CO2 Emissions Trading: Simulation Results at the Customer Class Level for an Investor-Owned Utility*

MA in Economics, University of Delaware **2006**

BA in Economics, University of Maryland **2002**

PROFESSIONAL EXPERIENCE

XCEL ENERGY **Denver, CO**
Manager, Energy Forecasting **10/2019-05/2022**
Director of Sales, Energy, and Demand Forecasting **05/2022-Present**

Management and Leadership:

- Manage the work and development of six employees
- Serve as company witness for sales forecasting and weather normalization in rate cases and resource plans
- Provide regulatory support for routine filings, Integrated Resource Plans, and rate cases
- Provide analytical and statistical analysis for special projects

Load Forecasting:

- Develop monthly short and long-term forecasts of electric customers, sales, and peak demand using time-series analysis and end-use modeling for four OpCos operating in eight states
- Sponsor projects to improve forecast accuracy and develop new forecasting tools
- Track regional economic indicators in support of forecasting models

ARIZONA PUBLIC SERVICE (APS) **Phoenix, AZ**
Manager, Energy and Revenue Analysis and Forecasting **11/2016-10/2019**

Management and Leadership:

- Manage the work and development of six employees
- Serve as expert on matters related to load forecasting and act as liaison to external stakeholders
- Provide regulatory support for monthly fuel cost filings, annual transmission filings, bi-annual Integrated Resource Plans, and rate cases
- Provide economic commentary for quarterly earnings release
- Provide analytical and statistical analysis for special projects

Load Forecasting:

- Develop monthly short and long-term forecasts of electric customers, sales, prices, and revenue using time-series analysis and end-use modeling
- Provide hourly system demand forecasts for use in medium and long-term dispatch modeling
- Develop company forecasts of customer adoption of electric vehicles and distributed generation
- Develop price elasticity models to assess customer response to changing rate design
- Track and forecast regional economic indicators in support of forecasting models

Financial Analysis:

- Analyze monthly financial impacts of fuel prices, plant dispatch, and plant outages
- Conduct monthly variance analysis and financial reporting
- Evaluate billing determinants and rate design impacts on company revenue

SOUTHERN CALIFORNIA EDISON (SCE) **Rosemead, CA**
Senior Energy Market Specialist, Short-Term Demand Forecasting **07/2014-10/2016**

Load Forecasting:
- Developed hourly short-term load forecasts using time-series analysis
- Created hourly prompt month load forecasts for the territory and the ISO
- Monitored short-term load forecasting errors and analyzed the impacts on procurement costs
- Developed semi-parametric econometric model for forecasting bundled load
- Created daily market bids for integrated demand response resources

EXELON CORPORATION, BALTIMORE GAS AND ELECTRIC (BGE) **Baltimore, MD**
Principal Analyst, Load Analysis and Settlements **06/2010-06/2014**

Management and Leadership:
- Supervised the work of employees in the forecasting unit
- Participated in quarterly calls with senior management explaining regional trends in energy usage and economics
- Represented BGE Load Forecasting in the PJM Load Forecasting Group
- Supported conservation and electric supply groups in policy development and goal setting
- Conducted ad-hoc analysis for senior management

Load Forecasting and Financial Analysis:
- Provided monthly short and long-term forecasts of gas and electric sales, customers, prices, and revenue using time-series analysis
- Developed annual gas design-day forecast
- Conducted monthly variance analyses and financial reporting

PEPCO HOLDINGS, INC. **Washington, DC**
Regulatory Affairs Analyst **12/2007-06/2010**

DEPARTMENT OF ENERGY, ENERGY INFORMATION ADMINISTRATION **Washington, D.C.**
Program Assistant **Summer, 2007**

DEPARTMENT OF LABOR, BUREAU OF LABOR STATISTICS **Washington, D.C.**
Economist **02/2003-08/2004**

DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS **Suitland, MD**
Survey Statistician **06/2002-01/2003**

Definition of Terms

Base Load - Component of sales not associated with weather.

Billing Days - Based on the meter reading schedule for the 21 billing cycles. For example, there are approximately 651 (21 cycles * 31 days) billing days during a typical billing month period.

Billing-Month Sales - Billed sales based on the meter reading schedule for the 21 billing cycles.

Calendar-Month Sales - Estimated sales, equal to the billing month sales, adjusted for the estimated unbilled sales of the current calendar month, less the estimated unbilled sales from the previous calendar month.

Commission – Minnesota Public Utilities Commission.

Company – Northern States Power Company, doing business as Xcel Energy.

Department – Minnesota Department of Commerce

Dkt – dekatherm; measure of gas sales.

DSM – Demand-Side Management.

DW Test Statistic - Durbin-Watson test statistic; tests for the presence of first-order autocorrelation. In the absence of first-order autocorrelation, the statistic equals 2.0.

Error Terms - The difference between the actual values of the data series being modeled (customers or sales) and the regression model's predicted, or "fitted" values for that series. Also called Residual Terms.

GUIC – Gas Utility Infrastructure Costs.

HDD - Heating Degree Days - Measure of weather. Calculated by subtracting the average daily temperature from a base of 65 degrees Fahrenheit.

NCE – New Centuries Energy Inc.

Definition of Terms (continued)

NOAA – National Oceanic and Atmospheric Administration.

Normal Weather – the average of twenty years of historical weather.

NSP – Northern States Power Company.

R-squared - Coefficient of determination; measures the quality of the model's fit to the historical data. The higher the R-squared statistic, the better the model is explaining the historical data.

Regression Model - Statistical technique employing multiple independent variables to model the variation of the dependent variable about its mean value.

Residual Terms - The difference between the actual values of the data series being modeled (customers or sales) and the regression models predicted, or "fitted" values for that series. Also called Error Terms.

t-Statistic - Measures the importance of the independent variable to the regression. The higher the absolute value of the t-statistic, the more likely it is that the variable has a relationship to the dependent variable and is making an important contribution to the equation.

Test Year – January 1, 2024-December 31, 2024.

Total Weather Load - Component of sales influenced by weather.

Unbilled Sales – Gas consumed in the current month but not billed to customers until the succeeding month.

Weather Normalized – Dkt sales adjusted to remove the impact of abnormal weather.

Xcel Energy – Northern States Power Company, a Minnesota corporation.

XEI – Xcel Energy Inc.

XES – Xcel Energy Services Inc.

1 Xcel Energy - Minnesota State
2 Test Year Sales and Customers by Customer Class

4 Weather Normalized Calendar Month Sales (Dkt)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
6		Jan 2024	Feb 2024	Mar 2024	Apr 2024	May 2024	Jun 2024	Jul 2024	Aug 2024	Sep 2024	Oct 2024	Nov 2024	Dec 2024	Year 2024
8	Residential	7,575,975	6,455,884	5,152,748	2,765,338	1,523,774	870,313	660,584	695,363	887,218	2,291,840	4,238,078	6,553,070	39,670,184
9	Total Commercial(1)	4,227,862	3,805,189	3,031,048	1,592,331	938,807	684,683	428,756	480,533	609,339	1,486,596	2,559,960	3,821,929	23,667,033
10	Total Demand	374,638	358,262	336,625	222,851	192,287	146,457	143,386	157,397	169,733	228,444	289,958	348,515	2,968,555
12	**Total Firm Sales**	**12,178,474**	**10,619,334**	**8,520,422**	**4,580,521**	**2,654,868**	**1,701,453**	**1,232,726**	**1,333,293**	**1,666,290**	**4,006,881**	**7,087,996**	**10,723,514**	**66,305,772**
14	Total Interruptible(2)	1,166,976	982,781	966,069	736,978	528,085	330,029	401,794	411,779	408,166	575,420	715,968	994,821	8,218,865
16	**Total Retail Sales**	**13,345,450**	**11,602,115**	**9,486,491**	**5,317,498**	**3,182,953**	**2,031,481**	**1,634,520**	**1,745,072**	**2,074,456**	**4,582,301**	**7,803,965**	**11,718,335**	**74,524,637**
18	Total Transportation	2,787,178	2,586,074	3,060,894	3,283,726	3,794,165	4,892,725	5,799,646	5,955,847	4,098,692	2,973,018	2,539,397	2,482,662	44,254,025
20	**Total Sales**	**16,132,628**	**14,188,189**	**12,547,385**	**8,601,224**	**6,977,118**	**6,924,207**	**7,434,166**	**7,700,919**	**6,173,148**	**7,555,319**	**10,343,362**	**14,200,997**	**118,778,662**

22 Number of Customers

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
24		Jan 2024	Feb 2024	Mar 2024	Apr 2024	May 2024	Jun 2024	Jul 2024	Aug 2024	Sep 2024	Oct 2024	Nov 2024	Dec 2024	Year 2024
26	Residential	452,487	452,920	453,346	453,551	453,738	453,534	453,438	453,753	454,071	454,951	455,680	456,299	453,981
27	Total Commercial(1)	36,199	36,233	36,263	36,263	36,252	36,125	36,312	36,310	36,313	36,329	36,332	36,401	36,278
28	Total Demand	146	146	146	146	147	147	147	147	147	147	147	147	147
30	**Total Firm Customers**	**488,832**	**489,300**	**489,755**	**489,960**	**490,137**	**489,805**	**489,897**	**490,210**	**490,531**	**491,428**	**492,159**	**492,848**	**490,405**
32	Total Interruptible(2)	246	244	243	241	240	239	237	236	234	233	232	230	238
34	**Total Retail Customers**	**489,078**	**489,544**	**489,998**	**490,202**	**490,377**	**490,044**	**490,134**	**490,446**	**490,765**	**491,661**	**492,391**	**493,078**	**490,643**
36	Total Transportation	30	30	30	30	30	30	30	30	30	30	30	30	30
38	**Total Customers**	**489,108**	**489,574**	**490,028**	**490,232**	**490,407**	**490,074**	**490,164**	**490,476**	**490,795**	**491,691**	**492,421**	**493,108**	**490,673**

(1) Includes Interdepartmental Sales
(2) Includes Generation Sales

Xcel Energy Minnesota Residential
2024 Test-Year Sales Forecast

Variable	Coefficient	StdErr	T-Stat	P-Value	Definition
ResCust_HDD65_Jan	0.011	0.000	88.097	0.00%	
ResCust_HDD65_Feb	0.011	0.000	75.376	0.00%	
ResCust_HDD65_Mar	0.011	0.000	74.157	0.00%	
ResCust_HDD65_Apr	0.010	0.000	42.744	0.00%	
ResCust_HDD65_May	0.010	0.000	22.235	0.00%	
ResCust_HDD65_Jun	0.015	0.002	8.476	0.00%	
ResCust_Jul	0.775	0.183	4.231	0.00%	
ResCust_Aug	0.645	0.183	3.522	0.06%	
ResCust_Sep	0.722	0.183	3.942	0.01%	
ResCust_HDD65_Oct	0.009	0.001	13.958	0.00%	
ResCust_HDD65_Nov	0.009	0.000	30.330	0.00%	
ResCust_HDD65_Dec	0.010	0.000	59.435	0.00%	
ResCust_Fcst	0.932	0.162	5.758	0.00%	
ResPrice_Q1Q4	-229495.448	94641.082	-2.425	1.64%	

Xcel Energy Minnesota Residential
2024 Test-Year Sales Forecast

Model Statistics	
Iterations	1
Adjusted Observations	180
Deg. of Freedom for Error	166
R-Squared	0.997
Adjusted R-Squared	0.997
AIC	23.738
BIC	23.986
F-Statistic	#NA
Prob (F-Statistic)	#NA
Log-Likelihood	-2,377.83
Model Sum of Squares	1,005,383,081,611,180.00
Sum of Squared Errors	3,140,443,161,274.94
Mean Squared Error	18,918,332,296.84
Std. Error of Regression	137,543.93
Mean Abs. Dev. (MAD)	94,861.14
Mean Abs. % Err. (MAPE)	4.42%
Durbin-Watson Statistic	2.041
Durbin-H Statistic	#NA
Ljung-Box Statistic	22.06
Prob (Ljung-Box)	0.5757
Skewness	-0.322
Kurtosis	5.023
Jarque-Bera	33.818
Prob (Jarque-Bera)	0.0000

Xcel Energy Minnesota Small Commercial
2024 Test-Year Sales Forecast

Variable	Coefficient	StdErr	T-Stat	P-Value
SmCommCust_HDD65_Jan_Reclass	0.027	0.001	35.303	0.00%
SmCommCust_HDD65_Feb_Reclass	0.027	0.001	31.858	0.00%
SmCommCust_HDD65_Mar_Reclass	0.027	0.001	32.932	0.00%
SmCommCust_HDD65_Apr_Reclass	0.023	0.001	19.716	0.00%
SmCommCust_HDD65_May_Reclass	0.022	0.002	9.735	0.00%
SmCommCust_HDD65_Jun_Reclass	0.019	0.007	2.623	0.96%
SmCommCust_HDD65_Oct_Reclass	0.011	0.002	4.483	0.00%
SmCommCust_HDD65_Nov_Reclass	0.017	0.002	11.032	0.00%
SmCommCust_HDD65_Dec_Reclass	0.022	0.001	23.624	0.00%
MA_HH_MN	37.626	7.795	4.827	0.00%
AR(1)	0.541	0.072	7.555	0.00%
SAR(1)	0.575	0.075	7.649	0.00%

Xcel Energy Minnesota Small Commercial
2024 Test-Year Sales Forecast

Model Statistics	
Iterations	20
Adjusted Observations	167
Deg. of Freedom for Error	155
R-Squared	0.991
Adjusted R-Squared	0.990
AIC	21.072
BIC	21.297
F-Statistic	#NA
Prob (F-Statistic)	#NA
Log-Likelihood	-1,984.51
Model Sum of Squares	21,572,959,111,219.90
Sum of Squared Errors	205,099,625,804.07
Mean Squared Error	1,323,223,392.28
Std. Error of Regression	36,376.14
Mean Abs. Dev. (MAD)	23,574.73
Mean Abs. % Err. (MAPE)	7.46%
Durbin-Watson Statistic	2.137
Durbin-H Statistic	#NA
Ljung-Box Statistic	33.63
Prob (Ljung-Box)	0.0914
Skewness	0.092
Kurtosis	6.490
Jarque-Bera	84.986
Prob (Jarque-Bera)	0.0000

Xcel Energy Minnesota Large Commercial
2024 Test-Year Sales Forecast

Variable	Coefficient	StdErr	T-Stat	P-Value
LgCommCust_HDD65_Jan_Reclass	0.169	0.001	130.566	0.00%
LgCommCust_HDD65_Feb_Reclass	0.169	0.001	113.242	0.00%
LgCommCust_HDD65_Mar_Reclass	0.179	0.002	114.407	0.00%
LgCommCust_HDD65_Apr_Reclass	0.170	0.003	65.356	0.00%
LgCommCust_HDD65_May_Reclass	0.171	0.005	33.882	0.00%
LgCom_Jun_Reclass	16.559	2.007	8.251	0.00%
LgCommCust_HDD65_Oct_Reclass	0.090	0.007	12.803	0.00%
LgCommCust_HDD65_Nov_Reclass	0.131	0.003	40.291	0.00%
LgCommCust_HDD65_Dec_Reclass	0.150	0.002	87.045	0.00%
CGMP_MSP	1.471	0.041	36.271	0.00%

Xcel Energy Minnesota Large Commercial
2024 Test-Year Sales Forecast

Model Statistics	
Iterations	1
Adjusted Observations	180
Deg. of Freedom for Error	170
R-Squared	0.995
Adjusted R-Squared	0.995
AIC	22.202
BIC	22.379
F-Statistic	#NA
Prob (F-Statistic)	#NA
Log-Likelihood	-2,243.55
Model Sum of Squares	154,384,507,570,193.00
Sum of Squared Errors	706,385,913,217.13
Mean Squared Error	4,155,211,254.22
Std. Error of Regression	64,460.93
Mean Abs. Dev. (MAD)	43,035.60
Mean Abs. % Err. (MAPE)	4.36%
Durbin-Watson Statistic	1.891
Durbin-H Statistic	#NA
Ljung-Box Statistic	23.74
Prob (Ljung-Box)	0.4766
Skewness	-1.027
Kurtosis	6.845
Jarque-Bera	142.510
Prob (Jarque-Bera)	0.0000

Xcel Energy Minnesota Medium Interruptible
2024 Test-Year Sales Forecast

Variable	Coefficient	StdErr	T-Stat	P-Value
MVICust_HDD65_Jan	2.507	0.119	21.010	0.00%
MVICust_HDD65_Feb	2.661	0.143	18.548	0.00%
MVICust_HDD65_Mar	2.757	0.147	18.700	0.00%
MVICust_HDD65_Apr	3.270	0.237	13.809	0.00%
MVICust_HDD65_May	3.282	0.404	8.133	0.00%
MVICust_HDD65_Oct	1.678	0.531	3.163	0.19%
MVICust_HDD65_Nov	3.195	0.289	11.071	0.00%
MVICust_HDD65_Dec	2.565	0.158	16.284	0.00%
MVICust_Fcst	3417.285	106.319	32.142	0.00%
SALES_MN_LessStPaul_LessMCF_MVI_2023v2_Custom	188873.796	50184.176	3.764	0.02%
AR(1)	0.455	0.069	6.593	0.00%

Xcel Energy Minnesota Medium Interruptible
2024 Test-Year Sales Forecast

Model Statistics	
Iterations	9
Adjusted Observations	179
Deg. of Freedom for Error	168
R-Squared	0.909
Adjusted R-Squared	0.903
AIC	21.812
BIC	22.008
F-Statistic	#NA
Prob (F-Statistic)	#NA
Log-Likelihood	-2,195.20
Model Sum of Squares	4,682,490,600,862.67
Sum of Squared Errors	470,398,336,539.60
Mean Squared Error	2,799,990,098.45
Std. Error of Regression	52,914.93
Mean Abs. Dev. (MAD)	40,252.67
Mean Abs. % Err. (MAPE)	8.81%
Durbin-Watson Statistic	2.189
Durbin-H Statistic	#NA
Ljung-Box Statistic	63.68
Prob (Ljung-Box)	0.0000
Skewness	0.256
Kurtosis	3.142
Jarque-Bera	2.102
Prob (Jarque-Bera)	0.3496

Xcel Energy Minnesota Small Interruptible
2024 Test-Year Sales Forecast

Variable	Coefficient	StdErr	T-Stat	P-Value
SVICust_HDD65_Jan	0.697	0.015	46.025	0.00%
SVICust_HDD65_Feb	0.690	0.017	40.011	0.00%
SVICust_HDD65_Mar	0.851	0.019	45.823	0.00%
SVICust_HDD65_Apr	0.815	0.031	26.465	0.00%
SVICust_HDD65_May	0.967	0.059	16.465	0.00%
SVICust_HDD65_Jun	0.990	0.214	4.632	0.00%
SVICust_HDD65_Oct	0.347	0.071	4.876	0.00%
SVICust_HDD65_Nov	0.624	0.037	16.657	0.00%
SVICust_HDD65_Dec	0.702	0.020	35.846	0.00%
SVICust_Fcst	217.477	12.359	17.596	0.00%
SALES_MN_SVI_2023v2_Customers.Outlier_2011_	71922.982	23444.595	3.068	0.25%
AR(1)	0.273	0.075	3.621	0.04%

Xcel Energy Minnesota Small Interruptible
2024 Test-Year Sales Forecast

Model Statistics	
Iterations	7
Adjusted Observations	179
Deg. of Freedom for Error	167
R-Squared	0.975
Adjusted R-Squared	0.973
AIC	20.117
BIC	20.330
F-Statistic	#NA
Prob (F-Statistic)	#NA
Log-Likelihood	-2,042.44
Model Sum of Squares	3,307,719,087,567.22
Sum of Squared Errors	85,357,541,638.48
Mean Squared Error	511,123,003.82
Std. Error of Regression	22,608.03
Mean Abs. Dev. (MAD)	15,368.03
Mean Abs. % Err. (MAPE)	8.35%
Durbin-Watson Statistic	2.095
Durbin-H Statistic	#NA
Ljung-Box Statistic	40.99
Prob (Ljung-Box)	0.017
Skewness	-0.482
Kurtosis	5.578
Jarque-Bera	56.480
Prob (Jarque-Bera)	0.000

Xcel Energy Minnesota Residential
2024 Test-Year Customer Forecast

Variable	Coefficient	StdErr	T-Stat	P-Value
MA_HH_MN	29.514	13.872	2.128	3.50%
Jan	256.768	59.284	4.331	0.00%
Feb	354.468	72.647	4.879	0.00%
Mar	415.849	72.717	5.719	0.00%
Apr	235.477	59.527	3.956	0.01%
Jun	-582.464	63.421	-9.184	0.00%
Jul	-1056.449	80.525	-13.119	0.00%
Aug	-1140.249	87.592	-13.018	0.00%
Sep	-1196.697	87.217	-13.721	0.00%
Oct	-640.532	79.374	-8.070	0.00%
Nov	-263.490	61.398	-4.291	0.00%
AR(1)	1.001	0.000	17844.381	0.00%
SAR(1)	0.354	0.068	5.185	0.00%

Xcel Energy Minnesota Residential
2024 Test-Year Customer Forecast

Model Statistics	
Iterations	27
Adjusted Observations	167
Deg. of Freedom for Error	154
R-Squared	1.000
Adjusted R-Squared	1.000
AIC	10.310
BIC	10.553
F-Statistic	#NA
Prob (F-Statistic)	#NA
Log-Likelihood	-1,084.84
Model Sum of Squares	38,414,785,681.15
Sum of Squared Errors	4,291,851.48
Mean Squared Error	27,869.17
Std. Error of Regression	166.94
Mean Abs. Dev. (MAD)	128.92
Mean Abs. % Err. (MAPE)	0.03%
Durbin-Watson Statistic	1.571
Durbin-H Statistic	#NA
Ljung-Box Statistic	70.990
Prob (Ljung-Box)	0.000
Skewness	0.136
Kurtosis	3.025
Jarque-Bera	0.520
Prob (Jarque-Bera)	0.771

Xcel Energy Minnesota Small Commercial
2024 Test-Year Customer Forecast

Variable	Coefficient	StdErr	T-Stat	P-Value
NR_MN	4.158	0.469	8.858	0.00%
BinaryTrans.Jan	110.815	20.913	5.299	0.00%
BinaryTrans.Feb	147.787	23.837	6.200	0.00%
BinaryTrans.Mar	175.767	24.443	7.191	0.00%
BinaryTrans.Apr	174.624	23.138	7.547	0.00%
BinaryTrans.May	157.994	19.801	7.979	0.00%
BinaryTrans.Jun	138.523	13.323	10.397	0.00%
BinaryTrans.Dec	56.074	14.365	3.903	0.01%
AR(1)	1.253	0.083	15.183	0.00%
AR(2)	-0.258	0.083	-3.114	0.22%

Xcel Energy Minnesota Small Commercial
2024 Test-Year Customer Forecast

Model Statistics	
Iterations	19
Adjusted Observations	178
Deg. of Freedom for Error	168
R-Squared	0.896
Adjusted R-Squared	0.891
AIC	8.022
BIC	8.201
F-Statistic	#NA
Prob (F-Statistic)	#NA
Log-Likelihood	-956.52
Model Sum of Squares	4,195,507.84
Sum of Squared Errors	484,741.56
Mean Squared Error	2,885.37
Std. Error of Regression	53.72
Mean Abs. Dev. (MAD)	36.16
Mean Abs. % Err. (MAPE)	0.15%
Durbin-Watson Statistic	1.940
Durbin-H Statistic	#NA
Ljung-Box Statistic	167.69
Prob (Ljung-Box)	0.0000
Skewness	-0.882
Kurtosis	7.943
Jarque-Bera	204.295
Prob (Jarque-Bera)	0.000