NOTICE OF CONFIDENTIALITY
AN ATTACHMENT TO THIS TESTIMONY HAS BEEN FILED UNDER SEAL

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

*** * * * ***

RE: IN THE MATTER OF ADVICE NO. 1797-ELECTRIC OF PUBLIC SERVICE COMPANY OF COLORADO TO REVISE ITS COLORADO P.U.C. NO. 8-ELECTRIC TARIFF TO IMPLEMENT RATE CHANGES EFFECTIVE ON THIRTY-DAYS' NOTICE.	**) PROCEEDING NO. 19AL-____E**

DIRECT TESTIMONY AND ATTACHMENTS OF JANNELL E. MARKS

ON

BEHALF OF

PUBLIC SERVICE COMPANY OF COLORADO

NOTICE OF CONFIDENTIALITY
AN ATTACHMENT TO THIS TESTIMONY HAS BEEN FILED UNDER SEAL

Highly Confidential: Attachment JEM-2

May 20, 2019

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO**

*** * * * ***

RE: IN THE MATTER OF ADVICE NO.	**)**	
1797-ELECTRIC OF PUBLIC SERVICE	**)**	
COMPANY OF COLORADO TO REVISE	**)**	
ITS COLORADO P.U.C. NO. 8-	**)**	**PROCEEDING NO. 19AL-____E**
ELECTRIC TARIFF TO IMPLEMENT	**)**	
RATE CHANGES EFFECTIVE ON	**)**	
THIRTY-DAYS' NOTICE.	**)**	

DIRECT TESTIMONY AND ATTACHMENTS OF JANNELL E. MARKS

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LIST OF ATTACHMENTS

Attachment JEM-1	Weather Normalization of the 2018 HTY Sales
HIGHLY CONFIDENTIAL Attachment JEM-2	Highly Confidential Version of Monthly 2018 HTY Electric MWh Sales and Number of Electric Customers for Each Rate Schedule – Filed Under Seal
PUBLIC Attachment JEM-2	Public Version of Highly Confidential Version of Monthly HTY Electric MWh Sales and Number of Electric Customers for Each Rate Schedule

GLOSSARY OF ACRONYMS AND DEFINED TERMS

Acronym/Defined Term	Meaning
2014 Electric Rate Case	Proceeding No. 14AL-0660E
Commission	Colorado Public Utilities Commission
DIA	Denver International Airport
DSM	Demand-Side Management
DW	Durbin-Watson
HTY	Historical Test Year
KW	Kilowatt
kWh	Kilowatt-hour
MSA	Metropolitan Statistical Area
MWh	Megawatt-hour
NOAA	National Oceanic and Atmospheric Administration
Public Service or the Company	Public Service Company of Colorado
RTD	Denver's Regional Transportation District
R-Squared	Coefficient of Determination Test Statistic
SEC	Securities Exchange Commission
Xcel Energy	Xcel Energy Inc.
XES	Xcel Energy Services Inc.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

*** * * * ***

RE: IN THE MATTER OF ADVICE NO. 1797-ELECTRIC OF PUBLIC SERVICE COMPANY OF COLORADO TO REVISE ITS COLORADO P.U.C. NO. 8-ELECTRIC TARIFF TO IMPLEMENT RATE CHANGES EFFECTIVE ON THIRTY-DAYS' NOTICE.	**)** **)** **)** **)** **)** **)** **)**	**PROCEEDING NO. 19AL-____E**

DIRECT TESTIMONY AND ATTACHMENTS OF JANNELL E. MARKS

I. INTRODUCTION, QUALIFICATIONS AND PURPOSE OF TESTIMONY, AND RECOMMENDATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Jannell E. Marks. My business address is 1800 Larimer Street, Denver, Colorado 80202.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am employed by Xcel Energy Services Inc. ("XES") as Director, Sales, Energy and Demand Forecasting. XES is a wholly-owned subsidiary of Xcel Energy Inc. ("Xcel Energy"), and provides an array of support services to Public Service Company of Colorado ("Public Service" or the "Company") and the other utility operating company subsidiaries of Xcel Energy on a coordinated basis.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THE PROCEEDING?

A. I am testifying on behalf of Public Service.

Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AND QUALIFICATIONS.

A. I am responsible for the development of forecasted sales data and economic indicators for Public Service and the other Xcel Energy utility operating companies; and the presentation of this information to Xcel Energy's senior management, other Xcel Energy departments, and externally to various regulatory and reporting agencies. I also am responsible for Xcel Energy's Load Research function, which designs, maintains, monitors, and analyzes electric load research samples in the Xcel Energy operating companies' service territories. Additionally, I am responsible for developing and implementing forecasting, planning, and load analysis studies for regulatory proceedings. A description of my qualifications, duties, and responsibilities is included at the end of my Direct Testimony in my Statement of Qualifications.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of my Direct Testimony is to support weather normalization of the Company's 2018 Historical Test Year ("HTY") sales and billing demand. Specifically, I discuss historical customer and sales growth trends and the factors driving that growth. I also provide detail regarding the Company's weather normalization methodology and its application to the 2018 HTY sales, billing demand, and revenues in this proceeding.

Q. ARE YOU SPONSORING ANY ATTACHMENTS AS PART OF YOUR DIRECT TESTIMONY?

A. Yes, I am sponsoring the following attachments: Attachment JEM-1, the weather normalization of the 2018 HTY electric sales, and Highly Confidential Attachment JEM-2 and Public Attachment JEM-2, the highly confidential and public versions respectively, of the monthly 2018 HTY electric megawatt-hour ("MWh") sales and number of electric customers for each rate schedule. These attachments were prepared by me or under my direct supervision.

Q. WHAT RECOMMENDATION ARE YOU MAKING IN YOUR DIRECT TESTIMONY?

A. I recommend that the Commission approve the Company's weather normalization of 2018 HTY sales and billing demand as I describe in my Direct Testimony.

II. HISTORICAL CUSTOMER AND MWH SALES TRENDS

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

A. The purpose of this section of my Direct Testimony is to provide relevant background regarding historical customer and sales trends since the Company's last electric rate case, Proceeding No. 14AL-0660E ("2014 Electric Rate Case"), in which a 2013 HTY was approved.

Q. PLEASE DESCRIBE THE CUSTOMER CLASSES INCLUDED IN THE COMPANY'S ELECTRIC RETAIL SERVICE.

A. The Residential, Commercial and Industrial, Street Lighting, Public Authority, and Interdepartmental classes comprise the Company's total electric retail customers and sales.

Q. PLEASE DISCUSS THE COMPANY'S HISTORICAL ELECTRIC CUSTOMER TRENDS.

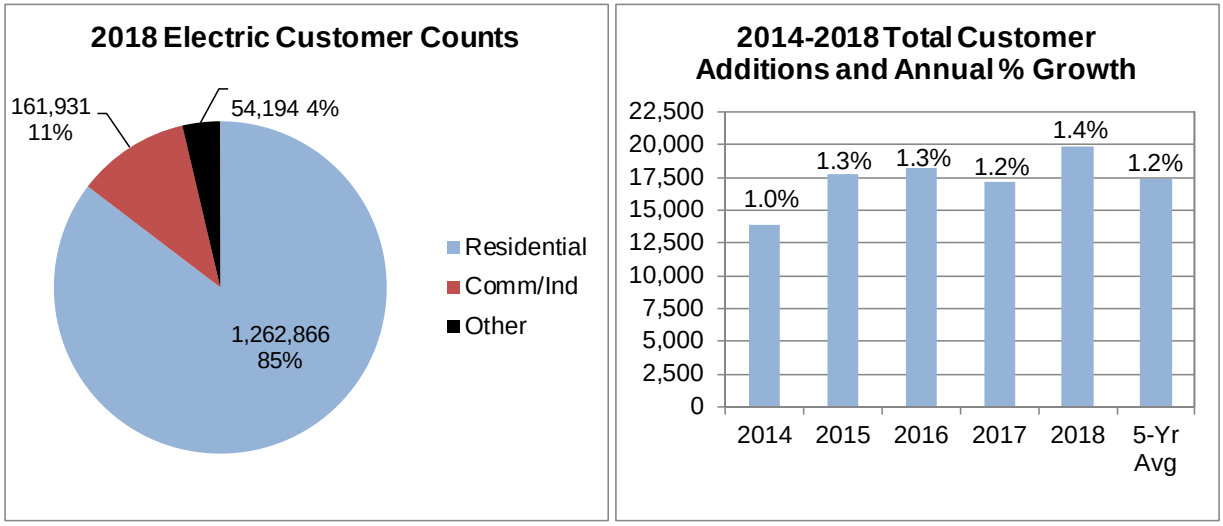
A. Total electric customer counts in the Company's service territory averaged 1,478,991 customers per month in 2018. Total customer counts increased an average of 17,349 customers per year for the 2014 through 2018 time period, for an average annual growth rate of 1.2 percent. The largest class of customers is the Residential class, which averaged 1,262,866 customers per month during 2018 and represents 85.4 percent of total customers. Residential customer counts averaged a growth rate of 1.3 percent, or 16,154 additions, per year during the time period of 2014 through 2018, accounting for 93 percent of the

total customer growth during this time period. Commercial and Industrial customer counts averaged 161,931 customers per month during 2018, representing 10.9 percent of total customers. Commercial and Industrial customers averaged growth of 0.7 percent, or 1,180 additions, per year during the time period of 2014 through 2018. The remaining 3.7 percent of total customers is in the "Other" category, which is comprised of Street Lighting, Public Authority, and Interdepartmental classes. Street Lighting customers averaged 54,107 per month in 2018 and have been flat with an average rate of 0.0 percent or 13 customers per year from 2014 to 2018. The number of Public Authority and Interdepartmental customers is very small, accounting for less than 0.01 percent of the total number of customers.

Figure JEM-D-1 provides a summary of the historical customer statistics from 2014–2018.

Figure JEM-D-1:

Historical Customer Statistics

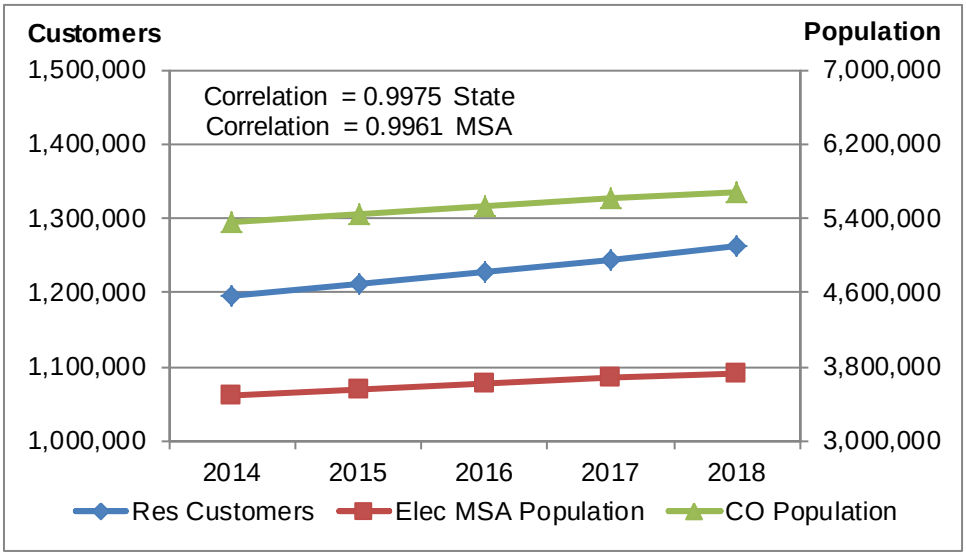


Q. WHAT FACTORS HAVE BEEN DRIVING RESIDENTIAL CUSTOMER GROWTH SINCE 2014?

A. Residential customers are highly correlated with population. The strong rate of growth in the number of customers during the past five years is the result of a strong rate of growth in population, both at the state level and an aggregated Metropolitan Statistical Area ("MSA") level. Figure JEM-D-2 compares Residential customers with Colorado and MSA population during the 2014 to 2018 time period and shows that customers are highly correlated with both measures of population, with a correlation coefficient of 0.9975 with state population and 0.9961 with MSA population.

Figure JEM-D-2:

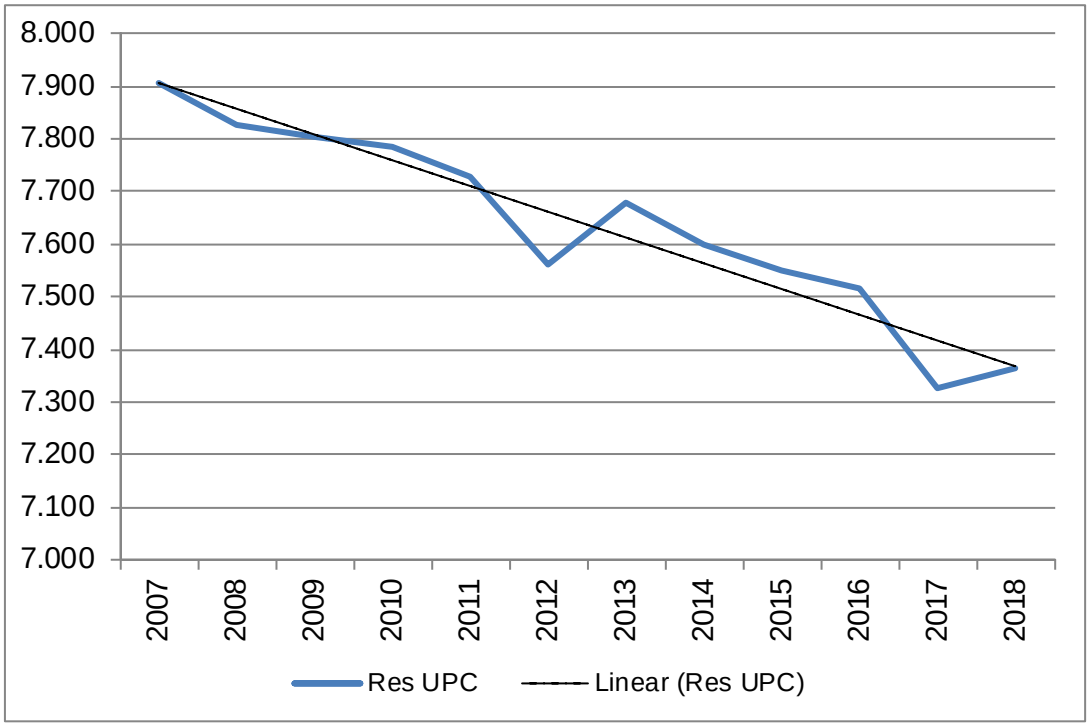
Residential Customers and Population



Growth in Residential sales during the past five years is due to an increasing number of customers, offset by declining use per customer. Residential use per customer has exhibited a declining trend for many years, with 2018 use per customer 6.9 percent lower than its peak level in 2007. During the past five years, Residential use per customer has averaged declines of 0.8 percent per year, driven by end-use efficiency improvements, Company-sponsored Demand-Side Management ("DSM") programs, and increasing amounts of distributed generation solar. Figure JEM-D-3 presents historical weather normalized Residential use per customer and the historical declining trend.

Figure JEM-D-3

Residential Use Per Customer
(Weather Normalized MWh)



Q. PLEASE DISCUSS THE COMPANY'S ELECTRIC MWH SALES TRENDS FROM 2014 THROUGH 2018.

A. After normalizing for weather—a process I explain further below—the Company's total electric sales have increased an average of 0.3 percent per year during the past five years. Residential sales have averaged annual growth of 0.5 percent and total Commercial and Industrial sales have increased at an average annual rate of 0.2 percent over the 2014 through 2018 time period. The remaining classes of sales—Street Lighting, Public Authority, and Interdepartmental—accounted for only 0.9 percent of 2018 total sales. These classes combined

averaged growth of 3.9 percent per year during the past five years due in large part to light rail and commuter rail additions by Denver's Regional Transportation District ("RTD"). Figure JEM-D-4 provides a summary of the historical MWh sales statistics. Table JEM-D-1 provides annual sales volumes and percent growth by class for 2014 through 2018.

Figure JEM-D-4

Historical MWh Sales Statistics

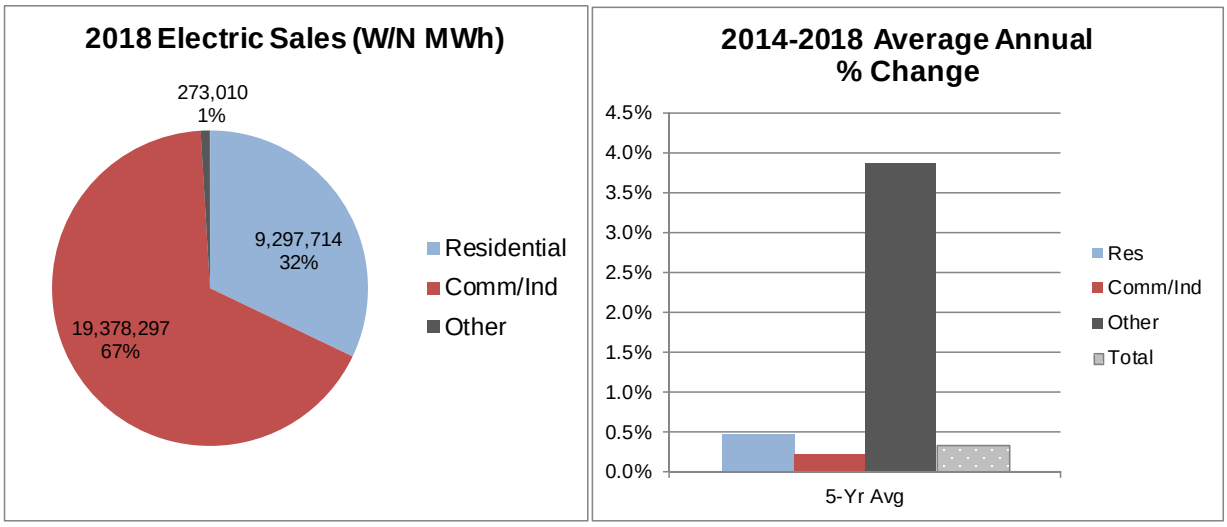


Table JEM-D-1

Historical W/N MWh Sales by Class 2014–2018

Customer Class	2014	2015	2016	2017	2018
Residential	9,080,553	9,146,253	9,230,049	9,118,117	9,297,714
Annual % Change	*0.0%*	*0.7%*	*0.9%*	*-1.2%*	*2.0%*
Total Commercial & Industrial	19,480,104	19,295,852	19,073,419	19,193,083	19,378,297
Annual % Change	*1.7%*	*-0.9%*	*-1.2%*	*0.6%*	*1.0%*
Other	242,126	242,655	266,757	275,866	273,010
Annual % Change	*7.3%*	*0.2%*	*9.9%*	*3.4%*	*-1.0%*
Total Sales	**28,802,783**	**28,684,760**	**28,570,226**	**28,587,066**	**28,949,020**
Annual % Change	***1.2%***	***-0.4%***	***-0.4%***	***0.1%***	***1.3%***

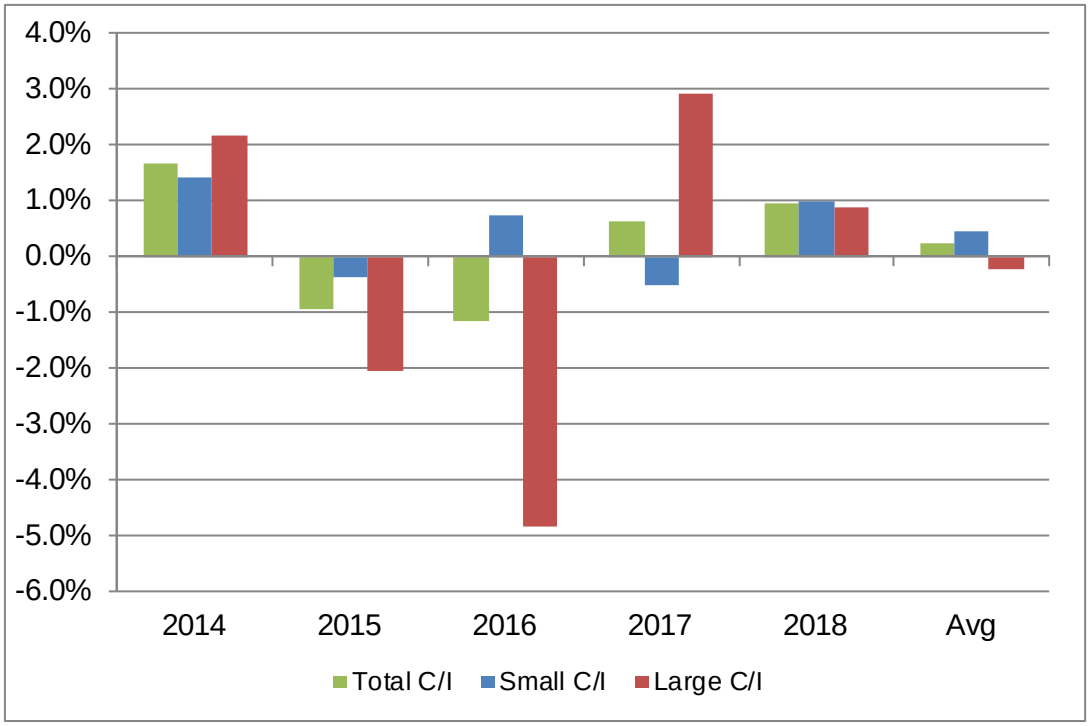
Q. PLEASE DISCUSS SALES TRENDS IN THE COMMERCIAL AND INDUSTRIAL SECTOR FROM 2014 THROUGH 2018.

A. Total Commercial and Industrial sales have increased at an average annual rate of 0.2 percent during the past five years. As shown in Figure JEM-D-5, total Commercial and Industrial Sales increased in 2014, declined in both 2015 and 2016, and then increased each year in 2017 and 2018. Small Commercial and Industrial sales showed increases in 2014, 2016, and 2018, and decreases in 2015 and 2017, for a 0.5 percent average annual growth rate over the 2014 to 2018 time period. Large Commercial and Industrial sales declined at an average rate of 0.2 percent during the past five years, with gains in 2014, 2017, and 2018, and losses in 2015 and 2016.[1]

[1] Small Commercial and Industrial is commercial and industrial service requiring less than 1,000 kilowatts billing demand per month on average per year. Large Commercial and Industrial is commercial and industrial service requiring more than 999 kilowatts billing demand per month on average per year.

Figure JEM-D-5

Commercial and Industrial Sales Annual Percent Growth



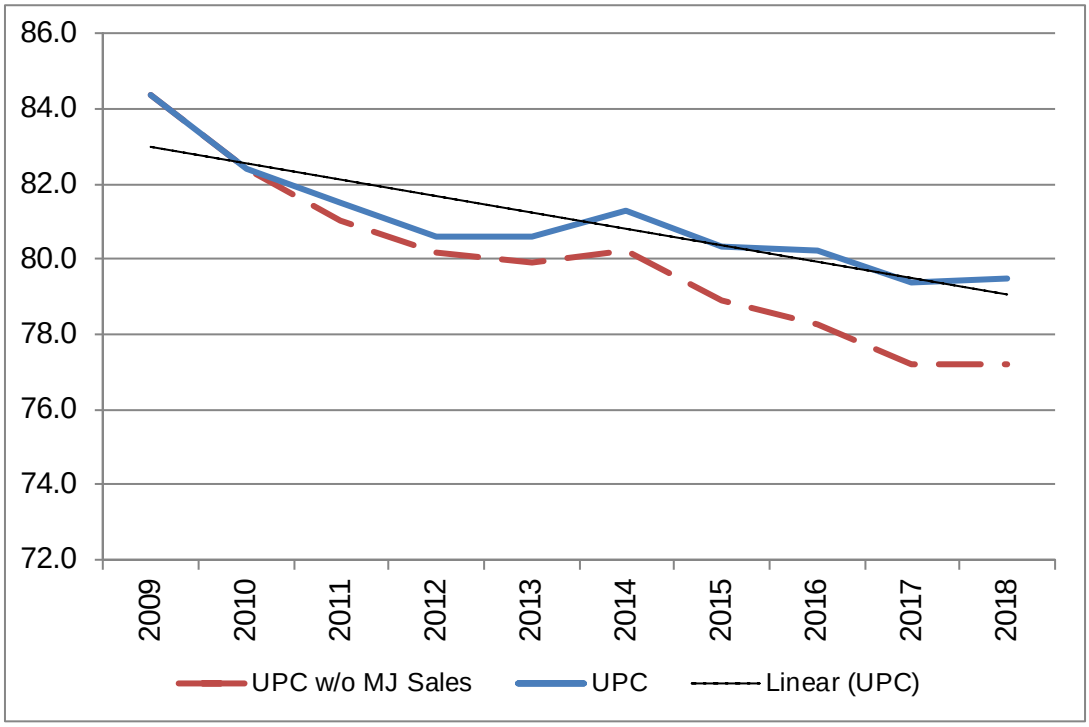
The 0.5 percent average growth in the Small Commercial and Industrial class reflects the combination of customer counts growing at an average annual rate of 0.7 percent and use per customer declining 0.3 percent per year on average. Similar to the Residential class, Small Commercial and Industrial use per customer has exhibited a declining trend for many years, with 2018 use per customer 7.8 percent lower than in 2007. During the past five years, the rate of change has slowed, but has still averaged -0.3 percent per year.

The decline in use per customer reflects the impacts of efficiency gains in end uses such as lighting and cooling, Company-sponsored DSM programs, and distributed generation solar. However, the rate of decline has slowed in the past

five years due to additional sales associated with the legalized marijuana industry in Colorado. In 2018, electricity sales to marijuana industry-related customers totaled around 480,000 MWh, with around three-quarters of these sales being in the Small Commercial and Industrial class. These sales account for 2.9 percent of Small Commercial and Industrial sales, 2.5 percent of total Commercial and Industrial sales, and 1.7 percent of total retail sales. Without these added sales, the average annual use per customer change from 2014 to 2018 would be -0.7 percent. Figure JEM-D-6 presents historical weather normalized Small Commercial and Industrial use per customer (solid line), use per customer excluding sales to marijuana industry related customers (heavy dashed line), and the historical declining trend of actual use per customer (light dashed line).

Figure JEM-D-6

Small Commercial and Industrial Use Per Customer
(Weather Normalized MWh)



As seen in Figure JEM-D-5, sales in the Large Commercial and Industrial class declined significantly in both 2015 and 2016. These declines are due to the loss of load for several very large customers due to changes in the demand for their products. In total, the Large Commercial and Industrial class lost more than 450,000 MWh (nearly 7 percent) of its sales from the end of 2014 to the end of 2016. Since 2016, this class has regained 241,000 MWh, or slightly more than half of the lost sales.

Q. PLEASE DISCUSS SALES TRENDS FROM 2014 THROUGH 2018 IN THE OTHER SALES CATEGORY.

A. As I previously explained, the other sales category (Street Lighting, Public Authority, and Interdepartmental) accounted for only 0.9 percent of 2018 total sales and averaged growth of 3.9 percent per year during the past five years. The historical growth in these classes reflects factors such as increases in number of customers, lighting efficiencies, and light rail and commuter rail additions by Denver's RTD.

III. OTHER FACTORS INFLUENCING PUBLIC SERVICE'S ELECTRIC SALES

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

A. In this section of my Direct Testimony, I will discuss the impacts of other factors that have influenced Public Service's sales since the Company's 2013 HTY in its 2014 Electric Rate Case.

Q. PLEASE DISCUSS NOTABLE FACTORS IMPACTING SALES SINCE THE 2013 HTY.

A. Key developments that have impacted the Company's electric sales include: Electric Vehicles, Distributed Generation Solar, and the Oil and Gas industry. I address each in turn below:

- *Electric Vehicles*: The Company estimates that there were just more than 16,000 electric vehicles (including plug-in hybrid electric vehicles) in its service territory in 2018, an increase of 38 percent from 2017 levels. The 16,000 vehicles in 2018 contributed an estimated 69,000 MWh (total electric vehicle load) to the Residential class electric sales.

- *Distributed Generation Solar*: In 2018 the Company had around 47,000 total behind-the-meter distributed generation solar customers (residential and commercial net metering), an increase of about 6,000 customers (15 percent) from 2017 and 29,000 customers (162 percent) since 2013. Total behind-the-meter distributed generation solar customers' solar production reduced billed sales by 513,000 MWh in 2018.

- *Oil and Gas Development*: Oil and gas development continues to grow in the Company's service territory. Sales to the Company's 10 largest oil and gas customers accounted for approximately 9 percent of total Large Commercial and Industrial sales in 2018 and grew by 41,000 MWh (8 percent) in 2018 from 2017 levels.

IV. WEATHER NORMALIZATION OF 2018 HTY SALES AND BILLING DEMAND

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

A. The purpose of this section of my Direct Testimony is to explain the Company's weather normalization methodology and its application to the 2018 HTY sales, billing demand, and revenues in this proceeding.

Q. HOW ARE THE COMPANY'S HISTORICAL 2018 HTY MWH SALES WEATHER NORMALIZED?

A. In order to calculate sales growth from year to year not influenced by weather, the Company estimates the MWh impact of the deviation from normal weather, or "weather-normalized" sales. The Company uses actual and normal weather, along with the actual number of customers and weather response coefficients to conduct this weather normalization of historical sales. The weather normalization is performed for the Residential sales class, the Commercial service sales class, and the Primary General service and Secondary General service sales classes.

The weather response coefficients are developed using regression models with the class-level sales as the dependent variable, and monthly weather as the explanatory variables. The weather variables are expressed as heating degree days or cooling degree days, with a different variable defined for each month that exhibits a statistically significant weather response. Each monthly coefficient effectively represents the MWh of weather response per heating or cooling degree day per customer.

The Company uses a statistical software package[2] to develop the regression models. The weather response coefficients are updated annually to incorporate the most recent year of actual sales, actual customer counts, and actual weather data. This annual update process results in coefficients that reflect the current relationship between sales and weather.

In the weather normalization regression models, each month's heating or cooling degree days are used as individual variables (*i.e.*, January heating degree days, February heating degree days, July cooling degree days, etc.). This allows each model to identify and quantify a unique weather response for each month, which is appropriate because our customers' response to weather varies from month to month.

The impact of the deviation from normal weather is calculated by multiplying the weather response coefficient for a given month times the number of customers in the month times the deviation in degree days from normal. This impact is then applied to the actual billed sales to derive weather-normalized sales. If summer weather is warmer than normal, the normalization process results in weather-normalized sales that are lower than actual sales. Conversely, if summer weather is cooler than normal, the normalization process results in weather-normalized sales that are higher than actual sales.

[2] Metrix ND 4.7, Copyright © 1997-2016, Itron, Inc., http://www.itron.com

Q. IS THE WEATHER NORMALIZATION METHODOLOGY NEW?

A. No. The Company has been using this weather normalization methodology for electric and gas sales for business analysis and internal and external reporting purposes since 2001. The Company's weather normalization methodology, and its methodology to calculate normal weather, as I describe later, is the same methodology that the Commission approved for use in the Company's gas rate cases in Proceeding No. 17AL-0363G,[3] Proceeding No. 15AL-0135G,[4] and Proceeding No. 12AL-1268G.[5] This also is the same methodology that the Company used in its electric rate cases in Proceeding Nos. 14AL-0660E and 11AL-947E. While settlement agreements were approved in the latter two completed electric base rate case proceedings, the Company's Test Year sales were weather-normalized using the Company's normal weather calculations and formed the basis of the test year revenues in those settlement agreements. Moreover, the methodology to weather normalize billing demand that I describe later in this section was approved in Proceeding No. 11AL-947E and has been used since then.

[3] Decision No. C18-0736-I, ordering ¶ 130 (mailed Aug. 29, 2018) and Recommended Decision No. R18-0318-I, ¶ 256 (mailed May 11, 2018).
[4] Decision No. C16-0123, ordering ¶ 6 (mailed Feb 16, 2016) and Recommended Decision R15-1204, ¶ 268 (mailed Nov. 16, 2015).
[5] Decision No. C13-1568, ordering ¶ 3 (mailed Dec. 23, 2013) and Recommended Decision R13-1307, ¶ 465 (mailed Oct. 22, 2013).

Q. DOES THE COMPANY WEATHER NORMALIZE SALES FOR MORE PURPOSES THAN JUST STATE REGULATORY PROCEEDINGS?

A. Yes. The Company also weather normalizes sales for business analysis and internal and external reporting purposes. Public Service uses the same weather-normalization methodology for all of these purposes. In addition, the weather response coefficients are used in the Company's monthly accounting process to estimate unbilled sales, calendar month sales, and, ultimately, the calendar month revenues that are included in the Company's financial reports, such as the Securities Exchange Commission ("SEC") 10-K filing. As such, oversight of the weather response coefficients is part of the Company's internal controls over financial reporting.

A. <u>Weather Normalization Regression Models</u>

Q. HOW DOES PUBLIC SERVICE EVALUATE THE VALIDITY OF ITS WEATHER NORMALIZATION REGRESSION MODELS THAT YOU PREVIOUSLY DESCRIBED?

A. There are a number of quantitative and qualitative validity tests that are applicable to regression analysis. I will describe several of the more common tests the Company uses.

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 set of explanatory variables specified in the model is explaining a high degree of the historical sales variability. The weather normalization regression models demonstrated very high R-squared statistics.

The t-statistic of each variable indicates 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, the absolute value of each t-statistic should be greater than 1.98 to be considered statistically significant at the 95 percent confidence level and greater than 1.66 to be considered statistically significant at the 90 percent confidence level. This criterion was applied in the development of the weather normalization regression models. The final weather normalization regression models tested satisfactorily under this standard. All variables except one were statistically significant at greater than the 95 percent confidence level. The one exception is June cooling degree days in the Commercial service sales class, which was statistically significant at greater than the 85 percent confidence level.

Each model was inspected 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, under the presence of first-order autocorrelation, an overestimate in one time period is likely to lead to an overestimate in the succeeding time period,

and vice versa. Thus, when estimating the relationship between weather and historical sales, absence of autocorrelation between the error terms 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. Autocorrelation was present in the Company's initial weather normalization regression models for the Residential, Primary General and Secondary General classes. Therefore, the Company applied an autocorrelation correction process so that the final regression models tested satisfactorily for the absence of first-order autocorrelation, as measured by the DW test statistic.

Q. IS A MODEL REJECTED IF FIRST-ORDER AUTOCORRELATION IS PRESENT?

A. No, not if the model is otherwise theoretically and statistically valid. It is not uncommon for autocorrelation to be present in time-series data. Because the observations are ordered chronologically, there are likely to be correlations among successive observations, especially if the time interval between successive observations is short, such as a month, rather than a year. If the overall regression model is theoretically and statistically sound in all facets except for the presence of autocorrelation, then it is a common practice to apply an autocorrelation correction process. The use of an autocorrelation correction process effectively removes the correlation from the error terms and produces more reliable regression statistics.

B. <u>Data Preparation</u>

Q. PLEASE DESCRIBE THE DATA AND DATA SOURCES THE COMPANY RELIED ON TO DEVELOP ITS WEATHER NORMALIZATION REGRESSION MODELS.

A. The data used in the regression models include historical billing month sales, monthly number of customers, number of billing days in each month, and weather variables. The billing month sales and monthly number of customers were obtained from Company billing system reports. The billing days information was obtained from Company meter reading schedules.

Q. WHAT WAS THE COMPANY'S MEASURE OF WEATHER AND WHAT WAS THE SOURCE?

A. Weather is measured in heating degree days and cooling degree days, which are calculated using a 65 degree temperature base. Daily weather was obtained from the National Oceanic and Atmospheric Administration ("NOAA") and was measured at the Denver International Airport ("DIA") weather station. Heating degree days 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 20 heating degree days (65 minus 45) were calculated for that day. If the average daily temperature was greater than 65 degrees Fahrenheit, then that day recorded zero heating degree days. Cooling degree days were calculated for each day by subtracting 65 degrees Fahrenheit from the average daily temperature. For example, if the average daily

temperature was 75 degrees Fahrenheit, then 10 cooling degree days (75 minus 65) were calculated for that day. If the average daily temperature was less than 65 degrees Fahrenheit, then that day recorded zero cooling degree days.

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

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

Q. WHY IS IT APPROPRIATE TO USE THE DIA WEATHER STATION TO REPRESENT THE COMPANY'S SERVICE TERRITORY?

A. Public Service uses data from the DIA weather station because a large majority (90.4 percent) of its Residential electric sales is within the Front Range region or the eastern part of the state. Based on total Residential electric sales in 2018, only 9.6 percent of sales were made to customers located outside the Front Range region. These include the Western Division (4.9 percent), the San Luis Valley Division (1.3 percent), and the Mountain Division (3.3 percent). Since these sales represent such a small proportion of the total, it is appropriate to use only the weather station at Denver International Airport.

Q. WHAT WEATHER ASSUMPTIONS WERE USED TO WEATHER NORMALIZE THE 2018 HTY SALES PRESENTED IN THIS PROCEEDING?

A. Normal weather was used for the test year period, where normal is defined as a 30-year rolling average of historical values. Daily normal heating degree days and cooling degree days were calculated by averaging 30 years of daily degree days using data from 1987 to 2016. These daily normal degree days were weighted by billing cycle information to derive normal billing month degree days in the same manner as the historical actual degree days were calculated.

Q. DOES NOAA ALSO CALCULATE 30-YEAR NORMALS?

A. Yes. However, NOAA updates its normals every 10 years. By rolling the normals annually, the Company is using the most current data available, minimizing the potential impact of any underlying trends in the actual weather data.

C. <u>Billing Demand</u>

Q. HOW IS HISTORICAL KILOWATT ("KW") BILLING DEMAND WEATHER-NORMALIZED?

A. The Company adjusts KW billing demand for weather variances from normal weather based on weather normalized kilowatt hour ("kWh") sales and a Calculated Demand Factor. The Calculated Demand Factor quantifies the relationship of billing demand to sales for a given month by service class, and is calculated as the ratio of billing demand to sales as follows:

Calculated Demand Factor = Billing Demand (KW) / Sales (kWh)

The Calculated Demand Factor is then applied to the respective month's weather normalized kWh sales, resulting in a weather normalized KW billing demand estimate.

*Weather Normalized Billing Demand = Calculated Demand Factor * Weather Normalized Sales*

The weather normalized sales and weather normalized billing demands are then used to calculate weather adjusted revenues.

Q. DID THE COMPANY WEATHER NORMALIZE THE 2018 HTY SALES AND BILLING DEMAND USED BY COMPANY WITNESS MS. DEBORAH A. BLAIR TO CALCULATE PRESENT BASE RATE REVENUE?

A. Yes. The weather normalization of the 2018 HTY sales are provided as Attachment JEM-1. Actual 2018 heating degree days were 3.9 percent lower than normal and actual 2018 cooling degree days were 29.1 percent higher than normal. The hotter-than-normal summer weather, combined with the warmer-than-normal winter weather, result in weather normalized sales being lower than actual sales by 352,621 MWh, or 1.2 percent. This results in weather normalized revenue that is $23.7 million lower than actual revenue.

V. 2018 HTY SALES BY RATE SCHEDULE

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

A. The purpose of this section of my testimony is to explain how the 2018 HTY rate schedule level weather normalized sales are developed.

Q. IN ADDITION TO THE WEATHER NORMALIZATION HISTORICAL SALES AT THE CUSTOMER CLASS LEVEL FOR THE 2018 HTY, DID YOU ALSO WEATHER NORMALIZE 2018 HTY SALES AT THE RATE SCHEDULE LEVEL OF DETAIL?

A. Yes. The weather normalized rate schedule level of detail is needed to appropriately estimate weather normalized revenues. For example, the Residential class of service is an aggregation of five rate schedules: Residential General, Residential Demand, Residential Demand-Time Differentiated Rates, Residential Energy Time-of-Use, and Residential Outdoor Area Lighting. Table JEM-D-2 provides a mapping of the rate schedule level of detail to the rate class level. Highly Confidential Attachment JEM-2 and Public Version Attachment JEM-2 provide the HTY weather normalized sales by month at the rate schedule level of detail.

Table JEM-D-2

Rate Schedule to Rate Class Mapping

Rate Class	Rate Schedules within Rate Class
Residential Sales	• Residential General • Residential Demand • Residential Demand-Time Differentiated Rates • Residential Energy Time-of-Use • Residential Outdoor Area Lighting
Commercial and Industrial Sales	• Commercial • Non Metered Service • Secondary General • Secondary General Low-Load Factor • Secondary General Critical Peak Pricing • Secondary Standby Service • Secondary Time-of-Use • Secondary Photovoltaic Time-of-Use • Primary General • Primary General Critical Peak Pricing • Primary Standby Service • Primary Time-of-Use • Transmission General • Transmission General Critical Peak Pricing • Transmission Standby Service • Commercial Outdoor Area Lighting • Parking Lot Lighting Service
Street Lighting Sales	• Metered Street Lighting Service • Metered Intersection Service • Energy Only Street Lighting Service • Street Lighting Service • Special Street Lighting Service • Customer-Owned Lighting Service • Street Lighting Service – Unincorporated Areas • Traffic Signal Lighting
Public Authority	• Special Contract Service

Q. HOW IS THE WEATHER NORMALIZED RATE SCHEDULE LEVEL DATA DERIVED FROM THE CUSTOMER CLASS LEVEL DATA?

A. After the class level sales weather normalization is completed, the rate sheet level weather normalized data is developed. Monthly rate sheet sales allocation factors are developed based on rate sheet level sales data obtained from Company billing system reports. The monthly rate sheet allocation factors are based on 2018 actual data, and these allocation factors are then applied to the class level weather impact to derive the rate sheet level weather impact. Non-weather sensitive rates such as Residential Outdoor Area Lighting are excluded in the development of the allocation factors so that the weather impact is allocated only to weather sensitive rates.

VI. RECOMMENDATIONS AND CONCLUSION

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.

A. In sum, I recommend the Commission find that the Company's weather normalized electric sales for the 2018 HTY are reasonable and appropriate for the purpose of determining the revenue requirement and final rates in this proceeding.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

Statement of Qualifications

Jannell E. Marks

I have served as Director, Sales, Energy and Demand Forecasting for Xcel Energy since 2007. In this position I am responsible for developing load analysis and energy sales forecasting policies, proposals, and strategies to meet corporate financial planning, budgeting, and internal earnings forecasting requirements as well as to support the Company's regulatory objectives and comply with regulatory requirements. I am also responsible for the development and presentation of load research and forecasted data for Xcel Energy's operating companies and reporting historical and statistical information to various regulatory agencies and others.

Prior to my current position, I served as Manager, Energy Forecasting for Xcel Energy from 2000–2007 and as Manager, Demand, Energy and Customer Forecasts for New England Energies, Inc. from 1997–2000. I began my career in 1982 as a Research Analyst with Public Service Company of Colorado and was promoted to Senior Research Analyst in 1991.

I received my Bachelor of Science in Statistics from Colorado State University in 1982. I am a member of Itron's Energy Forecasting Group and the Edison Electric Institute's Forecasting Group and have attended the Institute for Professional Education's Economic Modeling and Forecasting Class; Itron's Forecasting Workshops; and the Electric Power Research Institute's REEPS (Residential End-Use Energy Planning System), COMMEND (Commercial End-Use Planning System), and INFORM (Industrial End-Use Forecasting Model) Training Classes and User Group Meetings.

I have testified on forecasting issues before the Public Utility Commission of Texas, the Colorado Public Utilities Commission, the Minnesota Public Utilities Commission, the North Dakota Public Service Commission, the South Dakota Public Utilities Commission, the Public Service Commission of Wisconsin, and the New Mexico Public Regulation Commission.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

* * * *

RE: IN THE MATTER OF ADVICE NO. 1797-ELECTRIC OF PUBLIC SERVICE COMPANY OF COLORADO TO REVISE ITS COLORADO P.U.C. NO. 8-ELECTRIC TARIFF TO IMPLEMENT RATE CHANGES EFFECTIVE ON THIRTY-DAYS' NOTICE.	)	**PROCEEDING NO. 19AL-_____E**

AFFIDAVIT OF JANNELL E. MARKS
ON BEHALF OF
PUBLIC SERVICE COMPANY OF COLORADO

I, Jannell E. Marks, being duly sworn, state that the Direct Testimony and attachments were prepared by me or under my supervision, control, and direction; that the Direct Testimony and attachments are true and correct to the best of my information, knowledge and belief; and that I would give the same testimony orally and would present the same attachments if asked under oath.

Dated at Denver, Colorado, this 3rd day of May, 2019.

Jannell E. Marks
Director, Sales, Energy and Demand Forecasting

Subscribed and sworn to before me this 3rd day of May, 2019.

SCHUNA D WRIGHT
Notary Public
State of Colorado
Notary ID # 19974007693
My Commission Expires 05-06-2021

Schuna D. Wright
Notary Public

My Commission expires May 6, 2021