

**BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION**

**IN THE MATTER OF SOUTHWESTERN )  
PUBLIC SERVICE COMPANY'S )  
APPLICATION FOR REVISION OF ITS )  
RETAIL RATES UNDER ADVICE )  
NOTICE NO. 272, )  
SOUTHWESTERN PUBLIC SERVICE )  
COMPANY, )  
\_\_\_\_\_  
APPLICANT. )**

**CASE NO. 17-00255-UT**

**FILED IN OFFICE OF  
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**NM PUBLIC REGULATION COMM  
RECORDS MANAGEMENT BUREAU**

**DIRECT TESTIMONY**

*of*

**JANNELL E. MARKS**

*on behalf of*

**SOUTHWESTERN PUBLIC SERVICE COMPANY**

## **TABLE OF CONTENTS**

GLOSSARY OF ACRONYMS AND DEFINED TERMS.....	iii
LIST OF ATTACHMENTS .....	v
I. WITNESS IDENTIFICATION AND QUALIFICATIONS .....	1
II. ASSIGNMENT AND SUMMARY OF TESTIMONY AND RECOMMENDATIONS.....	5
III. LOAD RESEARCH.....	10
IV. WEATHER’S EFFECT ON TEST YEAR SALES.....	16
V. WEATHER’S EFFECT ON TEST YEAR PEAK DEMAND.....	27
VI. WEATHER NORMALIZATION METHODOLOGY .....	36
VERIFICATION.....	42

## **GLOSSARY OF ACRONYMS AND DEFINED TERMS**

<b><u>Acronym/Defined Term</u></b>	<b><u>Meaning</u></b>
Census class	Customer class in which all customers have IDR meters
Commission	New Mexico Public Regulation Commission
DW	Durbin-Watson
Golden Spread	Golden Spread Electric Cooperative, Inc.
IDR	Interval Demand Recorder
kW	Kilowatt
kWh	Kilowatt-hour
MW	Megawatt
MWh	Megawatt-hour
NCE	New Century Energies, Inc.
NOAA	National Oceanic and Atmospheric Administration
Non-Census class	Customer class in which not all customers have IDR meters
NSPM	Northern States Power Company, a Minnesota corporation
NSPW	Northern States Power Company, a Wisconsin corporation
Operating Companies	NSPM, NSPW, PSCo, and SPS

<b><u>Acronym/Defined Term</u></b>	<b><u>Meaning</u></b>
PSCo	Public Service Company of Colorado, a Colorado corporation
R <sup>2</sup> statistic	Coefficient of determination
RFP	Rate Filing Package
SPS	Southwestern Public Service Company, a New Mexico corporation
Test Year	July 1, 2016 through June 30, 2017
Xcel Energy	Xcel Energy Inc.

## LIST OF ATTACHMENTS

<b><u>Attachment</u></b>	<b><u>Description</u></b>
JEM-1	Weather Normalization of New Mexico Retail Test Year Sales ( <i>Filename:</i> JEM-1.xlsx)
JEM-2	Weather Normalization of Texas Retail Test Year Sales ( <i>Filename:</i> JEM-2.xlsx)
JEM-3	Weather Normalization of Firm Wholesale Test Year Sales ( <i>Filename:</i> JEM-3.xlsx)
JEM-4	Weather Normalization of SPS Test Year Peak Demand ( <i>Filename:</i> JEM-4.xlsx)
JEM-5	Regression Models and Associated Statistics ( <i>Filename:</i> JEM-5.xlsx)

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1                   **I. WITNESS IDENTIFICATION AND QUALIFICATIONS**

2   **Q.    Please state your name and business address.**

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

5   **Q.    On whose behalf are you testifying in this proceeding?**

6   A.    I am filing testimony on behalf of Southwestern Public Service Company, a New  
7           Mexico corporation (“SPS”) and wholly-owned electric utility subsidiary of Xcel  
8           Energy Inc. (“Xcel Energy”).

9   **Q.    By whom are you employed and in what position?**

10  A.    I am employed by Xcel Energy Services Inc., the service company subsidiary of  
11           Xcel Energy, as Director of Sales, Energy and Demand Forecasting.

12  **Q.    Please briefly outline your responsibilities as Director of Sales, Energy and**  
13           **Demand Forecasting.**

14  A.    I am responsible for the development of forecasted customer, sales, and peak  
15           demand data and economic conditions for the Xcel Energy Operating Companies,  
16           and for the presentation of this information to Xcel Energy’s senior management,  
17           other Xcel Energy departments, and various regulatory and reporting agencies. I  
18           also am responsible for Xcel Energy’s Load Research function, which designs,  
19           maintains, monitors, and analyzes electric load research samples in the Xcel

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 Energy Operating Companies' service territories. Finally, I am responsible for  
2 developing and implementing forecasting, planning, and load analysis studies for  
3 regulatory proceedings.

4 **Q. Please describe your educational background.**

5 A. I graduated from Colorado State University with a Bachelor of Science degree in  
6 Statistics.

7 **Q. Please describe your professional experience.**

8 A. I began my employment with Public Service Company of Colorado ("PSCo") in  
9 1982 in the Economics and Forecasting Department. In 1985, I became a  
10 Research Analyst, and, in 1991, I was promoted to Senior Research Analyst. In  
11 that position, I was responsible for developing the customer and sales forecasts  
12 for PSCo and the economic, customer, sales, and demand forecasts for Cheyenne  
13 Light, Fuel and Power Company. In 1997, when PSCo merged with SPS to form  
14 New Century Energies, Inc. ("NCE"), I assumed the position of Manager,  
15 Demand, Energy and Customer Forecasts. In that position, I was responsible for  
16 developing demand, energy, and customer forecasts for NCE's operating  
17 companies, including SPS. I also directed the preparation of statistical reporting  
18 for regulatory agencies and others regarding historical and forecasted reports. In

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 August 2000, following the merger of NCE and Northern States Power Company  
2 that created Xcel Energy, I was named Manager, Energy Forecasting, with the  
3 added responsibility for Northern States Power Company – Minnesota (“NSPM”)  
4 and Northern States Power Company Wisconsin (“NSPW”). I assumed my  
5 current position in February 2007, with the added responsibility for the Operating  
6 Companies’ load research function.

7 **Q. Have you attended or taken any special courses or seminars relating to**  
8 **public utilities?**

9 A. Yes. I have attended the Institute for Professional Education’s Economic  
10 Modeling and Forecasting class and Itron’s Load Forecasting Workshops. I have  
11 also attended industry forecasting conferences and forecasting software user  
12 group meetings and training classes sponsored by the Electric Power Research  
13 Institute. I am a member of Itron’s Energy Forecasting Group and Edison Electric  
14 Institute’s Load Forecasting Group.

15 **Q. Have you testified before any regulatory authorities?**

16 A. Yes. I have testified before the New Mexico Public Regulation Commission  
17 (“Commission”), the Public Utility Commission of Texas, the Colorado Public  
18 Utilities Commission, the Minnesota Public Utilities Commission, the North



Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1       Dakota Public Service Commission, and the Public Service Commission of  
2       Wisconsin on the issues of load research, sales and demand forecasts, weather  
3       normalization of sales and demand, and other related topics. I also have  
4       submitted written testimony to the South Dakota Public Utilities Commission.

4     A.     The purpose of my testimony is to:

- 11 In addition, I sponsor or co-sponsor Schedules P-1, P-6, and Q-1 of SPS's Rate  
12 Filing Package ("RFP").

A. **Load Research** - Load research is the systematic collection and analysis of customers' electrical energy and demand requirements. SPS uses information from Interval Demand Recorder ("IDR")<sup>1</sup> meters to determine the coincident and non-coincident peaks for all customer classes. For the "Census" classes, which are the customer classes in which all customers have IDR meters, the meters provide actual measurements of demand. However, it is costly and not feasible to

5

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 install an IDR meter for every customer in every class. Therefore, for those  
2 customer classes in which not all customers have IDR meters, which are referred  
3 to as the “non-Census” classes, it is necessary to develop load research samples to  
4 estimate the coincident and non-coincident peaks for the classes.

5 Using information from the IDR meters for the Census classes and  
6 information from the load research samples for the non-Census classes, I have  
7 provided various load research statistics to SPS witnesses Richard M. Luth and  
8 Evan D. Evans, who incorporate those statistics in the class cost of service study  
9 and rate design they present. Specifically, I provided the class coincident and  
10 non-coincident peak demand for Census classes and the class coincident and  
11 non-coincident load factors at peak for the non-Census classes. I recommend the  
12 Commission approve those peak demands and load factors for purposes of  
13 allocating costs among classes and designing rates.

14 **Weather Normalization** - SPS has calculated the effects of abnormal weather on  
15 Test Year sales. Normal daily weather was based on the average of the last 30  
16 years of historical heating degree days, cooling degree days, and precipitation  
17 data. The Test Year heating degree days were 21.2% below normal; cooling  
18 degree days were 10.0% above normal; and precipitation was 0.6% above normal.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 SPS calculated the effects of abnormal weather on Test Year sales for customer  
2 classes whose consumption patterns are affected by the weather using weather  
3 normalization regression coefficients derived from econometric models. In total,  
4 milder-than-normal winter weather was mostly offset by hotter-than-normal  
5 summer weather, resulting in actual sales being 5,676 megawatt-hours (“MWh”) or  
6 or -0.1% lower than normal. Therefore, Test Year sales were adjusted (increased)  
7 by 5,676 MWh.

8 Similarly, SPS also calculated the effects of abnormal weather on the  
9 coincident peak demands in the Test Year for total retail and aggregated full  
10 requirements wholesale. Taken together, the weather deviations resulted in an  
11 average of 15 MW, or 0.5%, more retail peak demand per month and an average  
12 of 3 MW, or 0.3%, more full requirement wholesale peak demand per month from  
13 June through September of the Test Year.

14 SPS also calculated the effect of abnormal weather on Golden Spread  
15 Electric Cooperative, Inc.’s (“Golden Spread”) full load peak demand coincident  
16 with the SPS transmission system peak demand. The average weather adjustment  
17 for the Golden Spread full load peak demand coincident with the SPS  
18 transmission system peak demand for the four months of June through September  
19 of the Test Year was 18 MW per month.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 I provided the MWh and MW impacts of abnormal weather to Mr. Luth,  
2 who uses them to calculate present revenues and the allocation of production and  
3 transmission capacity costs among classes.

4 I explain the methodology that SPS uses to weather normalize monthly  
5 sales and demand amounts, SPS's weather-impacted sales are developed using  
6 industry standard regression modeling techniques. SPS relies on a number of  
7 quantitative and qualitative tests to ensure that its regression models are  
8 statistically valid. Thus, SPS's estimates of weather normalized sales are  
9 reasonable and should be used to set rates in this proceeding.

10 I recommend that the Commission approve the adjusted sales and demand  
11 amounts resulting from the weather normalization discussed in this testimony.

12 **Q. How is your testimony organized?**

13 A. Section III provides a description of SPS's load research function. Section IV  
14 discusses weather's effect on Test Year sales. Section V discusses weather's  
15 effect on Test Year peak demand. An overview of the weather normalization  
16 methodology is provided in Section VI.

17 **Q. Were Attachments JEM-1 through JEM-5 prepared by you or under your**  
18 **direct supervision and control?**

19 A. Yes.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1   **Q.    Were the RFP schedules that you sponsor or co-sponsor prepared by you or**  
2           **under your direct supervision and control?**

3   **A.    Yes.**

4   **Q.    Do you incorporate the RFP schedules that are sponsored or co-sponsored by**  
5           **you into your testimony?**

6   **A.    Yes.**

### III. LOAD RESEARCH

2     **Q.     What is the purpose of load research?**

A. Load research is the systematic collection and analysis of customers' electrical energy and demand requirements by time-of-day, month, season, and year. This data, which includes load research samples, is collected and analyzed by customer classes, stratum of customer classes, and other subsets of customer classes. Load research enables utilities to better understand customers, their consumption patterns, their consumption responses to various factors, and the impact of customers' energy requirements on the electric utility's system. In addition, load research data is used to develop demand and energy allocators for cost allocation studies and is used in designing rates.

12 **Q. What are load research samples?**

A. It is costly and not feasible to install IDR meters for all customers in all customer classes. Therefore, it is necessary for SPS to develop load research samples to determine the coincident and non-coincident peaks for certain classes. Load research samples are subsets of the entire population that SPS surveys to estimate the characteristics of the entire population. SPS's load research samples are developed using a stratified random sampling method. This technique divides the class of interest into smaller groups with like-characteristics. This method

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 effectively reduces the overall variance of the class, thereby reducing the sample  
2 size. The samples are designed to meet or exceed the “90/10” load research  
3 standard specified by Federal Energy Regulatory Commission regulations  
4 implementing the Public Utilities Regulatory Policies Act of 1978.<sup>2</sup>

5 Accuracy Level. If sample metering is required, the sampling method and  
6 procedures for collecting, processing, and analyzing the sample loads,  
7 taken together, shall be designed so as to provide reasonably accurate data  
8 consistent with available technology and equipment. An accuracy of plus  
9 or minus 10 percent at the 90 percent confidence level shall be used as a  
10 target for the measurement of group loads at the time of system and  
11 customer group peaks.

12 Data validation is performed regularly on the load research samples to ensure that  
13 the energy use of the sample corresponds closely with the population energy use.

14 **Q. Does SPS use load research samples to determine the demand of all its**  
15 **customer classes?**

16 A. No. It is not necessary to conduct load research samples for customer classes in  
17 which all customers have IDR meters because the IDR meters provide actual  
18 measurements of demand. It also is not necessary to conduct load research  
19 samples for the Street Lighting and Area Lighting classes because lighting  
20 facilities are generally unmetered. Most of the customers with IDR meters are in

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<sup>2</sup> Code of Federal Regulations, Title 18, Chapter 1, Subchapter K, Part 290.403, Subpart B.



Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 the Large General Service-Transmission class, although some Primary General  
2 Service customers with on-site generation also have IDR meters. In addition, a  
3 few of the customers with individual rate schedules have IDR meters installed.  
4 As noted earlier, I refer to the classes in which all customers have IDR meters as  
5 “Census” classes. SPS uses the output of those IDR meters to determine the  
6 Census classes’ demands for purposes of allocation, rate design, and billing.

7 **Q. For which customer classes has SPS developed load research samples?**

8 A. SPS develops load research samples for its non-Census classes throughout its  
9 service territory in both New Mexico and Texas. SPS developed load research  
10 samples for the following New Mexico retail non-Census customer classes:

- 11 • Residential Service;
- 12 • Residential Space Heating Service;
- 13 • Small General Service;
- 14 • Secondary General Service;
- 15 • Irrigation Service;
- 16 • Primary General Service;
- 17 • Small Municipal and School Service; and
- 18 • Large Municipal and School Service.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1   **Q.   How does SPS go about performing the load research for the non-Census**  
2       **classes?**

3   A.   As I discussed earlier in my testimony, it is cost-prohibitive to install an IDR  
4       meter for every customer. Consequently, SPS installs IDR meters on a random  
5       sample of customers in each non-Census class (developed as I previously  
6       described). SPS then uses the electric usage data from those sample customers to  
7       extrapolate the demand data for the remainder of the class.

8   **Q.   What load research statistics did you provide for SPS's cost allocation study**  
9       **and rate design?**

10  A.   For each SPS Census customer class, I provided the class coincident peak demand  
11       and non-coincident peak demand. For each SPS non-Census customer class, I  
12       provided: (1) the load factors at the time of the monthly system peak, which is  
13       the class coincident peak; and (2) the load factors at the time of the monthly class  
14       peak, which is the class non-coincident peak.

15  **Q.   Please define the terms “monthly system peak,” “class coincident peak,”**  
16       **“monthly class peak,” and “class non-coincident peak.”**

17  A.   The *monthly system peak* is the 60-minute interval in each month in which SPS's  
18       system experiences the highest demand, and each class's demand during that

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1       60-minute interval is the *class coincident peak*. The *monthly class peak* is the  
2       30-minute interval in each month in which a class experiences its highest demand.  
3       Unless the monthly class peak occurs during the same 60-minute interval as the  
4       monthly system peak, the monthly class peak is a *class non-coincident peak*.

5       **Q.    What is a load factor?**

6       A.    A load factor is the ratio of the average load in kilowatts (“kW”) supplied during  
7       a designated period to the peak or maximum load in kW occurring in that period.  
8       For example, assume a customer used 10,000 kilowatt-hours (“kWh”) during a  
9       30-day period (720 hours) and had a maximum demand of 21 kW during this  
10      same period. The customer’s average load would be 13.89 kW (10,000 kWh /  
11      720 hours = 13.89 kW). Dividing that number by 21 kW leads to 0.66 (13.89 / 21  
12      = 0.66). That is then multiplied by 100% to arrive at a load factor of 66%.

13      **Q.    How did SPS use the non-Census class’s load factors derived from your load**  
14      **research and the Census class’s peak demand data?**

15      A.    I provided the non-Census class coincident and non-coincident load factors at  
16      peak and the Census class coincident and non-coincident peak demand for each  
17      month to Mr. Luth who used them to develop demand allocators. Mr. Luth  
18      discusses SPS’s demand allocators in further detail in his testimony.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1   **Q.   How did SPS calculate the demand at the time of the monthly system peak**  
2       **and the demand at the monthly class peak for the non-Census classes?**

3   A.   As explained by Mr. Luth, each non-Census class's demand at the time of the  
4       system peak was calculated by applying the monthly system peak load factors  
5       derived from the load research to the monthly sales by customer class. Each non-  
6       Census class's demand at the time of the non-coincident peak was calculated by  
7       applying the monthly class peak load factors derived from the load research to the  
8       monthly energy sales by customer class.

9   **Q.   Did you make any adjustments to the class demands at the time of the monthly**  
10       **system peaks?**

11   A.   Yes. Because the hourly loads for the sample classes are estimates, the sum of  
12       each hourly demand, adjusted to generation level, will almost never equal SPS's  
13       total system load. To account for this difference, the sample classes were  
14       adjusted each month so that the sum of all hourly demand equals the hourly  
15       system load at the hour of SPS's monthly system peak demand. Mr. Luth  
16       describes this process in his direct testimony. Both monthly system peak demand  
17       by class and monthly non-coincident class peak demands were adjusted consistent  
18       with the proportional allocation process discussed above.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1                   **IV. WEATHER'S EFFECT ON TEST YEAR SALES**

2   **Q.    What topic do you discuss in this section of your testimony?**

3   A.    I explain the weather normalization that SPS performed to ensure that its Test  
4           Year sales and the present revenues calculated using those sales are adjusted to  
5           eliminate the effects of abnormal weather.

6   **Q.    Did SPS calculate the effects on sales of abnormal weather for the Test Year?**

7   A.    Yes. Because the twelve months that comprise the Test Year were hotter than the  
8           30-year average in SPS's New Mexico service area during the cooling season and  
9           warmer than the 30-year average during the heating season, SPS calculated the  
10          effects of abnormal weather, as it has done in prior cases. The Test Year heating  
11          degree days were 21.2% below normal; the Test Year cooling degree days were  
12          10.0% above normal; and the Test Year precipitation was 0.6% above normal.  
13          The percent difference from normal is calculated using the following formula:

14                   
$$(Actual\ weather - Normal\ weather) / Normal\ weather$$

15          The calculation of the percent difference from normal weather is shown on page 1  
16          of Attachment JEM-1.

17                SPS calculated the effects on sales of abnormal weather during the Test  
18          Year for the following customer classes:

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

- 1                   • Residential Service;
- 2                   • Residential Space Heating Service;
- 3                   • Small General Service;
- 4                   • Secondary General Service;
- 5                   • Irrigation Service;
- 6                   • Small Municipal and School Service; and
- 7                   • Large Municipal and School Service.

8                   SPS's research indicates that weather has little or no effect on the  
9                   consumption of the Primary General Service, Large General Service-  
10                  Transmission, Street Lighting and Area Lighting classes. Therefore, SPS did not  
11                  make weather adjustments for those classes.

12                  Taken together the weather deviations resulted in 5,676 MWh less being  
13                  consumed in the Test Year than would have been consumed in the Test Year with  
14                  normal weather, which amounts to -0.1% of total New Mexico retail sales. The  
15                  calculation of the -0.1% appears on page 3 of Attachment JEM-1.

16   **Q.   How did SPS define the normal weather?**

17   A.   SPS used a 30-year average to define normal weather for purposes of this rate  
18                  case. This aligns with the National Oceanic and Atmospheric Administration's

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 ("NOAA") view that normal weather should be measured based on a 30-year  
2 period of time.

3 **Q. What 30-year period did SPS use for weather normalization of sales?**

4 A. SPS used actual weather data from January 1, 1986 through December 31, 2015.

5 **Q. Did SPS include the Test Year in the 30-year period used to derive normal**  
6 **weather?**

7 A. No. It is standard practice not to include the test year being normalized in the  
8 calculation of normal weather. Using actual weather data from the 12-month  
9 period used as the test year period in the calculation of the "normal" weather may  
10 create a bias toward the actual test year weather, which would potentially misstate  
11 the variance of the test year weather from normal weather conditions. SPS  
12 applied this methodology for weather normalization adjustments in its most recent  
13 historical test year case, Case No. 15-00296-UT. In addition, NOAA also  
14 excludes the current year's weather when calculating its 30-year normal weather  
15 statistics for purposes of comparing and analyzing the weather for a particular  
16 month.

17 **Q. How did SPS determine the normal weather?**

18 A. Normal daily weather was based on the average of the last 30 years of historical  
19 heating degree days, cooling degree days, and precipitation data used to develop

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 the weather adjustment coefficients for the Test Year. The Test Year actual and  
2 normal cooling degree days, heating degree days, and precipitation are reflected  
3 on page 1 of Attachment JEM-1.

4 **Q. What measure did SPS use to calculate heating degree days, cooling degree**  
5 **days, and precipitation?**

6 A. SPS used heating degree days and cooling degree days based on a 65-degree  
7 Fahrenheit temperature base and rainfall equivalent precipitation measured in  
8 inches as reported by NOAA for Roswell, New Mexico.

9 **Q. Please explain how SPS calculated heating degree days.**

10 A. SPS calculated heating degree days for each day by subtracting the average daily  
11 temperature from 65 degrees Fahrenheit. For example, if the average daily  
12 temperature was 45 degrees Fahrenheit, then 20 heating degree days were  
13 calculated for that day. If the average daily temperature was greater than 65  
14 degrees Fahrenheit, then that day recorded zero heating degree days. Daily  
15 heating degree days are aggregated to monthly totals.

16 **Q. How did SPS calculate cooling degree days?**

17 A. SPS calculated cooling degree days for each day by subtracting 65 degrees  
18 Fahrenheit from the average daily temperature. For example, if the average daily



Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 temperature was 75 degrees Fahrenheit, 10 cooling degree days were calculated  
2 for that day. If the average daily temperature was less than 65 degrees Fahrenheit,  
3 then that day recorded zero cooling degree days. Daily cooling degree days are  
4 aggregated to monthly totals.

5 **Q. How was the Test Year weather adjustment calculated?**

6 A. SPS calculated the weather adjustment using the deviation between normal and  
7 actual weather, customer counts, and weather adjustment coefficients that  
8 quantify the impact of a one-unit change in weather on sales per customer.

9 **Q. How did SPS develop the weather adjustment coefficients used in the**  
10 **weather normalization of sales?**

11 A. SPS developed the billing-month coefficients for each weather-sensitive class  
12 using econometric models.<sup>3</sup> SPS then converted the billing-month coefficients to  
13 a calendar-month basis by prorating the modeled weather coefficients based on  
14 the number of billing days in each billing month that occur in a particular calendar  
15 month. Pages 8-13 of Attachment JEM-1 reflect the conversion of modeled  
16 weather coefficients to a calendar-month basis.

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<sup>3</sup> An econometric model is a widely accepted modeling approach in which a linear regression equation relates a dependent variable, such as sales, to a set of explanatory variables, such as economic and demographic concepts, customers, price, and weather. After the relationships are identified, forecasts of the explanatory variables can be used to predict future sales.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1           The data used in each of the models are:

- 2           • Historical billing-month sales by weather-sensitive class;
- 3           • Real personal income per household for the SPS New Mexico service
- 4           territory;
- 5           • Non-farm employment for the SPS New Mexico service territory;
- 6           • Weather (heating or cooling degree days);
- 7           • Seasonal binary variables;
- 8           • Precipitation variables;
- 9           • Customer counts;
- 10          • Number of billing days in each month;
- 11          • Population for the SPS New Mexico service territory;
- 12          • Other binary variables; and
- 13          • Autoregressive correction terms.

14   **Q.   How do the factors listed in the previous question affect sales?**

15   A.   Sales are expected to increase as each of the economic indicators increases and to  
16       decrease as each economic indicator decreases. For example, if personal income  
17       increases, electricity consumption will increase because customers have the  
18       means to purchase and use more electricity-consuming products. Likewise, as  
19       employment and population levels grow, electricity consumption is expected to  
20       increase.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1           Weather is also an independent variable that affects sales. The further the  
2           average daily temperature deviates from 65 degrees Fahrenheit, the more cooling  
3           degree days or heating degree days SPS will experience, which increases  
4           electricity consumption. Similarly, SPS expects more sales to irrigation  
5           customers when there is little precipitation, and it expects fewer sales to irrigation  
6           customers when there is more precipitation. This impacts customers in the  
7           irrigation, municipals and schools rate classes.

8   **Q.   Why is it necessary to convert the billing-month coefficients to calendar-**  
9   **month coefficients?**

10   A.   Because the Test Year sales being weather normalized are calendar-month sales,  
11       the billing-month coefficients need to be converted to calendar-month  
12       coefficients. After the billing-month coefficients are developed through the  
13       econometric modeling process, the next step is to convert the billing-month  
14       coefficients to a coefficient that represents a calendar month. SPS determines the  
15       percentage of billing days for a calendar month that is billed in the current month  
16       and that is billed in a future month. The monthly billing-month coefficient is  
17       converted to a monthly calendar-month coefficient using these percentages.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1   **Q.   Please explain the steps you went through to complete the weather-**  
2       **normalization calculation.**

3   **A.**   After calculating the calendar-month coefficients, I undertook a six-step process  
4       to calculate the effect on sales of weather variance from normal conditions during  
5       the Test Year. The numbers used as examples in the six steps recounted below  
6       appear on pages 4-5 of Attachment JEM-1:

- 7           • Step 1 – I calculated the difference between the 30-year average heating  
8           degree days in a particular month and the heating degree days in that  
9           month of the Test Year. For example, the 30-year average number of  
10          heating degree days in October 2016 is 131, whereas the number of  
11          heating degree days in October of the Test Year was 35, for a difference of  
12          -96.
- 13          • Step 2 – I multiplied the difference calculated in Step 1 by the number of  
14          customers in each class. For example, the Residential Service class had  
15          58,602 customers in October 2016, so I multiplied -96 by 58,602, for a  
16          total of -5,610,165.
- 17          • Step 3 – I then multiplied the result from Step 2 by the heating degree day  
18          coefficient for that class to determine the number of MWh resulting from  
19          the abnormal weather. Multiplying -5,610,165 by the October 2016  
20          coefficient for the Residential Service class, which is 0.0000026, yields -  
21          14.4 MWh.
- 22          • Step 4 – I then performed Steps 1-3 using the cooling degree data. For  
23          October 2016, that calculation results in 489.3 MWh.
- 24          • Step 5 – I netted the heating degree MWh against the cooling degree  
25          MWh for each class by month. That produces a total of 475 MWh for the  
26          Residential Service class for October 2016 (-14.4 MWh + 489.3 MWh =  
27          474.9 MWh, which rounds to 475 MWh).

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

- 1           • Step 6 – Finally, I totaled the number of MWh of all classes in each  
2           month, and then I added the monthly amounts to arrive at the 12-month  
3           total of -5,676 MWh attributable to abnormal weather. In other words,  
4           actual weather resulted in total Test Year retail sales being 5,676 MWh  
5           lower than if weather had been normal.

6   **Q.   How did SPS use the weather-adjusted sales figures?**

7   A.   After calculating the weather-adjusted sales by class, I supplied those sales figures  
8       to Mr. Luth, who used them to calculate present revenues. The numbers that I  
9       provided to Mr. Luth are summarized on page 4 of Attachment JEM-1.

10 **Q.   Did SPS adjust its Texas retail sales during the Test Year to account for the**  
11 **effects of abnormal weather on Texas retail sales?**

12 A.   Yes. SPS adjusted the Test Year sales for the weather-sensitive Texas retail  
13       classes using the same process described for New Mexico retail sales. These  
14       calculations are provided in Attachment JEM-2. SPS relied on NOAA weather  
15       data measured at weather stations in Amarillo and Lubbock, Texas. The weather  
16       data is aggregated to the state level by weighting the individual weather station  
17       data by the share of load in the Amarillo and Lubbock regions of the Texas  
18       service area.<sup>4</sup>

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<sup>4</sup> The weight for Amarillo is approximately 0.745, and the weight for Lubbock is approximately 0.255.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1    **Q.    Did SPS adjust its firm wholesale sales during the Test Year to account for**  
2       **the effects of abnormal weather on wholesale sales?**

3    A.    Yes. SPS adjusted the Test Year sales for SPS firm wholesale customers using  
4       weather adjustment coefficients developed for each wholesale customer and  
5       weather specific to the location of each wholesale customer. The weather  
6       adjustment coefficients for the wholesale customers were developed using  
7       historical calendar-month sales for each customer, weather variables (heating or  
8       cooling degree days or precipitation), and an economic indicator such as Gross  
9       State Product. Since the coefficients are based on calendar-month sales, there is  
10      no need to convert the coefficients from a billing-month basis to a calendar-month  
11      basis. Sales to the wholesale customers in New Mexico were weather normalized  
12      based on Roswell weather, and sales to wholesale customers in Texas were  
13      weather normalized based on weather for Amarillo and Lubbock. The  
14      calculations of the weather adjustment for firm wholesale sales are provided in  
15      Attachment JEM-3.

16   **Q.    Why does SPS adjust its Texas retail sales and its firm wholesale sales for**  
17       **purposes of this New Mexico retail rate case?**

18   A.    Certain of the allocation factors SPS uses to allocate the components of the total  
19       company cost of service among its three rate jurisdictions depend on relative

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 levels of sales for each jurisdiction. Consequently, to ensure that the allocation  
2 percentages for each jurisdiction are determined on the same basis, it is necessary  
3 to adjust the sales in all three jurisdictions to account for the effects of abnormal  
4 weather on sales.

5 **Q. Why does SPS use data from one weather station in New Mexico and two**  
6 **weather stations in Texas?**

7 A. SPS uses three weather stations because these three weather stations are  
8 representative of SPS's service territory weather conditions. For example, based  
9 on annual 2015 sales, 46.4% of SPS's weather-sensitive sales in Texas are to  
10 customers located in Randall County and Potter County, which include and  
11 surround Amarillo. Another 16.2% of SPS's weather-sensitive sales in Texas are  
12 to customers located in the counties immediately surrounding Lubbock. In  
13 addition, Roswell is a major population and economic center in the SPS New  
14 Mexico service territory, and is close to the geographic center of the SPS New  
15 Mexico service territory and, more specifically, close to the center of the weather  
16 sensitive loads.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1           **V.   WEATHER'S EFFECT ON TEST YEAR PEAK DEMAND**

2   **Q.   What topic do you discuss in this section of your testimony?**

3   A.   I explain how SPS calculated the effects of abnormal weather on coincident peak  
4       demands in the Test Year.<sup>5</sup>

5   **Q.   Did SPS calculate the effects of abnormal weather on its Test Year system  
6       peak demand?**

7   A.   Yes. Because weather varied from normal during the Test Year, it was necessary  
8       to adjust the Test Year coincident peak demand to account for weather for the  
9       following customer groups:

- 10           • Total retail; and  
11           • Aggregated full requirements wholesale.

12       For the same reason I explained in Section IV of my testimony, I adjusted the  
13       peak demands in all three of SPS's rate jurisdictions to ensure that the allocation  
14       percentages for each jurisdiction are determined on the same basis for purposes of  
15       this rate case.

16   **Q.   What source of weather did SPS use to measure the adjustment?**

17   A.   SPS used a combination of peak day average daily temperature, peak day heating  
18       degree days, and accumulated precipitation for the week prior to the peak day to

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<sup>5</sup> SPS does not weather-normalize non-coincident peak demands.



Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1       measure weather adjustments for peak demand. These weather values were  
2       calculated using weather data reported from the NOAA weather stations in  
3       Roswell, Amarillo, and Lubbock. The total SPS weather is an average of the  
4       Roswell, Amarillo, and Lubbock weather station data weighted by sales  
5       associated with the respective regions of the SPS service area.<sup>6</sup>

6       **Q. How did SPS calculate average peak day temperature?**

7       A. The peak day average temperature was calculated by adding the peak day  
8       maximum daily temperature and peak day minimum daily temperature, and then  
9       by dividing that amount by 2. For example, if the peak day maximum  
10      temperature was 55 degrees Fahrenheit and the peak day minimum temperature  
11      was 35 degrees Fahrenheit, the average peak day temperature would be 45  
12      degrees Fahrenheit.

13      **Q. Please explain how SPS calculated the peak day heating degree days.**

14      A. SPS calculated peak day heating degree days by subtracting the peak day average  
15      temperature from 65 degrees Fahrenheit. For example, if the peak day average  
16      daily temperature was 45 degrees Fahrenheit, then 20 heating degree days were

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<sup>6</sup> The weight for Amarillo is approximately 0.563, the weight for Lubbock is approximately 0.194, and the weight for Roswell is approximately 0.243.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1           calculated for that day. If the average peak day temperature was greater than 65  
2           degrees Fahrenheit, then that peak day recorded zero heating degree days.

3   **Q.   How did SPS calculate precipitation?**

4   A.   SPS calculated the accumulation of water equivalent precipitation for the seven  
5           days prior to the peak day, measured in inches.

6   **Q.   How did SPS define the normal weather?**

7   A.   As noted earlier, SPS agrees with NOAA's definition that normal weather is  
8           representative of typical weather based on a 30-year period. However, peak day  
9           data is only available beginning in 1987. Therefore, the normal peak day weather  
10          was based on the average of the 29-year period from January 1987 to December  
11          2015 for the peak day of each month for historical average daily temperature,  
12          heating degree days, and precipitation. The Test Year and normal weather for  
13          maximum temperatures, heating degree days, and precipitation are summarized  
14          on page 1 of Attachment JEM-4.

15   **Q.   How was the Test Year weather adjustment calculated?**

16   A.   SPS calculated the peak demand weather adjustment using the deviation between  
17          normal and actual weather and weather adjustment coefficients that quantify the  
18          impact of a one-unit change in weather on retail and full requirements wholesale  
19          peak demand.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1   **Q.   How did SPS calculate the coefficients used in the peak demand weather**  
2       **normalization calculations?**

3   A.   SPS developed the peak demand weather coefficients for the retail coincident  
4       peak demand and full requirements wholesale coincident peak demand using  
5       econometric models. The data used in the models include historical peak demand  
6       and sales for each customer group, as well as the weather concept variables  
7       (average temperature, heating degree days, and precipitation for the week prior to  
8       the peak day). Each regression model also has an autoregressive error correction  
9       term variable.

10   **Q.   What dependent variables does SPS use in the regression models?**

11   A.   The dependent variables used to develop peak demand weather coefficients are  
12       the monthly coincident peak demands for each customer class. The first  
13       explanatory variable in each regression model is a 12-month moving average for  
14       the respective sales for each customer class. The next set of explanatory variables  
15       in each regression model uses the following weather concept variables:

- 16           •   Average peak day temperature;
- 17           •   Peak day heating degree days; and
- 18           •   The accumulation of precipitation for the seven days prior to the peak day
- 19               of each month.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1   **Q.   How did the Test Year peak day weather for the June through September**  
2       **period compare to normal weather?**

3   A.   Average peak day temperatures were hotter than normal in July and August, 2016  
4       and June 2017 and cooler than normal in September 2016. Accumulated  
5       precipitation was less than normal in July 2016 and June 2017 and greater than  
6       normal in August and September 2016. As shown on page 2 of Attachment JEM-  
7       4, taken together these weather deviations resulted in an average of 15 megawatts  
8       (“MW”), or 0.5%, more retail peak demand per month and an average of 3 MW,  
9       or 0.3%, more full requirement wholesale peak demand per month from June,  
10      July, August, and September in the Test Year compared to normal weather.  
11      Because weather affected the level of peak demand, SPS adjusted the Test Year  
12      peak demand for deviations of the actual Test Year weather from the 29-year  
13      average weather.

14   **Q.   Please explain the steps you went through to complete the peak demand**  
15       **weather-normalization calculation.**

16   A.   I undertook a four-step process to calculate the effect on peak demand of weather  
17       variance from the normal conditions during the Test Year. The numbers used as  
18       examples in the four steps recounted below are for the retail peak demand and  
19       appear on page 3 of Attachment JEM-4:

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

- 1                   • Step 1 – I calculated the difference between: (i) the normal weather  
2 concepts (as measured in peak day average temperature, peak day heating  
3 degree days, and precipitation) in a particular month, and (ii) the actual  
4 weather concept in that month of the Test Year. For example, for the  
5 retail peak demand, the normal peak day average temperature in July is  
6 83.7 degrees Fahrenheit, whereas the actual peak day average temperature  
7 in July of the Test Year was 90.3 degrees Fahrenheit, a difference of 6.6  
8 degrees Fahrenheit. This step is repeated for each weather concept. The  
9 normal precipitation for the week preceding the peak day in July is 0.25 of  
10 an inch of precipitation, whereas the actual precipitation for the week  
11 preceding the peak day in July of the Test Year was 0.06 of an inch, for a  
12 difference of -0.19 of an inch of precipitation. The normal heating degree  
13 days on the peak day in July is 0.0, and the actual peak day heating degree  
14 days in July of the Test Year was also 0.0, resulting in no difference from  
15 normal.
- 16                   • Step 2 – The variance in weather from the normal from Step 1 for each  
17 weather concept is multiplied by the respective weather adjustment  
18 coefficient to determine the number of MW resulting from the variance in  
19 actual weather from the normal weather. Weather adjustment coefficients  
20 are developed with econometric models using the same methodology  
21 described earlier. To continue with the retail peak demand example from  
22 Step 1, multiplying the variance in peak day average temperature of 6.6  
23 degrees Fahrenheit by the July 2016 coefficient for average peak day  
24 temperature, which is 11.19015, yields 74.0 MW. This step is repeated for  
25 each weather concept. Multiplying the variance in precipitation of -0.19  
26 by the July 2016 precipitation coefficient which is -65.30827, yields 12.7  
27 MW. Because there is no weather adjustment coefficient in July for  
28 heating degree days, this weather concept does not have a weather  
29 adjustment in July.
- 30                   • Step 3 – For each month, I summed the weather adjustments calculated in  
31 Step 2 from each weather concept. Continuing with the example from  
32 Step 1 and Step 2, this step produces a total weather adjustment of 87 MW  
33 for the total retail peak demand for July 2016 (74.0 MW + 12.7 MW =

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 86.7 MW). In other words, weather normalized peak demand for July  
2 2016 is 87 MW lower than the actual peak demand.

3 • Step 4 – Finally, I averaged the weather adjusted MW for the summer  
4 months of the Test Year for July 2016, August 2016, September 2016, and  
5 June 2017 to arrive at a 4-month average of weather's impact on the peak  
6 demand. Continuing with the example from the previous steps, the  
7 average weather adjustment for the retail peak demand for the four months  
8 of June, July, August, and September of the Test Year was 15 MW per  
9 month. Using the same methodology described in Step 1 through Step 4,  
10 the average weather adjustment for the full requirement wholesale peak  
11 demand for the four months of June, July, August, and September of the  
12 Test Year was 3 MW per month. Pages 3 and 4 of Attachment JEM-4  
13 contain the weather adjustment calculations for the retail peak demand and  
14 the full requirements wholesale peak demand, respectively.

15 **Q. Did SPS calculate the effect of weather on the Golden Spread full load peak**  
16 **demand coincident with the SPS system peak demand?**

17 A. Yes. I calculated the effect of weather on the Golden Spread full load peak  
18 demand coincident with the SPS system peak demand using the same  
19 methodology previously described for weather adjusting the retail and full  
20 requirement wholesale peak demand. The weather values used to adjust the  
21 Golden Spread full load peak demand were calculated for the Texas Panhandle  
22 region. As I explained earlier, the Texas Panhandle weather is an average of the  
23 Amarillo and Lubbock weather station data weighted by sales associated with the  
24 respective regions of the SPS service area located in Texas. The peak demand  
25 weather coefficients for Golden Spread were developed using an econometric

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 model. The data used in the model includes historical peak demand for Golden  
2 Spread, as well as the weather concept variables for average temperature and  
3 accumulated precipitation for the week prior to the peak day, and an  
4 autoregressive error correction term variable. For the Texas Panhandle, average  
5 peak day temperatures were hotter than normal in July and August 2016 and June  
6 2017 and cooler than normal in September 2016. Accumulated precipitation was  
7 less than normal in July 2016 and June 2017 and greater than normal in August  
8 and September 2016.

9 **Q. What is the weather adjustment for the Golden Spread full load peak**  
10 **demand coincident with the SPS system peak demand for the Test Year?**

11 A. As shown on page 2 of Attachment JEM-4, the average weather adjustment for  
12 the Golden Spread full load peak demand coincident with the SPS system peak  
13 demand for the four months of June, July, August, and September of the Test  
14 Year was 18 MW per month. In other words, Golden Spread's actual peak  
15 demand was 18 MW higher than the weather normalized peak demand. Page 5 of  
16 Attachment JEM-4 provides the weather adjustment calculation for the Golden  
17 Spread full load peak demand.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1   **Q.   Why does SPS adjust its system retail peak demand and its firm wholesale**  
2       **peak demand for purposes of this New Mexico retail rate case?**

3   A.   Certain of the allocation factors SPS uses to allocate system production and  
4       transmission capacity costs among its three rate jurisdictions depend on relative  
5       levels of peak demand for each jurisdiction. Consequently, to ensure that the  
6       allocation percentages for each jurisdiction are determined on the same basis, it is  
7       necessary to adjust the peak demands in all three jurisdictions to account for the  
8       effects of abnormal weather.

9   **Q.   How did SPS use the weather-adjusted peak demand figures?**

10  A.   After calculating the weather adjustments for peak demand by customer class, I  
11       supplied those peak demand adjustments to Mr. Luth, who used them to calculate  
12       the class allocation of production and transmission capacity costs among classes.  
13       The numbers that I provided to Mr. Luth are on page 2 of Attachment JEM-4.



Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1                   **VI. WEATHER NORMALIZATION METHODOLOGY**

2   **Q.     What topic do you discuss in this section of your testimony?**

3   A.     I provide an overview of SPS's methodology to develop the weather adjustment  
4           coefficients used in the weather normalization calculation. These coefficients  
5           quantify the impact of a one-unit change in weather on sales per customer.

6   **Q.     Please describe the data and data sources SPS relied on to develop the Test**  
7           **Year weather adjustment coefficients.**

8   A.     SPS uses econometric models to develop the weather coefficients used in the  
9           weather normalization process. The inputs to the econometric models include  
10          historical billing-month sales and monthly number of customers by rate class,  
11          which were obtained from SPS billing system reports.

12   **Q.     What measure of weather did SPS use for the weather normalization of New**  
13          **Mexico Test Year retail sales?**

14   A.     As explained in Section IV, the measure of weather used was heating degree days  
15           and cooling degree days, using a sixty-five degree temperature base, and rainfall  
16           equivalent precipitation, measured in inches. This information was obtained from  
17           the NOAA and was measured at the Roswell, New Mexico weather station. The  
18           workpaper for Schedule P-6 provides the historical data and the calculations

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 applied to develop the weather variables used to weather normalize New Mexico  
2 Test Year retail sales.

3 **Q. Did the weather reflect the same billing days as the sales data?**

4 A. Yes. To align the weather data with the same period of time as the billing-month  
5 sales data, the heating degree days, cooling degree days, and precipitation data  
6 were weighted by the number of times a particular day was included in a  
7 particular billing month. These weighted heating degree days and cooling degree  
8 days were divided by the total billing cycle days to arrive at average heating  
9 degree days and cooling degree days for a billing month.

10 **Q. What was your source of economic and demographic data?**

11 A. Historical economic and demographic variables for the six-county SPS service  
12 territory, the state of New Mexico, and the nation were obtained from IHS Global  
13 Insight, Inc. The variables used in the models were service territory non-farm  
14 employment, population, and real personal income per household. This  
15 information is used to determine the historical relationship between customers  
16 and sales measures, and economic and demographic measures.

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1   **Q.   Please describe the regression models and associated analyses used in SPS's**  
2       **weather normalization process.**

3   A.   The formulae in the regression models and associated statistics used in SPS's  
4       weather normalization process are provided in Attachment JEM-5. Specifically,  
5       Attachment JEM-5 shows, by customer class or major rate group, the formulae in  
6       the regression models with their summary statistics and descriptions for each  
7       variable included in the model.

8   **Q.   What techniques did SPS employ to evaluate the validity of its regression**  
9       **models?**

10   A.   There are a number of quantitative and qualitative validity tests that are applicable  
11       to multiple regression analysis. Several of the more common tests SPS uses are  
12       as follows:

13               First, the coefficient of determination (" $R^2$  statistic") test statistic is a  
14       measure of the quality of the model's fit to the historical data. It represents the  
15       proportion of the variation of the historical sales around their mean value that can  
16       be attributed to the functional relationship between the historical sales and the  
17       explanatory variables included in the model. If the  $R^2$  statistic is high, the set of  
18       explanatory variables specified in the model are explaining a high degree of the  
19       historical sales variability. All regression models used to develop the weather

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 normalization coefficients demonstrate  $R^2$  statistics larger than 83%, which is  
2 satisfactory under this standard.

3 Second, the t-statistic of each variable indicates the degree of correlation  
4 between that variable's data series and the sales data series being modeled. The  
5 t-statistic is a measure of the statistical significance of each variable's individual  
6 contribution to the prediction model. Generally, the absolute value of each  
7 t-statistic should be greater than 1.960 to be considered statistically significant at  
8 the 95% confidence level and greater than 1.645 to be considered statistically  
9 significant at the 90% confidence level. This criterion was applied in the  
10 development of the regression models used to develop the sales forecast. All  
11 variables in the final regression models used to develop the weather normalization  
12 coefficients tested satisfactorily at greater than a 92% confidence level.

13 Third, each model was inspected for the presence of first-order  
14 autocorrelation, as measured by the Durbin-Watson ("DW") test statistic.  
15 Autocorrelation refers to the correlation of the model's error terms for different  
16 time periods. For example, under the presence of first-order autocorrelation, an  
17 overestimate in one time period is likely to lead to an overestimate in the  
18 succeeding time period, and vice versa. Thus, when forecasting with a regression  
19 model, absence of autocorrelation between the error terms is very important. The

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 DW test statistic ranges between 0 and 4, and provides a measure to test for  
2 autocorrelation. In the absence of first-order autocorrelation, the DW test statistic  
3 equals 2.0. Autoregressive correction terms were applied where appropriate so  
4 that the final regression models used to develop the weather normalization  
5 coefficients tested satisfactorily for the absence of first-order autocorrelation, as  
6 measured by the DW test statistic.

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

15 **Q. Please explain the difference between "billing-month" sales and "calendar-**  
16 **month" sales.**

17 A. SPS reads electric meters each working day according to a meter-reading  
18 schedule based on 21 billing cycles per billing month. Meters read early in the  
19 calendar month mostly reflect consumption that occurred during the previous

Case No. 17-00255-UT  
Direct Testimony  
of  
Jannell E. Marks

1 calendar month. Meters read late in the calendar month mostly reflect  
2 consumption that occurred during the current calendar month. Consequently, the  
3 “billing-month” sales for the current calendar month reflect consumption that  
4 occurred in both the previous calendar month and the current calendar month.  
5 Thus, billing-month sales lag calendar-month sales. In order to determine the  
6 sales for a calendar month, SPS estimates “unbilled” sales, which is the electricity  
7 consumed in the current calendar month that is not billed to the customer until the  
8 succeeding calendar month.

9 **Q. What is the purpose of estimating calendar-month sales?**

10 A. Calendar-month sales are used to align the Test Year revenues with the relevant  
11 projected Test Year expenses, which are reported on a calendar-month basis. SPS  
12 reflects calendar-month revenue on its books for accounting and financial  
13 reporting purposes.

14 **Q. Does this conclude your pre-filed direct testimony?**

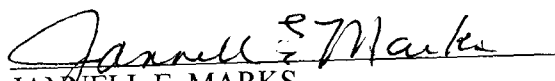
15 A. Yes.

VERIFICATION

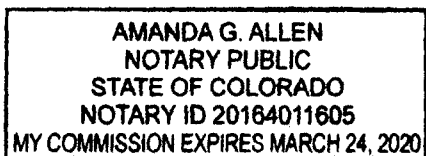
STATE OF COLORADO                    )  
  ) ss.  
COUNTY OF DENVER                    )


JANNELL E. MARKS, first being sworn on her oath, states:

I am the witness identified in the preceding testimony. I have read the direct testimony and the accompanying attachments and am familiar with their contents. Based upon my personal knowledge, the facts stated in the testimony are true. In addition, in my judgment and based upon my professional experience, the opinions and conclusions stated in the testimony are true, valid, and accurate.

  
JANNELL E. MARKS

SUBSCRIBED AND SWORN TO before me this 19 day of October, 2017 by  
JANNELL E. MARKS.



  
Notary Public of the State of Colorado  
My Commission Expires: 03/24/2020

Southwestern Public Service Company

Weather Normalization of New Mexico Retail Test Year Sales

Roswell Weather Data

Normal Weather Based on a 30-year Historical Average

Month	Year	Weather Act Cal HDD65	Weather Act Cal CDD65	Weather Act Cal Precip	Weather Norm Cal HDD65	Weather Norm Cal CDD65	Weather Norm Cal Precip	Dev HDD65	Dev CDD65	Dev Precip
Jul	2016	0	672	0.45	0	510	1.92	0	162	-1.47
Aug	2016	0	427	5.05	0	470	1.77	0	-43	3.28
Sep	2016	2	231	1.21	9	256	1.65	-7	-25	-0.44
Oct	2016	35	78	0.46	131	50	1.18	-96	28	-0.72
Nov	2016	349	2	0.71	456	1	0.48	-107	1	0.23
Dec	2016	732	0	0.30	743	0	0.63	-11	0	-0.33
Jan	2017	647	0	1.09	726	0	0.37	-79	0	0.72
Feb	2017	380	0	0.16	520	1	0.45	-140	-1	-0.29
Mar	2017	175	34	0.32	351	4	0.48	-176	30	-0.16
Apr	2017	112	74	1.45	138	50	0.52	-26	24	0.93
May	2017	10	173	0.54	25	212	1.30	-15	-39	-0.76
Jun	2017	0	505	0.56	0	443	1.48	0	62	-0.92
Annual - Update		2,442	2,196	12.30	3,099	1,996	12.23	-657	200	0.07
Annual Dev %								-21.2%	10.0%	0.6%



Actual Sales	Actual Sales			Actual Sales			Actual Sales			Actual Sales			Actual Sales			Actual Sales			Actual Sales			Actual Sales		
	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth	Cal Mth		
Res	Small C&I	Large C&I	Other Sale	Auth	Res	Small C&I	Large C&I	Other Sale	Auth	Res	Small C&I	Large C&I	Other Sale	Auth	Res	Small C&I	Large C&I	Other Sale	Auth	Res	Small C&I	Large C&I	Other Sale	Auth
130,729	165,562	215,037	14,276		1,111					116,009	158,533	215,036			1,111					13,464				
240,522	309,142	441,833	27,947		2,221					229,625	306,768	441,832			2,221					27,406				
319,696	444,064	652,740	39,445		3,332					310,559	442,303	652,739			3,332					39,326				
384,456	563,798	865,940	50,274		4,442					375,210	561,637	865,939			4,442					49,818				
458,764	679,299	1,073,370	58,881		5,550					453,295	677,265	1,073,369			5,550					58,425				
572,597	803,471	1,284,428	69,295		6,658					567,764	801,463	1,284,427			6,658					68,839				
684,095	928,150	1,494,051	78,760		7,768					684,158	926,386	1,494,050			7,768					78,312				
771,463	1,040,971	1,687,998	88,779		8,879					779,051	1,039,179	1,687,997			8,879					84,926				
825,966	1,177,926	1,902,429	95,414		9,990					839,357	1,176,073	1,902,428			9,990					94,661				
885,223	1,303,935	2,102,363	111,021		11,102					898,796	1,302,942	2,102,362			11,102					105,352				
957,636	1,437,710	2,318,062	122,009		12,209					972,792	1,436,980	2,318,061			12,209					116,617				
1,064,781	1,586,539	2,547,985	127,919		13,320					1,074,972	1,583,045	2,547,984			13,320					126,900				

Southwestern Public Service Company

Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Rate Case HTY - Calendar Month Weather Normal Sales  
30-Year Normal Weather

MONTHLY MWH

	Act var fr WN Res	Act var fr WN Small C&I	Act var fr WN Large C&I	Act var fr WN Street	Act var fr WN Other Sale Auth	Act var fr WN Retail	% var Res	% var Small C&I	% var Large C&I	% var Street	% var Other Sale Auth	% var Retail
Jul-16	14,721	7,029	1	0	813	22,564	12.69%	4.43%	0.00%	0.00%	6.04%	4.5%
Aug-16	(3,824)	(4,655)	(0)	0	(272)	(8,752)	-3.37%	-3.14%	0.00%	0.00%	-1.95%	-1.7%
Sep-16	(1,761)	(613)	(0)	0	(422)	(2,796)	-2.18%	-0.45%	0.00%	0.00%	-3.54%	-0.6%
Oct-16	110	400	0	0	338	847	0.17%	0.34%	0.00%	0.00%	3.22%	0.2%
Nov-16	(3,777)	(127)	0	0	0	(3,904)	-4.84%	-0.11%	0.00%	0.00%	0.00%	-1.0%
Dec-16	(637)	(26)	0	0	0	(663)	-0.56%	-0.02%	0.00%	0.00%	0.00%	-0.1%
Jan-17	(4,896)	(244)	0	0	(8)	(5,148)	-4.21%	-0.20%	0.00%	0.00%	-0.08%	-1.1%
Feb-17	(7,524)	28	0	0	158	(7,338)	-7.93%	0.02%	0.00%	0.00%	2.39%	-1.8%
Mar-17	(5,804)	61	0	0	146	(5,596)	-9.62%	0.04%	0.00%	0.00%	1.50%	-1.3%
Apr-17	(181)	(860)	0	0	(700)	(1,741)	-0.30%	-0.68%	0.00%	0.00%	-6.54%	-0.4%
May-17	(1,583)	(262)	(0)	0	311	(1,534)	-2.14%	-0.20%	0.00%	0.00%	2.76%	-0.4%
Jun-17	4,965	2,764	1	0	655	8,384	4.86%	1.89%	0.00%	0.00%	6.37%	1.7%
<b>Total</b>	<b>(10,191)</b>	<b>3,495</b>	<b>1</b>	<b>0</b>	<b>1,019</b>	<b>(5,676)</b>	<b>-0.95%</b>	<b>0.22%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.80%</b>	<b>-0.1%</b>

YEAR TO DATE MWH

	Act var fr WN Res	Act var fr WN Small C&I	Act var fr WN Large C&I	Act var fr WN Street	Act var fr WN Other Sale Auth	Act var fr WN Retail	% var Res	% var Small C&I	% var Large C&I	% var Street	% var Other Sale Auth	% var Retail
Jul-16	14,721	7,029	1	0	813	22,564	12.69%	4.43%	0.00%	0.00%	6.04%	4.5%
Aug-16	10,897	2,374	1	0	540	13,813	4.75%	0.77%	0.00%	0.00%	1.97%	1.4%
Sep-16	9,136	1,761	1	0	118	11,017	2.94%	0.40%	0.00%	0.00%	0.30%	0.8%
Oct-16	9,246	2,161	1	0	456	11,864	2.46%	0.38%	0.00%	0.00%	0.91%	0.6%
Nov-16	5,470	2,034	1	0	456	7,960	1.21%	0.30%	0.00%	0.00%	0.78%	0.4%
Dec-16	4,833	2,008	1	0	456	7,297	0.85%	0.25%	0.00%	0.00%	0.66%	0.3%
Jan-17	(63)	1,764	1	0	448	2,149	-0.01%	0.19%	0.00%	0.00%	0.57%	0.1%
Feb-17	(7,588)	1,792	1	0	606	(5,189)	-0.97%	0.17%	0.00%	0.00%	0.71%	-0.1%
Mar-17	(13,391)	1,853	1	0	752	(10,785)	-1.60%	0.16%	0.00%	0.00%	0.79%	-0.3%
Apr-17	(13,572)	993	1	0	53	(12,526)	-1.51%	0.08%	0.00%	0.00%	0.05%	-0.3%
May-17	(15,156)	731	1	0	364	(14,060)	-1.56%	0.05%	0.00%	0.00%	0.31%	-0.3%
Jun-17	(10,191)	3,495	1	0	1,019	<b>(5,676)</b>	<b>-0.95%</b>	<b>0.22%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.80%</b>	<b>-0.1%</b>

Southwestern Public Service Company  
Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Weather Impacted Sales Calculation  
Using Roswell Weather (Normal Period 1986-2015)

New Mexico Retail Weather Adjustment Summary													
	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Total
Heating Degree Days 30-yr normal	0	0	9	131	456	743	726	520	351	138	25	0	3,099
Heating Degree Days Actual	0	0	2	35	349	732	647	380	175	112	10	0	2,442
Variance from Normal	(0)	(0)	(7)	(96)	(107)	(11)	(79)	(140)	(176)	(26)	(15)	(0)	(657)
Cooling Degree Days 30-yr normal	510	470	256	50	1	0	0	1	4	50	212	443	1,996
Cooling Degree Days Actual	672	427	231	78	2	0	0	0	34	74	173	505	2,196
Variance from Normal	162	(43)	(25)	28	1	(0)	0	(1)	30	24	(39)	62	200
Precipitation 30-yr normal	1.92	1.77	1.65	1.18	0.48	0.63	0.37	0.45	0.48	0.52	1.30	1.48	12.23
Precipitation Actual	0.45	5.05	1.21	0.46	0.71	0.30	1.09	0.16	0.32	1.45	0.54	0.56	12.30
Variance from Normal	(1.47)	3.28	(0.44)	(0.72)	0.23	(0.33)	0.72	(0.29)	(0.16)	0.93	(0.76)	(0.92)	0.07
New Mexico Residential Service (1)	8,905	(2,332)	(1,120)	475	(1,301)	(239)	(1,671)	(2,286)	(1,267)	0	(996)	3,079	1,247
New Mexico Residential Space Heat (2)	5,815	(1,491)	(641)	(365)	(2,476)	(398)	(3,225)	(5,238)	(4,537)	(181)	(587)	1,886	(11,438)
New Mexico Small General Service (3)	1,319	(343)	(166)	71	(127)	(26)	(223)	(404)	(250)	0	(150)	471	171
New Mexico Secondary General Service (4) & (5)	4,996	(1,337)	(703)	329	0	0	0	0	0	0	(599)	1,795	4,480
New Mexico Irrigation Service (6)	716	(2,976)	257	0	0	0	(21)	432	311	(860)	488	499	(1,156)
Large Municipal and School Service (7)	739	(247)	(387)	308	0	0	(7)	140	132	(628)	284	596	930
Small Municipal and School Service (8)	74	(26)	(35)	30	0	0	(1)	18	14	(72)	27	59	88
New Mexico Retail Weather Adjustment Total	22,564	(8,752)	(2,796)	847	(3,904)	(663)	(5,148)	(7,338)	(5,596)	(1,741)	(1,534)	8,384	(5,676)

New Mexico Residential Service													
Heating Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	0	0	0	0	0	0	0	0	0	0	0	0	0
Heating Degree Days Weather Coefficients	0.0000000	0.0000000	0.0000000	0.0000026	0.0002074	0.0003754	0.0003608	0.0002770	0.0001225	0.0000000	0.0000000	0.0000000	0.0000000
Res Service Customers	58,757	58,777	58,690	58,602	58,616	58,640	58,716	58,748	58,835	58,795	58,862	58,880	58,880
Heating Degree Days Weather Adjustment (MWh)	0	0	0	(14)	(1,301)	(239)	(1,671)	(2,286)	(1,267)	0	0	0	0
Cooling Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	162	(43)	(25)	28	1	(0)	0	(1)	30	24	(39)	62	200
Cooling Degree Days Weather Coefficients	0.0009354	0.0009185	0.0007651	0.0002940	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0004373	0.0008389	0.0008389
Res Service Customers	58,757	58,777	58,690	58,602	58,616	58,640	58,716	58,748	58,835	58,795	58,862	58,880	58,880
Cooling Degree Days Weather Adjustment (MWh)	8,905	(2,332)	(1,120)	489	0	0	0	0	0	0	(996)	3,079	3,079
NM Residential Service Weather Adjustment (1)	8,905	(2,332)	(1,120)	475	(1,301)	(239)	(1,671)	(2,286)	(1,267)	0	(996)	3,079	3,079

Southwestern Public Service Company  
Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Weather Impacted Sales Calculation  
Using Roswell Weather (Normal Period 1986-2015)

<b>New Mexico Residential Space Heat</b>												
<b>Heating Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Heating Degree Days Weather Coefficients												
Res Space Heat Customers	0.0000000	0.0000000	0.0000006	0.0002188	0.0007806	0.0012345	0.0013781	0.0012564	0.0008688	0.0002374	0.0000000	0.0000000
Heating Degree Days Weather Adjustment (MWh)	29,726	29,743	29,697	29,679	29,640	29,649	29,672	29,683	29,703	29,661	29,663	29,654
	0	0	(0)	(622)	(2,476)	(398)	(3,225)	(5,238)	(4,537)	(181)	0	0
<b>Cooling Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Cooling Degree Days Weather Coefficients	0.0012074	0.0011607	0.0008660	0.0003046	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0005113	0.0010203
Res Space Heat Customers	29,726	29,743	29,697	29,679	29,640	29,649	29,672	29,683	29,703	29,661	29,663	29,654
Cooling Degree Days Weather Adjustment (MWh)	5,815	(1,491)	(641)	257	0	0	0	0	0	0	(587)	1,886
<b>NM Residential Space Heat Weather Adjustment (2)</b>	<b>5,815</b>	<b>(1,491)</b>	<b>(641)</b>	<b>(365)</b>	<b>(2,476)</b>	<b>(398)</b>	<b>(3,225)</b>	<b>(5,238)</b>	<b>(4,537)</b>	<b>(181)</b>	<b>(587)</b>	<b>1,886</b>

<b>New Mexico Small General Service</b>												
<b>Heating Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Heating Degree Days Weather Coefficients												
Small General Service Customers	0.0000000	0.0000000	0.0000000	0.0000013	0.0001036	0.0002097	0.0002457	0.0002501	0.0001234	0.0000000	0.0000000	0.0000000
Heating Degree Days Weather Adjustment (MWh)	11,464	11,495	11,511	11,502	11,479	11,481	11,493	11,505	11,509	11,509	11,553	11,567
	0	0	0	-1	-127	-26	-223	-404	-250	0	0	0
<b>Cooling Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Cooling Degree Days Weather Coefficients	0.0007101	0.0006906	0.0005796	0.0002203	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0003361	0.0006535
Small General Service Customers	11,464	11,495	11,511	11,502	11,479	11,481	11,493	11,505	11,509	11,509	11,553	11,567
Cooling Degree Days Weather Adjustment (MWh)	1,319	(343)	(166)	72	0	0	0	0	0	0	(150)	471
<b>NM Small General Service Weather Adjustment (3)</b>	<b>1,319</b>	<b>(343)</b>	<b>(166)</b>	<b>71</b>	<b>(127)</b>	<b>(26)</b>	<b>(223)</b>	<b>(404)</b>	<b>(250)</b>	<b>0</b>	<b>(150)</b>	<b>471</b>

Southwestern Public Service Company  
Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Weather Impacted Sales Calculation  
Using Roswell Weather (Normal Period 1986-2015)

New Mexico Small Secondary General Service												
Cooling Degree Days Weather Adjustment (30-yr normal)												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Cooling Degree Days Weather Coefficients	162	(43)	(25)	28	1	(0)	0	(1)	30	24	(39)	62
Small Secondary General Customers	0.0089757	0.0090614	0.0082468	0.0033825	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0044567	0.0082643
Cooling Degree Days Weather Adjustment (MWh)	3,434	3,414	3,420	3,428	3,433	3,448	3,454	3,463	3,468	3,475	3,474	3,483
	4,994	-1,336	-703	329	0	0	0	0	0	0	-599	1,794
NM Small Secondary General Service Weather Adjustment (4)	4,994	(1,336)	(703)	329	0	0	0	0	0	0	(599)	1,794

New Mexico Large Secondary General Service												
Cooling Degree Days Weather Adjustment (30-yr normal)												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Cooling Degree Days Weather Coefficients	162	(43)	(25)	28	1	(0)	0	(1)	30	24	(39)	62
Large Secondary General Customers	0.0089757	0.0090614	0.0082468	0.0033825	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0044567	0.0082643
Cooling Degree Days Weather Adjustment (MWh)	1	0	0	0	0	0	0	0	0	0	0	1
NM Large Secondary General Service Weather Adjustment (5)	1	(0)	(0)	0	0	0	0	0	0	0	(0)	1

New Mexico Irrigation Service												
Precipitation Weather Adjustment (30-yr normal)												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Precipitation Weather Coefficients	(1.47)	3.28	(0.44)	(0.72)	0.23	(0.33)	0.72	(0.29)	(0.16)	0.93	(0.76)	(0.92)
Irrigation Customers	-0.4776028	-0.8888062	-0.5752869	0.0000000	0.0000000	0.0000000	-0.0291497	-1.4833168	-1.8620969	-0.9165016	-0.6322749	-0.5333201
Precipitation Weather Adjustment (MWh)	1,021	1,021	1,022	1,021	1,020	1,020	1,020	1,013	1,015	1,014	1,015	1,016
	716	(2,976)	257	0	0	0	(21)	432	311	(860)	488	499
NM Irrigation Weather Adjustment (6)	716	(2,976)	257	0	0	0	(21)	432	311	(860)	488	499

Southwestern Public Service Company  
Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Weather Impacted Sales Calculation  
Using Roswell Weather (Normal Period 1986-2015)

New Mexico Municipal and School Service													
Cooling Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	
Cooling Degree Days Weather Coefficients	162	0.0036276	0.0097512	0.0068300	0.0000000	0.0000000	0	(1)	0.0000000	0.0000000	0.0028379	0.0033768	
Municipal & School Customers	1,735	1,737	1,737	1,740	1,741	1,738	1,736	1,712	1,737	1,733	1,734	1,730	
Cooling Degree Days Weather Adjustment (MWh)	813	(272)	(422)	338	0	0	0	0	0	0	(190)	364	
Precipitation Weather Adjustment (30-yr normal)													
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	
Precipitation Weather Coefficients	(1.47)	3.28	(0.44)	(0.72)	0.23	(0.33)	0.72	(0.29)	(0.16)	0.93	(0.76)	(0.92)	
Municipal & School Customers	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	-0.0063138	-0.3212843	-0.5127061	-0.4361233	-0.3807966	-0.1825539	
Precipitation Weather Adjustment (MWh)	1,735	1,737	1,737	1,740	1,741	1,738	1,736	1,712	1,737	1,733	1,734	1,730	
	0	0	0	0	0	0	(8)	158	146	(700)	502	291	
Municipal & School Weather Adjustment	813	(272)	(422)	338	0	0	(8)	158	146	(700)	311	655	
New Mexico - Municipal and School Weather Impact Allocation													
Billed Sales in KWh	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	
LMSNM	11,313	12,240	12,449	10,150	9,572	8,271	8,800	8,026	8,841	7,586	9,719	10,568	
SMSNM	1,129	1,268	1,133	974	769	930	1,083	1,043	952	870	937	1,043	
Total	12,442	13,508	13,582	11,124	10,341	9,201	9,883	9,069	9,793	8,456	10,657	11,610	
Allocation Factors													
LMSNM	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	
SMSNM	90.92%	90.61%	91.66%	91.25%	92.57%	89.89%	89.04%	88.50%	90.28%	89.71%	91.20%	91.02%	
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
Municipal and School Allocation of Sales impacted by weather													
LMSNM (7)	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	
SMSNM (8)	739	(247)	(387)	308	0	0	(7)	140	132	(628)	284	596	
	74	(26)	(35)	30	0	0	(1)	18	14	(72)	27	59	

Southwestern Public Service Company

Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Residential Service Coefficients (Modeled with MWH)

Year	Month	Model Coefficients		Monthly weights Model to calendar			Calendar Month	
		RES HDD	RES CDD	Current	1st Future	2nd Future	RES HDD	RES CDD
2016	7	0.000000	0.000906	42.86%	57.14%	0.00%	0.000000	0.0009354
2016	8	0.000000	0.000957	47.16%	52.69%	0.15%	0.000000	0.0009185
2016	9	0.000000	0.000884	47.30%	52.54%	0.16%	0.000000	0.0007651
2016	10	0.000000	0.000660	44.55%	54.69%	0.77%	0.000026	0.0002940
2016	11	0.000000	0.000000	37.94%	61.59%	0.48%	0.0002074	0.0000000
2016	12	0.000334	0.000000	39.29%	60.71%	0.00%	0.0003754	0.0000000
2017	1	0.000402	0.000000	45.78%	53.00%	1.23%	0.0003608	0.0000000
2017	2	0.000327	0.000000	37.41%	62.59%	0.00%	0.0002770	0.0000000
2017	3	0.000247	0.000000	49.62%	49.92%	0.46%	0.0001225	0.0000000
2017	4	0.000000	0.000000	41.75%	58.25%	0.00%	0.0000000	0.0000000
2017	5	0.000000	0.000000	42.86%	57.14%	0.00%	0.0000000	0.0004373
2017	6	0.000000	0.000765	47.94%	51.59%	0.48%	0.0000000	0.0008389
2017	7	0.000000	0.000906	44.09%	55.91%	0.00%	0.0000000	
2017	8	0.000000	0.000957	48.39%	51.15%	0.46%	0.0000000	
2017	9	0.000000	0.000884	44.29%	55.71%	0.00%	0.0000000	

Southwestern Public Service Company

Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Residential Space Heat Coefficients (Modeled with MWH)

Year	Month	Model Coefficients		Monthly weights Model to calendar			Calendar Month	
		RES HDD	RES CDD	Current	1st Future	2nd Future	RES HDD	RES CDD
2016	7	0.000000	0.001135	42.86%	57.14%	0.00%	0.000000	0.0012074
2016	8	0.000000	0.001262	47.16%	52.69%	0.15%	0.000000	0.0011607
2016	9	0.000000	0.001071	47.30%	52.54%	0.16%	0.0000006	0.0008660
2016	10	0.000000	0.000684	44.55%	54.69%	0.77%	0.0002188	0.0003046
2016	11	0.000386	0.000000	37.94%	61.59%	0.48%	0.0007806	0.0000000
2016	12	0.001019	0.000000	39.29%	60.71%	0.00%	0.0012345	0.0000000
2017	1	0.001374	0.000000	45.78%	53.00%	1.23%	0.0013781	0.0000000
2017	2	0.001386	0.000000	37.41%	62.59%	0.00%	0.0012564	0.0000000
2017	3	0.001179	0.000000	49.62%	49.92%	0.46%	0.0008688	0.0000000
2017	4	0.000569	0.000000	41.75%	58.25%	0.00%	0.0002374	0.0000000
2017	5	0.000000	0.000000	42.86%	57.14%	0.00%	0.0000000	0.0005113
2017	6	0.000000	0.000895	47.94%	51.59%	0.48%	0.0000000	0.0000000
2017	7	0.000000	0.001135	44.09%	55.91%	0.00%	0.0000000	0.0010203
2017	8	0.000000	0.001262	48.39%	51.15%	0.46%	0.0000000	0.0000000
2017	9	0.000000	0.001071	44.29%	55.71%	0.00%	0.0000000	0.0000000



Southwestern Public Service Company

Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Small General Service Coefficients (Modeled with MWH)

Year	Month	Model Coefficients		Monthly weights Model to calendar			Calendar Month	
		RES HDD	RES CDD	Current	1st Future	2nd Future	RES HDD	RES CDD
2016	7	0.000000	0.000713	42.86%	57.14%	0.00%	0.000000	0.0007101
2016	8	0.000000	0.000708	47.16%	52.69%	0.15%	0.000000	0.0006906
2016	9	0.000000	0.000676	47.30%	52.54%	0.16%	0.000000	0.0005796
2016	10	0.000000	0.000495	44.55%	54.69%	0.77%	0.000013	0.0002203
2016	11	0.000000	0.000000	37.94%	61.59%	0.48%	0.0001036	0.0000000
2016	12	0.000166	0.000000	39.29%	60.71%	0.00%	0.0002097	0.0000000
2017	1	0.000238	0.000000	45.78%	53.00%	1.23%	0.0002457	0.0000000
2017	2	0.000253	0.000000	37.41%	62.59%	0.00%	0.0002501	0.0000000
2017	3	0.000249	0.000000	49.62%	49.92%	0.46%	0.0001234	0.0000000
2017	4	0.000000	0.000000	41.75%	58.25%	0.00%	0.0000000	0.0000000
2017	5	0.000000	0.000000	42.86%	57.14%	0.00%	0.0000000	0.0003361
2017	6	0.000000	0.000588	47.94%	51.59%	0.48%	0.0000000	0.0006535
2017	7	0.000000	0.000713	44.09%	55.91%	0.00%	0.0000000	0.0000000
2017	8	0.000000	0.000708	48.39%	51.15%	0.46%	0.0000000	0.0000000
2017	9	0.000000	0.000676	44.29%	55.71%	0.00%	0.0000000	0.0000000

Southwestern Public Service Company

Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Secondary General Service Coefficients (Modeled with MWH)

Year	Month	Model Coefficients		Monthly weights Model to calendar			Calendar Month		Actual Cust	RES CDD per Cst
		RES HDD	RES CDD	Current	1st Future	2nd Future	RES HDD	RES CDD		
2016	7	0.000000	30.334422	42.86%	57.14%	0.00%	0.000000	30.8314773	3,435	0.0089757
2016	8	0.000000	31.204312	47.16%	52.69%	0.15%	0.000000	30.9447159	3,415	0.0090614
2016	9	0.000000	30.726343	47.30%	52.54%	0.16%	0.000000	28.2122316	3,421	0.0082468
2016	10	0.000000	26.034776	44.55%	54.69%	0.77%	0.000000	11.5984927	3,429	0.0033825
2016	11	0.000000	0.000000	37.94%	61.59%	0.48%	0.000000	0.000000	3,434	0.0000000
2016	12	0.000000	0.000000	39.29%	60.71%	0.00%	0.000000	0.000000	3,449	0.0000000
2017	1	0.000000	0.000000	45.78%	53.00%	1.23%	0.000000	0.000000	3,455	0.0000000
2017	2	0.000000	0.000000	37.41%	62.59%	0.00%	0.000000	0.000000	3,464	0.0000000
2017	3	0.000000	0.000000	49.62%	49.92%	0.46%	0.000000	0.000000	3,469	0.0000000
2017	4	0.000000	0.000000	41.75%	58.25%	0.00%	0.000000	0.000000	3,476	0.0000000
2017	5	0.000000	0.000000	42.86%	57.14%	0.00%	0.000000	15.4868854	3,475	0.0044567
2017	6	0.000000	27.103405	47.94%	51.59%	0.48%	0.000000	28.7926813	3,484	0.0082643
2017	7	0.000000	30.334422	44.09%	55.91%	0.00%	0.000000			
2017	8	0.000000	31.204312	48.39%	51.15%	0.46%	0.000000			
2017	9	0.000000	30.726343	44.29%	55.71%	0.00%	0.000000			

Southwestern Public Service Company

Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Muni & School Service Coefficients (Modeled with MWH)

Year	Month	Model Coefficients				Monthly weights Model to calendar				Calendar Month			
		RES HDD	RES CDD	Precip		Current	1st Future	2nd Future		RES HDD	RES CDD	Precip	
2016	7	0.000000	0.001896	0.000000		42.86%	57.14%	0.00%		0.000000	0.0028907	0.0000000	
2016	8	0.000000	0.003637	0.000000		47.16%	52.69%	0.15%		0.0000000	0.0036276	0.0000000	
2016	9	0.000000	0.003586	0.000000		47.30%	52.54%	0.16%		0.0000000	0.0097512	0.0000000	
2016	10	0.000000	0.015331	0.000000		44.55%	54.69%	0.77%		0.0000000	0.0068300	0.0000000	
2016	11	0.000000	0.000000	0.000000		37.94%	61.59%	0.48%		0.0000000	0.0000000	0.0000000	
2016	12	0.000000	0.000000	0.000000		39.29%	60.71%	0.00%		0.0000000	0.0000000	0.0000000	
2017	1	0.000000	0.000000	0.000000		45.78%	53.00%	1.23%		0.0000000	0.0000000	-0.0063138	
2017	2	0.000000	0.000000	0.000000		37.41%	62.59%	0.00%		0.0000000	0.0000000	-0.3212843	
2017	3	0.000000	0.000000	-0.513316		49.62%	49.92%	0.46%		0.0000000	0.0000000	-0.5127061	
2017	4	0.000000	0.000000	-0.513316		41.75%	58.25%	0.00%		0.0000000	0.0000000	-0.4361233	
2017	5	0.000000	0.000000	-0.380797		42.86%	57.14%	0.00%		0.0000000	0.0028379	-0.3807966	
2017	6	0.000000	0.004967	-0.380797		47.94%	51.59%	0.48%		0.0000000	0.0033768	-0.1825539	
2017	7	0.000000	0.001896	0.000000		44.09%	55.91%	0.00%		0.0000000			
2017	8	0.000000	0.003637	0.000000		48.39%	51.15%	0.46%					
2017	9	0.000000	0.003586	0.000000		44.29%	55.71%	0.00%					

Southwestern Public Service Company

Weather Normalization of New Mexico Retail Test Year Sales

New Mexico Irrigation Service Coefficients (Modeled with MWH)

Year	Month	Model Coefficients			Monthly weights Model to calendar			Calendar Month		
		RES HDD	RES CDD	Precip	Current	1st Future	2nd Future	RES HDD	RES CDD	Precip
2016	7	0.000000	0.000000	-0.413359	42.86%	57.14%	0.00%	0.000000	0.000000	-0.4776028
2016	8	0.000000	0.000000	-0.525792	47.16%	52.69%	0.15%	0.000000	0.000000	-0.8888062
2016	9	0.000000	0.000000	-1.216251	47.30%	52.54%	0.16%	0.000000	0.000000	-0.5752869
2016	10	0.000000	0.000000	0.000000	44.55%	54.69%	0.77%	0.000000	0.000000	0.0000000
2016	11	0.000000	0.000000	0.000000	37.94%	61.59%	0.48%	0.000000	0.000000	0.0000000
2016	12	0.000000	0.000000	0.000000	39.29%	60.71%	0.00%	0.000000	0.000000	0.0000000
2017	1	0.000000	0.000000	0.000000	45.78%	53.00%	1.23%	0.000000	0.000000	-0.0291497
2017	2	0.000000	0.000000	0.000000	37.41%	62.59%	0.00%	0.000000	0.000000	-1.4833168
2017	3	0.000000	0.000000	-2.369894	49.62%	49.92%	0.46%	0.000000	0.000000	-1.8620969
2017	4	0.000000	0.000000	-1.369053	41.75%	58.25%	0.00%	0.000000	0.000000	-0.9165016
2017	5	0.000000	0.000000	-0.592140	42.86%	57.14%	0.00%	0.000000	0.000000	-0.6322749
2017	6	0.000000	0.000000	-0.662379	47.94%	51.59%	0.48%	0.000000	0.000000	-0.5333201
2017	7	0.000000	0.000000	-0.413359	44.09%	55.91%	0.00%	0.000000	0.000000	
2017	8	0.000000	0.000000	-0.525792	48.39%	51.15%	0.46%	0.000000	0.000000	
2017	9	0.000000	0.000000	-1.216251	44.29%	55.71%	0.00%	0.000000	0.000000	

Southwestern Public Service Company

Weather Normalization of Texas Retail Test Year Sales

Texas Panhandle Weather Data (Amarillo TX and Lubbock TX)  
Normal Weather Based on a 30-year Historical Average

Month	Year	Weather Act Cal HDD65	Weather Act Cal CDD65	Weather Act Cal Precip	Weather Norm Cal HDD65	Weather Norm Cal CDD65	Weather Norm Cal Precip	Dev HDD65	Dev CDD65	Dev Precip
Jul	2016	0	582	2.76	0	439	2.57	0	143	0.19
Aug	2016	0	372	3.83	1	400	2.59	-1	-28	1.23
Sep	2016	5	225	0.99	30	194	2.07	-25	31	-1.08
Oct	2016	67	108	0.36	205	37	1.45	-138	71	-1.09
Nov	2016	363	4	0.96	528	1	0.78	-165	3	0.18
Dec	2016	794	0	0.33	821	0	0.73	-27	0	-0.40
Jan	2017	748	0	2.88	819	0	0.65	-71	0	2.22
Feb	2017	447	6	0.61	655	0	0.64	-208	6	-0.03
Mar	2017	305	16	1.65	479	5	1.19	-174	11	0.46
Apr	2017	207	44	1.33	238	30	1.36	-31	14	-0.03
May	2017	71	96	1.00	73	141	2.61	-2	-45	-1.60
Jun	2017	0	395	1.57	4	333	2.98	-4	62	-1.41
Annual		3,007	1,848	18.27	3,854	1,581	19.62	-847	267	-1.35
Annual Dev %								-22.0%	16.9%	-6.9%

[illegible]

**Weather Normalization of Texas Retail Test Year Sales**

## MONTHLY MWH

	Act var fr WN Res	Act var fr WN Small C&I	Act var fr WN Large C&I	Act var Cal Mth Street	Act var Cal Mth Muni&Sch	Act var fr WN Retail	% var Res	% var Small C&I	% var Large C&I	% var Street	% var Muni&Sch	% var Retail
Jul-16	41,497	22,933	793	0	1,681	66,904	15.2%	7.1%	0.1%	0.0%	4.6%	5.1%
Aug-16	(7,934)	(6,578)	(386)	0	(710)	(15,609)	-3.1%	-1.9%	-0.1%	0.0%	-1.7%	-1.1%
Sep-16	7,593	5,161	385	0	1,218	14,357	4.0%	1.9%	0.1%	0.0%	3.7%	1.2%
Oct-16	5,746	3,778	5	0	1,723	11,252	4.1%	1.7%	0.0%	0.0%	5.7%	1.0%
Nov-16	(8,532)	(3,813)	(5)	0	0	(12,351)	-5.4%	-1.6%	0.0%	0.0%	0.0%	-1.1%
Dec-16	(2,337)	(818)	(1)	0	0	(3,155)	-1.0%	-0.3%	0.0%	0.0%	0.0%	-0.3%
Jan-17	(6,059)	(1,212)	(1)	0	0	(7,272)	-2.6%	-0.5%	0.0%	0.0%	0.0%	-0.6%
Feb-17	(14,466)	(792)	0	0	0	(15,258)	-7.7%	-0.4%	0.0%	0.0%	0.0%	-1.5%
Mar-17	(7,506)	(3,886)	0	0	(273)	(11,665)	-4.9%	-1.5%	0.0%	0.0%	-1.2%	-1.1%
Apr-17	332	103	5	0	191	631	0.2%	0.0%	0.0%	0.0%	0.6%	0.1%
May-17	(7,928)	(1,093)	308	0	(50)	(8,762)	-4.6%	-0.4%	0.0%	0.0%	-0.2%	-0.8%
Jun-17	16,585	10,695	590	0	1,364	29,235	7.3%	3.8%	0.1%	0.0%	4.4%	2.4%
Total	16,991	24,478	1,692	0	5,145	48,306	0.7%	0.8%	0.0%	0.0%	1.4%	0.3%

## YEAR TO DATE MWH

	Act var fr WN Res	Act var fr WN Small C&I	Act var fr WN Large C&I	Act var fr WN Street	Act var fr WN Muni&Sch	Act var fr WN Retail	% var Res	% var Small C&I	% var Large C&I	% var Street	% var Muni&Sch	% var Retail
Jul-16	41,497	22,933	793	0	1,681	66,904	15.2%	7.1%	0.1%	0.0%	4.6%	5.1%
Aug-16	33,563	16,354	407	0	971	51,295	6.3%	2.4%	0.0%	0.0%	1.2%	1.9%
Sep-16	41,156	21,515	791	0	2,189	65,651	5.7%	2.3%	0.0%	0.0%	2.0%	1.7%
Oct-16	46,902	25,294	796	0	3,912	76,903	5.4%	2.2%	0.0%	0.0%	2.8%	1.6%
Nov-16	38,369	21,480	791	0	3,912	64,552	3.8%	1.5%	0.0%	0.0%	2.3%	1.1%
Dec-16	36,033	20,662	790	0	3,912	61,397	2.9%	1.2%	0.0%	0.0%	2.0%	0.8%
Jan-17	29,973	19,451	789	0	3,912	54,125	2.0%	1.2%	0.0%	0.0%	1.7%	0.6%
Feb-17	15,507	18,659	789	0	3,912	38,867	0.9%	0.9%	0.0%	0.0%	1.6%	0.4%
Mar-17	8,002	14,773	789	0	3,639	27,203	0.4%	0.6%	0.0%	0.0%	1.3%	0.3%
Apr-17	8,333	14,876	794	0	3,830	27,833	0.4%	0.6%	0.0%	0.0%	1.3%	0.2%
May-17	406	13,783	1,102	0	3,780	19,071	0.0%	0.5%	0.0%	0.0%	1.1%	0.2%
Jun-17	16,991	24,478	1,692	0	5,145	<b>48,306</b>	0.7%	0.8%	0.0%	0.0%	1.4%	<b>0.3%</b>

Southwestern Public Service Company  
Weather Normalization of Texas Retail Test Year Sales

Texas Weather Impacted Sales Calculation  
Using Panhandle Weather (Normal Period 1986-2015)

Texas Retail Weather Adjustment Summary													
	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Total
Heating Degree Days 30-yr normal	0	1	30	205	528	821	819	655	479	238	73	4	3,854
Heating Degree Days Actual	0	0	5	67	363	794	748	447	305	207	71	0	3,007
Variance from Normal	(0)	(1)	(25)	(138)	(165)	(27)	(71)	(208)	(174)	(31)	(2)	(4)	(847)
Cooling Degree Days 30-yr normal	439	400	194	37	1	0	0	0	5	30	141	333	1,581
Cooling Degree Days Actual	582	372	225	108	4	0	0	6	16	44	96	395	1,848
Variance from Normal	143	(28)	31	71	3	0	0	6	11	14	(45)	62	267
Precipitation 30-yr normal	2.57	2.59	2.07	1.45	0.78	0.73	0.65	0.64	1.19	1.36	2.61	2.98	19.62
Precipitation Actual	2.76	3.83	0.99	0.36	0.96	0.33	2.88	0.61	1.65	1.33	1.00	1.57	18.27
Variance from Normal	0.19	1.23	(1.08)	(1.09)	0.18	(0.40)	2.22	(0.03)	0.46	(0.03)	(1.60)	(1.41)	(1.35)
Texas Residential Service (1)	32,905	(6,331)	6,124	5,633	(3,444)	(1,121)	(2,819)	(6,108)	(2,293)	620	(6,828)	13,702	30,039
Texas Residential Space Heat (2)	8,592	(1,603)	1,469	1,113	(5,089)	(1,216)	(3,240)	(8,358)	(5,213)	(288)	(1,099)	2,883	(13,048)
Texas Small General Service (3)	3,136	(648)	602	506	(488)	(156)	(383)	(941)	(391)	0	(448)	1,175	1,965
Texas Secondary General Service (4) & (5)	19,829	(5,937)	4,565	3,277	(3,331)	(662)	(829)	149	(3,495)	103	(650)	9,532	22,550
CRMWA Weather Adjustment (6)	761	(380)	379	0	0	0	0	0	0	5	313	578	1,655
Small Municipal and School Service (7)	76	(33)	53	72	0	0	0	0	(23)	11	(3)	75	228
Large Municipal and School Service (8)	914	(392)	603	741	0	0	0	0	(154)	100	(24)	687	2,475
Large School Service (9)	691	(285)	562	910	0	0	0	0	(96)	81	(22)	602	2,441
Texas Retail Weather Adjustment Total	66,904	(15,609)	14,357	11,252	(12,351)	(3,155)	(7,272)	(15,258)	(11,665)	631	(8,762)	29,235	48,306

Texas Residential Service													
Heating Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	0	(1)	(25)	(138)	(165)	(27)	(71)	(208)	(174)	(31)	(2)	(4)	0
Heating Degree Days Weather Coefficients	0.000000	0.000000	0.000000	0.000016	0.0001264	0.0002506	0.0002394	0.0001765	0.0000792	0.0000000	0.0000000	0.0000000	0.0000000
Res Service Customers	162,349	163,455	163,916	164,453	164,717	165,224	165,827	166,199	166,880	167,213	167,821	168,285	0
Heating Degree Days Weather Adjustment (MWh)	0	0	0	-35	-3,444	-1,121	-2,819	-6,108	-2,297	0	0	0	0
Cooling Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	143	(28)	31	71	3	0	0	6	11	14	(45)	62	0
Cooling Degree Days Weather Coefficients	0.0014161	0.0013957	0.0012228	0.0004876	0.0000000	0.0000000	0.0000000	0.0000000	0.0000021	0.0002709	0.0009006	0.0013188	0
Res Service Customers	162,349	163,455	163,916	164,453	164,717	165,224	165,827	166,199	166,880	167,213	167,821	168,285	0
Cooling Degree Days Weather Adjustment (MWh)	32,905	(6,331)	6,124	5,633	(3,444)	(1,121)	(2,819)	(6,108)	(2,293)	620	(6,828)	13,702	0
TX Residential Service Weather Adjustment (1)	32,905	(6,331)	6,124	5,633	(3,444)	(1,121)	(2,819)	(6,108)	(2,293)	620	(6,828)	13,702	0



Southwestern Public Service Company  
Weather Normalization of Texas Retail Test Year Sales

Texas Weather Impacted Sales Calculation  
Using Panhandle Weather (Normal Period 1986-2015)

<b>Texas Residential Space Heat</b>												
<b>Heating Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Heating Degree Days Weather Coefficients	0.0000000	0.0000000	0.0000006	0.0002294	0.0008271	0.0012210	0.0012515	0.0011098	0.0008388	0.0002648	0.0000000	0.0000000
Res Space Heat Customers	39,663	38,866	38,202	37,697	37,205	36,804	36,448	36,165	35,737	35,363	35,003	34,527
Heating Degree Days Weather Adjustment (MWh)	0	0	-1	-1,197	-5,089	-1,216	-3,240	-8,358	-5,213	-288	0	0
<b>Cooling Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Cooling Degree Days Weather Coefficients	0.0015136	0.0014860	0.0012594	0.0004912	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0006952	0.0013524
Res Space Heat Customers	39,663	38,866	38,202	37,697	37,205	36,804	36,448	36,165	35,737	35,363	35,003	34,527
Cooling Degree Days Weather Adjustment (MWh)	8,592	1,603	1,470	1,309	0	0	0	0	0	0	(1,099)	2,883
<b>TX Residential Space Heat Weather Adjustment (2)</b>	8,592	(1,603)	1,469	113	(5,089)	(1,216)	(3,240)	(8,358)	(5,213)	(288)	(1,099)	2,883

<b>Texas Small General Service</b>												
<b>Heating Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Heating Degree Days Weather Coefficients	0.0000000	0.0000000	0.0000000	0.0000011	0.0000907	0.0001775	0.0001656	0.0001385	0.0000688	0.0000000	0.0000000	0.0000000
Small General Service Customers	32,577	32,593	32,527	32,572	32,523	32,540	32,600	32,616	32,644	32,646	32,635	32,671
Heating Degree Days Weather Adjustment (MWh)	0	0	0	-5	-488	-156	-383	-941	-391	0	0	0
<b>Cooling Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Cooling Degree Days Weather Coefficients	0.0006727	0.0007161	0.0006053	0.0002219	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0003036	0.0005827
Small General Service Customers	32,577	32,593	32,527	32,572	32,523	32,540	32,600	32,616	32,644	32,646	32,635	32,671
Cooling Degree Days Weather Adjustment (MWh)	3,136	(648)	602	511	0	0	0	0	0	0	(448)	1,175
<b>TX Small General Service Weather Adjustment</b>	3,136	(648)	602	506	(488)	(156)	(383)	(941)	(391)	0	(448)	1,175

Southwestern Public Service Company  
Weather Normalization of Texas Retail Test Year Sales

Texas Weather Impacted Sales Calculation  
Using Panhandle Weather (Normal Period 1986-2015)

<b>Texas Small Secondary General Service</b>												
<b>Heating Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Heating Degree Days Weather Coefficients												
Small Secondary General Customers	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Heating Degree Days Weather Adjustment (MWh)	11,831	11,843	11,832	11,845	11,829	11,843	11,822	11,816	11,853	11,861	11,871	11,877
	0	0	0	-35	-3,326	-661	-625	0	0	0	0	0
<b>Cooling Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Cooling Degree Days Weather Coefficients												
Small Secondary General Customers	0.0118566	0.0125795	0.0105503	0.0039489	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0055513	0.0101848
Cooling Degree Days Weather Adjustment (MWh)	11,831	11,843	11,832	11,845	11,829	11,843	11,822	11,816	11,853	11,861	11,871	11,877
	20,076	-4,135	3,814	3,307	0	0	0	0	0	0	-2,977	7,468
<b>Precipitation Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Precipitation Weather Coefficients												
Small Secondary General Customers	-0.1231452	-0.1228317	-0.0582496	0.0000000	0.0000000	0.0000000	-0.0073367	-0.3941846	-0.6409341	-0.3463493	-0.1227309	-0.1226690
Precipitation Weather Adjustment (MWh)	11,831	11,843	11,832	11,845	11,829	11,843	11,822	11,816	11,853	11,861	11,871	11,877
	(280)	(1,796)	746	0	0	0	(203)	149	(3,495)	103	2,332	2,052
<b>TX Small Secondary General Service Weather Adjustment (4)</b>	19,796	(5,931)	4,560	3,272	(3,326)	(661)	(829)	149	(3,495)	103	(645)	9,520

<b>Texas Large Secondary General Service</b>												
<b>Heating Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Heating Degree Days Weather Coefficients												
Large Secondary General Customers	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Heating Degree Days Weather Adjustment (MWh)	19	19	18	18	18	18	18	19	19	19	19	19
	0	0	0	0	-5	-1	-1	0	0	0	0	0
<b>Cooling Degree Days Weather Adjustment (30-yr normal)</b>												
Variance from Normal												
Cooling Degree Days Weather Coefficients												
Large Secondary General Customers	0.0118566	0.0125795	0.0105503	0.0039489	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0055513	0.0101848
Cooling Degree Days Weather Adjustment (MWh)	32	-7	6	5	0	0	0	0	0	0	-5	12
<b>TX Large Secondary General Service Weather Adjustment (5)</b>	32	(7)	6	5	(5)	(1)	(1)	0	0	0	(5)	12

Southwestern Public Service Company  
Weather Normalization of Texas Retail Test Year Sales

Texas Weather Impacted Sales Calculation  
Using Panhandle Weather (Normal Period 1986-2015)

Canadian River Municipal Water Authority (CRMWA)												
Cooling Degree Days Weather Adjustment (30-yr normal)												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Cooling Degree Days Weather Coefficients	143	(28)	31	71	3	0	0	6	11	14	(45)	62
CRMWA Customers	5,577,521.8	4,994,996.3	5,481,291.2	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	4,906,768.2
Cooling Degree Days Weather Adjustment (MWh)	798	(139)	167	0	0	0	0	0	0	0	0	303
Precipitation Weather Adjustment (30-yr normal)												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Precipitation Weather Coefficients	0.19	1.23	(1.08)	(1.09)	0.18	(0.40)	2.22	(0.03)	0.46	(0.03)	(1.60)	(1.41)
Small Secondary General Customers	-195,322.44	-195,322.44	-195,322.44	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-195,322.44	-195,322.44	-195,322.44
Precipitation Weather Adjustment (MWh)	(38)	(241)	211	0	0	0	0	0	0	5	313	275
CRMWA Weather Adjustment (6)	761	(380)	379	0	0	0	0	0	0	5	313	578

Southwestern Public Service Company  
Weather Normalization of Texas Retail Test Year Sales

Texas Weather Impacted Sales Calculation  
Using Panhandle Weather (Normal Period 1986-2015)

Texas Municipal and School Service												
Cooling Degree Days Weather Adjustment (30-yr normal)												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Cooling Degree Days Weather Coefficients	143	(28)	31	71	3	0	0	6	11	14	(45)	62
Municipal & School Customers	0.0026868	0.0040204	0.0087790	0.0053828	0.0000000	0.0000000	0.0000000	0.0000000	0.000217	0.0027429	0.0041896	0.0031806
Cooling Degree Days Weather Adjustment (MWh)	4,545	4,541	4,540	4,528	4,529	4,523	4,520	4,515	4,477	4,482	4,478	4,481
	1,748	(507)	1,218	1,723	0	0	0	0	1	168	(848)	880
Precipitation Weather Adjustment (30-yr normal)												
Variance from Normal	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
Precipitation Weather Coefficients	0.19	1.23	(1.08)	(1.09)	0.18	(0.40)	2.22	(0.03)	0.46	(0.03)	(1.60)	(1.41)
Small Secondary General Customers	(0.0767732)	(0.0362049)	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	(0.1331691)	(0.2024684)	(0.1113471)	(0.0767732)
Precipitation Weather Adjustment (MWh)	4,545	4,541	4,540	4,528	4,529	4,523	4,520	4,515	4,477	4,482	4,478	4,481
	(67)	(203)	0	0	0	0	0	0	(274)	23	798	484
Weather Adjustment	1,681	(710)	1,218	1,723	0	0	0	0	(273)	191	(50)	1,364
Texas - Municipal and School Weather Impact Allocation (Billed Sales in KWh)												
SMSTX	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
LMSTX	1,475	1,733	1,646	1,393	1,267	1,453	2,090	1,979	1,808	1,521	1,683	1,604
LSSTX	17,834	20,555	18,567	14,352	14,028	12,717	14,620	11,914	12,398	13,986	14,021	14,681
Total	13,481	14,922	17,304	17,615	14,543	13,499	15,843	13,709	7,746	11,318	13,032	12,850
	32,790	37,209	37,517	33,361	29,838	27,668	32,553	27,603	21,952	26,825	28,735	29,135
SMSTX	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
LMSTX	4.50%	4.66%	4.39%	4.18%	4.24%	5.25%	6.42%	7.17%	8.24%	5.67%	5.86%	5.51%
LSSTX	54.39%	55.24%	49.49%	43.02%	47.02%	45.96%	44.91%	43.16%	56.48%	52.14%	48.79%	50.39%
Total	41.11%	40.10%	46.12%	52.80%	48.74%	48.79%	48.67%	49.67%	35.29%	42.19%	45.35%	44.11%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Municipal and School Allocation of Sales impacted by weather												
SMSTX (7)	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
LMSTX (8)	76	(33)	53	72	0	0	0	0	(23)	11	(3)	75
LSSTX (9)	914	(392)	603	741	0	0	0	0	(154)	100	(24)	687
	691	(285)	562	910	0	0	0	0	(96)	81	(22)	602

Southwestern Public Service Company

Weather Normalization of Texas Retail Test Year Sales

Texas Residential Service Coefficients (Modeled with MWH)

Year	Month	Model Coefficients		Monthly weights Model to calendar		Calendar Month		
		RES HDD	RES CDD	Current	1st Future	2nd Future	RES HDD	RES CDD
2016	7	0.000000	0.001403	42.86%	57.14%	0.00%	0.000000	0.0014161
2016	8	0.000000	0.001426	47.16%	52.69%	0.15%	0.000000	0.0013957
2016	9	0.000000	0.001369	47.30%	52.54%	0.16%	0.000000	0.0012228
2016	10	0.000000	0.001095	44.55%	54.69%	0.77%	0.0000016	0.0004876
2016	11	0.000000	0.000000	37.94%	61.59%	0.48%	0.0001264	0.0000000
2016	12	0.000203	0.000000	39.29%	60.71%	0.00%	0.0002506	0.0000000
2017	1	0.000281	0.000000	45.78%	53.00%	1.23%	0.0002394	0.0000000
2017	2	0.000205	0.000000	37.41%	62.59%	0.00%	0.0001765	0.0000000
2017	3	0.000160	0.000000	49.62%	49.92%	0.46%	0.0000792	0.0000021
2017	4	0.000000	0.000000	41.75%	58.25%	0.00%	0.0000000	0.0002709
2017	5	0.000000	0.000465	42.86%	57.14%	0.00%	0.0000000	0.0009006
2017	6	0.000000	0.001227	47.94%	51.59%	0.48%	0.0000000	0.0013188
2017	7	0.000000	0.001403	44.09%	55.91%	0.00%		
2017	8	0.000000	0.001426	48.39%	51.15%	0.46%		
2017	9	0.000000	0.001369	44.29%	55.71%	0.00%		

Southwestern Public Service Company

Weather Normalization of Texas Retail Test Year Sales

Texas Residential Space Heat Coefficients (Modeled with MWH)

Year	Month	Model Coefficients		Monthly weights Model to calendar			Calendar Month	
		RES HDD	RES CDD	Current	1st Future	2nd Future	RES HDD	RES CDD
2016	7	0.000000	0.001477	42.86%	57.14%	0.00%	0.000000	0.0015136
2016	8	0.000000	0.001541	47.16%	52.69%	0.15%	0.000000	0.0014860
2016	9	0.000000	0.001438	47.30%	52.54%	0.16%	0.0000006	0.0012594
2016	10	0.000000	0.001103	44.55%	54.69%	0.77%	0.0002294	0.0004912
2016	11	0.000404	0.000000	37.94%	61.59%	0.48%	0.0008271	0.0000000
2016	12	0.001084	0.000000	39.29%	60.71%	0.00%	0.0012210	0.0000000
2017	1	0.001310	0.000000	45.78%	53.00%	1.23%	0.0012515	0.0000000
2017	2	0.001206	0.000000	37.41%	62.59%	0.00%	0.0011098	0.0000000
2017	3	0.001052	0.000000	49.62%	49.92%	0.46%	0.0008388	0.0000000
2017	4	0.000634	0.000000	41.75%	58.25%	0.00%	0.0002648	0.0000000
2017	5	0.000000	0.000000	42.86%	57.14%	0.00%	0.0000000	0.0006952
2017	6	0.000000	0.001217	47.94%	51.59%	0.48%	0.0000000	0.0013524
2017	7	0.000000	0.001477	44.09%	55.91%	0.00%	0.0000000	0.0000000
2017	8	0.000000	0.001541	48.39%	51.15%	0.46%	0.0000000	0.0000000
2017	9	0.000000	0.001438	44.29%	55.71%	0.00%	0.0000000	0.0000000

Southwestern Public Service Company

Weather Normalization of Texas Retail Test Year Sales

Texas Small General Service Coefficients (Modeled with MWH)

Year	Month	Model Coefficients				Monthly weights Model to calendar			Calendar Month		
		RES HDD	RES CDD	Precip		Current	1st Future	2nd Future	RES HDD	RES CDD	Precip
2016	7	0.000000	0.000629	0.000000		42.86%	57.14%	0.00%	0.000000	0.0006727	0.0000000
2016	8	0.000000	0.000705	0.000000		47.16%	52.69%	0.15%	0.000000	0.0007161	0.0000000
2016	9	0.000000	0.000726	0.000000		47.30%	52.54%	0.16%	0.000000	0.0006053	0.0000000
2016	10	0.000000	0.000498	0.000000		44.55%	54.69%	0.77%	0.000011	0.0002219	0.0000000
2016	11	0.000000	0.000000	0.000000		37.94%	61.59%	0.48%	0.0000907	0.0000000	0.0000000
2016	12	0.000146	0.000000	0.000000		39.29%	60.71%	0.00%	0.0001775	0.0000000	0.0000000
2017	1	0.000198	0.000000	0.000000		45.78%	53.00%	1.23%	0.0001656	0.0000000	0.0000000
2017	2	0.000138	0.000000	0.000000		37.41%	62.59%	0.00%	0.0001385	0.0000000	0.0000000
2017	3	0.000139	0.000000	0.000000		49.62%	49.92%	0.46%	0.0000688	0.0000000	0.0000000
2017	4	0.000000	0.000000	0.000000		41.75%	58.25%	0.00%	0.0000000	0.0000000	0.0000000
2017	5	0.000000	0.000000	0.000000		42.86%	57.14%	0.00%	0.0000000	0.0003036	0.0000000
2017	6	0.000000	0.000531	0.000000		47.94%	51.59%	0.48%	0.0000000	0.0005827	0.0000000
2017	7	0.000000	0.000629	0.000000		44.09%	55.91%	0.00%			
2017	8	0.000000	0.000705	0.000000		48.39%	51.15%	0.46%			
2017	9	0.000000	0.000726	0.000000		44.29%	55.71%	0.00%			

**Southwestern Public Service Company**

**Weather Normalization of Texas Retail Test Year Sales**

**Texas Secondary General Service Coefficients (Modeled with MWH)**

Year	Month	Model Coefficients			Precip	Monthly weights Model to calendar		
		RES HDD	RES CDD			Current	1st Future	2nd Future
2016	7	0.000000	126.129304		-1459.270694	42.86%	57.14%	0.00%
2016	8	0.000000	151.279356		-1459.270694	47.16%	52.69%	0.15%
2016	9	0.000000	147.500374		-1459.270694	47.30%	52.54%	0.16%
2016	10	0.000000	105.160435		0.000000	44.55%	54.69%	0.77%
2016	11	0.000000	0.000000		0.000000	37.94%	61.59%	0.48%
2016	12	32.558111	0.000000		0.000000	39.29%	60.71%	0.00%
2017	1	19.253593	0.000000		0.000000	45.78%	53.00%	1.23%
2017	2	0.000000	0.000000		0.000000	37.41%	62.59%	0.00%
2017	3	0.000000	0.000000		-7454.137547	49.62%	49.92%	0.46%
2017	4	0.000000	0.000000		-7820.015465	41.75%	58.25%	0.00%
2017	5	0.000000	0.000000		-1459.270694	42.86%	57.14%	0.00%
2017	6	0.000000	115.508667		-1459.270694	47.94%	51.59%	0.48%
2017	7	0.000000	126.129304		-1459.270694	44.09%	55.91%	0.00%
2017	8	0.000000	151.279356		-1459.270694	48.39%	51.15%	0.46%
2017	9	0.000000	147.500374		-1459.270694	44.29%	55.71%	0.00%



Southwestern Public Service Company

Weather Normalization of Texas Retail Test Year Sales

Texas Secondary General Service Coefficients (Modeled with MWH)

Year	Month	Calendar Month						Actual Cust	RES HDD	RES CDD	Precip
		RES HDD	RES CDD	Precip	Precip	Precip	Precip				
2016	7	0.000000	140.5007619	-1459.2706936	11,850	0.000000	0.0118566	-0.1231452			
2016	8	0.000000	149.2174363	-1457.0291104	11,862	0.000000	0.0125795	-0.1228317			
2016	9	0.000000	125.0209773	-690.2582011	11,850	0.000000	0.0105503	-0.0582496			
2016	10	0.2500623	46.8456625	0.000000	11,863	0.0000211	0.0039489	0.0000000			
2016	11	20.1433459	0.000000	0.000000	11,847	0.0017003	0.000000	0.0000000			
2016	12	24.4811003	0.000000	0.000000	11,861	0.0020640	0.000000	0.0000000			
2017	1	8.8134728	0.000000	-91.6023047	11,840	0.0007444	0.000000	-0.0077367			
2017	2	0.000000	0.000000	-4665.1745191	11,835	0.000000	0.000000	-0.3941846			
2017	3	0.000000	0.000000	-7609.1693791	11,872	0.000000	0.000000	-0.6409341			
2017	4	0.000000	0.000000	-4114.6292251	11,880	0.000000	0.000000	-0.3463493			
2017	5	0.000000	66.0049528	-1459.2706936	11,890	0.000000	0.0055513	-0.1227309			
2017	6	0.000000	121.1579037	-1459.2706936	11,896	0.000000	0.0101848	-0.1226690			
2017	7										
2017	8										
2017	9										

Southwestern Public Service Company

Weather Normalization of Texas Retail Test Year Sales

Texas CRMWA Coefficients (Modeled with MWH)

Year	Month	Model Coefficients			Monthly weights Model to calendar			Revenue Month		
		RES	HDD	Precip	Current	1st Future	2nd Future	RES	HDD	Precip
2016	7	0.000000	5.577522	-195.322444	42.86%	57.14%	0.00%	0.000000	4.9949963	-195.3224443
2016	8	0.000000	4.994996	-195.322444	47.16%	52.69%	0.15%	0.000000	5.4812912	-195.3224443
2016	9	0.000000	5.481291	-195.322444	47.30%	52.54%	0.16%	0.000000	0.0000000	0.0000000
2016	10	0.000000	0.000000	0.000000	44.55%	54.69%	0.77%	0.000000	0.0000000	0.0000000
2016	11	0.000000	0.000000	0.000000	37.94%	61.59%	0.48%	0.000000	0.0000000	0.0000000
2016	12	0.000000	0.000000	0.000000	39.29%	60.71%	0.00%	0.000000	0.0000000	0.0000000
2017	1	0.000000	0.000000	0.000000	45.78%	53.00%	1.23%	0.000000	0.0000000	0.0000000
2017	2	0.000000	0.000000	0.000000	37.41%	62.59%	0.00%	0.000000	0.0000000	0.0000000
2017	3	0.000000	0.000000	0.000000	49.62%	49.92%	0.46%	0.000000	0.0000000	-195.3224443
2017	4	0.000000	0.000000	-195.322444	41.75%	58.25%	0.00%	0.000000	0.0000000	-195.3224443
2017	5	0.000000	0.000000	-195.322444	42.86%	57.14%	0.00%	0.000000	4.9067682	-195.3224443
2017	6	0.000000	4.906768	-195.322444	47.94%	51.59%	0.48%	0.000000	5.5775218	-195.3224443
2017	7	0.000000	5.577522	-195.322444	44.09%	55.91%	0.00%			
2017	8	0.000000	4.994996	-195.322444	48.39%	51.15%	0.46%			
2017	9	0.000000	5.481291	-195.322444	44.29%	55.71%	0.00%			

Southwestern Public Service Company

Weather Normalization of Texas Retail Test Year Sales

Texas Municipals and Schools Coefficients (Modeled with MWH)

Year	Month	Model Coefficients			Monthly weights Model to calendar			Calendar Month		
		RES HDD	RES CDD	Precip	Current	1st Future	2nd Future	RES HDD	RES CDD	Precip
2016	7	0.000000	0.002609	-0.076773	42.86%	57.14%	0.00%	0.000000	0.0026868	-0.0767732
2016	8	0.000000	0.002745	-0.076773	47.16%	52.69%	0.15%	0.000000	0.0040204	-0.0362049
2016	9	0.000000	0.005138	0.000000	47.30%	52.54%	0.16%	0.000000	0.0087790	0.0000000
2016	10	0.000000	0.012083	0.000000	44.55%	54.69%	0.77%	0.000000	0.0053828	0.0000000
2016	11	0.000000	0.000000	0.000000	37.94%	61.59%	0.48%	0.000000	0.0000000	0.0000000
2016	12	0.000000	0.000000	0.000000	39.29%	60.71%	0.00%	0.000000	0.0000000	0.0000000
2017	1	0.000000	0.000000	0.000000	45.78%	53.00%	1.23%	0.000000	0.0000000	0.0000000
2017	2	0.000000	0.000000	0.000000	37.41%	62.59%	0.00%	0.000000	0.0000000	0.0000000
2017	3	0.000000	0.000000	0.000000	49.62%	49.92%	0.46%	0.000000	0.0000217	-0.1331691
2017	4	0.000000	0.000000	-0.265295	41.75%	58.25%	0.00%	0.000000	0.0027429	-0.2024684
2017	5	0.000000	0.004709	-0.157446	42.86%	57.14%	0.00%	0.000000	0.0041896	-0.1113471
2017	6	0.000000	0.003800	-0.076773	47.94%	51.59%	0.48%	0.000000	0.0031806	-0.0767732
2017	7	0.000000	0.002609	-0.076773	44.09%	55.91%	0.00%			
2017	8	0.000000	0.002745	-0.076773	48.39%	51.15%	0.46%			
2017	9	0.000000	0.005138	0.000000	44.29%	55.71%	0.00%			

Southwestern Public Service Company

Weather Normalization of Firm Wholesale Test Year Sales

Roswell Weather Data

Normal Weather Based on a 30-year Historical Average

Month	Year	Weather Act Cal HDD65	Weather Act Cal CDD65	Weather Act Cal Precip	Weather Norm Cal HDD65	Weather Norm Cal CDD65	Weather Norm Cal Precip	Dev HDD65	Dev CDD65	Dev Precip
Jul	2016	0	672	0.45	0	510	1.92	0	162	-1.47
Aug	2016	0	427	5.05	0	470	1.77	0	-43	3.28
Sep	2016	2	231	1.21	9	256	1.65	-7	-25	-0.44
Oct	2016	35	78	0.46	131	50	1.18	-96	28	-0.72
Nov	2016	349	2	0.71	456	1	0.48	-107	1	0.23
Dec	2016	732	0	0.30	743	0	0.63	-11	0	-0.33
Jan	2017	647	0	1.09	726	0	0.37	-79	0	0.72
Feb	2017	380	0	0.16	520	1	0.45	-140	-1	-0.29
Mar	2017	175	34	0.32	351	4	0.48	-176	30	-0.16
Apr	2017	112	74	1.45	138	50	0.52	-26	24	0.93
May	2017	10	173	0.54	25	212	1.30	-15	-39	-0.76
Jun	2017	0	505	0.56	0	443	1.48	0	62	-0.92
Annual - Update		2,442	2,196	12.30	3,099	1,996	12.23	-657	200	0.07
Annual Dev %								-21.2%	10.0%	0.6%

Southwestern Public Service Company

Weather Normalization of Firm Wholesale Test Year Sales

Lubbock Weather Data

Normal Weather Based on a 30-year Historical Average

Month	Year	Weather Act Cal HDD65	Weather Act Cal CDD65	Weather Act Cal Precip	Weather Norm Cal HDD65	Weather Norm Cal CDD65	Weather Norm Cal Precip	Dev HDD65	Dev CDD65	Dev Precip
Jul	2016	0	642	0.58	0	494	1.90	0	148	-1.32
Aug	2016	0	431	3.03	0	456	1.71	0	-25	1.32
Sep	2016	2	254	1.47	17	234	2.59	-15	20	-1.12
Oct	2016	44	127	1.05	147	59	1.44	-103	68	-0.39
Nov	2016	318	7	0.54	451	3	0.84	-133	4	-0.30
Dec	2016	706	0	0.49	734	0	0.78	-28	0	-0.29
Jan	2017	653	0	2.03	739	0	0.59	-86	0	1.44
Feb	2017	361	4	0.89	567	0	0.78	-206	4	0.11
Mar	2017	220	46	0.67	391	9	1.02	-171	37	-0.35
Apr	2017	141	79	1.32	163	58	1.31	-22	21	0.01
May	2017	23	173	0.58	41	210	2.62	-18	-37	-2.04
Jun	2017	0	478	1.78	1	407	2.76	-1	71	-0.98
Annual		2,468	2,241	14.43	3,252	1,930	18.34	-784	311	-3.91
Annual Dev %								-24.1%	16.1%	-21.3%

**Southwestern Public Service Company**

**Weather Normalization of Firm Wholesale Test Year Sales**

**Amarillo Weather Data**

**Normal Weather Based on a 30-year Historical Average**

Month	Year	Weather Act Cal HDD65	Weather Act Cal CDD65	Weather Act Cal Precip	Weather Norm Cal HDD65	Weather Norm Cal CDD65	Weather Norm Cal Precip	Dev HDD65	Dev CDD65	Dev Precip
Jul	2016	0	561	3.51	0	420	2.80	0	141	0.71
Aug	2016	0	349	4.10	1	380	2.89	-1	-31	1.21
Sep	2016	9	212	0.82	35	181	1.89	-26	31	-1.07
Oct	2016	77	105	0.13	226	30	1.45	-149	75	-1.32
Nov	2016	379	3	1.10	555	1	0.76	-176	2	0.34
Dec	2016	826	0	0.27	851	0	0.71	-25	0	-0.44
Jan	2017	787	0	3.17	847	0	0.68	-60	0	2.49
Feb	2017	480	5	0.51	686	0	0.59	-206	5	-0.08
Mar	2017	347	12	1.98	509	3	1.24	-162	9	0.74
Apr	2017	238	37	1.34	264	22	1.38	-26	15	-0.04
May	2017	94	76	1.15	85	118	2.60	9	-42	-1.45
Jun	2017	1	367	1.50	5	308	3.06	-4	59	-1.56
<b>Annual</b>		<b>3,238</b>	<b>1,727</b>	<b>19.58</b>	<b>4,064</b>	<b>1,463</b>	<b>20.05</b>	<b>-826</b>	<b>264</b>	<b>-0.47</b>
<b>Annual Dev %</b>								<b>-20.3%</b>	<b>18.1%</b>	<b>-2.4%</b>

Southwestern Public Service Company

Weather Normalization of Firm Wholesale Test Year Sales

SPS Wholesale Weather Impacted Sales

Sales (In MWh) Calendar Month	Central Valley	Farmers	Lea County	Roosevelt	WTMPA	Tri County	Total
Jul-16	58,408	30,034	105,457	14,562	319,446	37,487	565,395
Aug-16	54,110	27,293	93,368	12,280	288,337	34,934	510,322
Sep-16	48,216	14,802	67,800	6,837	244,983	31,738	414,375
Oct-16	52,806	16,616	62,257	9,096	219,014	28,738	388,528
Nov-16	51,159	12,978	70,971	7,577	195,327	26,881	364,893
Dec-16	56,314	14,391	79,563	9,197	236,354	31,795	427,614
Jan-17	55,211	16,619	77,966	8,907	231,587	30,357	420,647
Feb-17	49,499	11,604	68,595	8,432	191,216	25,175	354,521
Mar-17	56,494	19,120	81,416	10,605	200,741	26,917	395,295
Apr-17	53,047	16,433	77,518	9,793	199,585	24,914	381,290
May-17	57,197	16,262	92,380	8,898	226,127	25,597	426,461
Jun-17	47,207	19,181	78,863	8,126	278,638	31,479	463,493
Total	639,670	215,333	956,155	114,311	2,831,354	356,011	5,112,834

Southwestern Public Service Company

Weather Normalization of Firm Wholesale Test Year Sales

SPS Wholesale Weather Impacted Sales

Sales (In MWh) Calendar Month	Central Valley	Farmers	Lea County	Roosevelt	WTMPA	Tri County	Total
Jul-16	54,572	24,637	96,000	11,511	290,018	34,883	511,621
Aug-16	55,074	28,645	96,220	14,128	293,649	35,522	523,238
Sep-16	48,416	15,342	68,616	7,077	241,108	31,431	411,990
Oct-16	52,806	15,690	62,257	9,096	207,482	28,738	376,070
Nov-16	51,159	12,978	70,971	7,577	197,434	26,881	367,000
Dec-16	56,314	14,391	79,563	9,197	237,717	31,895	429,076
Jan-17	55,211	16,619	77,966	8,907	235,634	30,525	424,862
Feb-17	49,499	11,604	68,595	8,432	195,110	25,175	358,415
Mar-17	56,494	19,120	81,416	10,605	204,095	26,917	398,648
Apr-17	53,047	16,433	77,518	9,793	199,585	24,914	381,290
May-17	57,951	17,504	94,829	9,168	231,809	25,967	437,228
Jun-17	46,085	17,795	76,192	7,068	266,047	30,701	443,887
Total	636,629	210,757	950,144	112,560	2,799,689	353,549	<b>5,063,327</b>



Southwestern Public Service Company

Weather Normalization of Firm Wholesale Test Year Sales

SPS Wholesale Weather Impacted Sales

Sales (In MWh) Calendar Month	Weather Impacted Sales					
	Central Valley	Farmers	Lea County	Roosevelt	WTMPA	Tri County
Jul-16	3,837	5,398	9,457	3,052	29,427	2,604
Aug-16	(964)	(1,352)	(2,851)	(1,848)	(5,313)	(588)
Sep-16	(199)	(540)	(816)	(241)	3,874	307
Oct-16	0	926	0	0	11,532	0
Nov-16	0	0	0	0	(2,108)	0
Dec-16	0	0	0	0	(1,363)	(99)
Jan-17	0	0	0	0	(4,047)	(169)
Feb-17	0	0	0	0	(3,894)	0
Mar-17	0	0	0	0	(3,354)	0
Apr-17	0	0	0	0	0	0
May-17	(754)	(1,242)	(2,449)	(270)	(5,682)	(370)
Jun-17	1,122	1,386	2,670	1,059	12,591	777
Total	3,041	4,576	6,011	1,752	31,664	2,462
						49,506
						1.0%

Southwestern Public Service Company  
Weather Normalization of Firm Wholesale Test Year Sales

New Mexico Wholesale Weather Impacted Sales Calculation  
Using Roswell Weather (Normal Period 1986-2015)

New Mexico Wholesale Weather Adjustment Summary													
	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Total
Heating Degree Days 30-yr normal	510	470	256	50	1	743	726	520	351	138	25	0	3,099
Heating Degree Days Actual	672	427	231	78	2	732	647	380	175	112	10	0	2,442
Variance from Normal	162	(43)	(25)	28	1	(0)	(79)	(140)	(176)	(26)	(15)	(0)	(657)
Cooling Degree Days 30-yr normal	192	177	165	118	0.48	0.63	0.37	0.45	0.48	0.52	1.30	1.48	1,996
Cooling Degree Days Actual	0.45	5.05	1.21	0.46	0.71	0.30	1.09	0.16	0.32	1.45	0.54	0.56	12.30
Variance from Normal	(1.47)	3.28	(0.44)	(0.72)	0.23	(0.33)	0.72	(0.29)	(0.16)	0.93	(0.76)	(0.92)	0.07
Precipitation 30-yr normal	3,837	(964)	(199)	0	0	0	0	0	0	0	(754)	1,122	3,041
Farmers (2)	5,398	(1,352)	(540)	926	0	0	0	0	0	0	(1,242)	1,386	4,576
Lea County (3)	9,457	(2,851)	(816)	0	0	0	0	0	0	0	(2,449)	2,670	6,011
Roosevelt (4)	3,052	(1,848)	(241)	0	0	0	0	0	0	0	(270)	1,059	1,752
New Mexico Wholesale Weather Adjustment Total	21,743	(7,016)	(1,796)	926	0	0	0	0	0	0	(4,715)	6,237	15,379

Central Valley													
	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Total
Cooling Degree Days Weather Adjustment (30-yr normal)	162	(43)	(25)	28	1	(0)	0	0	0	0	(39)	62	162
Variance from Normal	23,678	22,318	7,999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	19,488	18,001	18,001
Cooling Degree Days Weather Coefficients	3,837	(964)	(199)	0	0	0	0	0	0	0	(754)	1,122	1,122
Cooling Degree Days Weather Adjustment (MWh)													
Central Valley Weather Adjustment (1)	3,837	(964)	(199)	0	0	0	0	0	0	0	(754)	1,122	1,122

### New Mexico Wholesale Weather Impacted Sales Calculation Using Roswell Weather (Normal Period 1986-2015)

Farmers												
Cooling Degree Days Weather Adjustment (30-yr normal)												
Variance from Normal	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017
Cooling Degree Days Weather Coefficients	162	(43)	(25)	28	1	(0)	0	(1)	30	24	(39)	62
Cooling Degree Days Weather Adjustment (MWh)	33.313	31.301	21.672	32.609	0.000	0.000	0.000	0.000	0.000	0.000	32.090	22.238
	5,398	(1,352)	(540)	926	0	0	0	0	0	0	(1,242)	1,386
Farmers Weather Adjustment (2)	5,398	(1,352)	(540)	926	0	0	0	0	0	0	(1,242)	1,386

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Southwestern Public Service Company  
Weather Normalization of Firm Wholesale Test Year Sales

Texas Wholesale Weather Impacted Sales Calculation  
Using Lubbock and Amarillo Weather (Normal Period 1986-2015)

WTMPA Wholesale Weather Adjustment Summary													
Lubbock Weather													
Heating Degree Days 30-yr normal	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Total
Heating Degree Days Actual	0	0	17	147	451	734	739	567	391	163	41	1	3,252
Variance from Normal	(0)	(0)	(15)	(103)	(133)	(28)	(86)	(206)	(171)	(22)	(18)	(1)	(784)
Cooling Degree Days 30-yr normal	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Total
Cooling Degree Days Actual	494	456	234	59	3	0	0	0	9	58	210	407	1,930
Variance from Normal	642	431	254	127	7	0	0	4	46	79	173	478	2,241
	148	(25)	20	68	4	0	0	4	37	21	(37)	71	311
Precipitation 30-yr normal													
Precipitation Actual	1.90	1.71	2.59	1.44	0.84	0.78	0.59	0.78	1.02	1.31	2.62	2.76	18.34
Variance from Normal	0.58	3.03	1.47	1.05	0.54	0.49	2.03	0.89	0.67	1.32	0.58	1.78	14.43
	(1.32)	1.32	(1.12)	(0.39)	(0.30)	(0.29)	1.44	0.11	(0.35)	0.01	(2.04)	(0.98)	(3.91)
WTMPA (1)													
	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Total
	29,427	(5,313)	3,874	11,532	(2,108)	(1,363)	(4,047)	(3,894)	(3,354)	0	(5,682)	12,591	31,664
WTMPA Wholesale Weather Adjustment Total	29,427	(5,313)	3,874	11,532	(2,108)	(1,363)	(4,047)	(3,894)	(3,354)	0	(5,682)	12,591	31,664

WTMPA													
Cooling Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	
Cooling Degree Days Weather Coefficients	148	(25)	20	68	4	0	0	4	37	21	(37)	71	
Cooling Degree Days Weather Adjustment (MWh)	199,103	210,542	194,038	168,637	0,000	0,000	0,000	0,000	0,000	0,000	152,747	177,133	
	29,427	(5,313)	3,874	11,532	0	0	0	0	0	0	(5,682)	12,591	
Heating Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	(0)	(0)	(15)	(103)	(133)	(28)	(86)	(206)	(171)	(22)	(18)	(1)	
Heating Degree Days Weather Coefficients	0,000	0,000	0,000	0,000	15,864	47,864	47,304	18,950	19,596	0,000	0,000	0,000	
Heating Degree Days Weather Adjustment (MWh)	0	0	0	0	(2,108)	(1,363)	(4,047)	(3,894)	(3,354)	0	0	0	
	29,427	(5,313)	3,874	11,532	(2,108)	(1,363)	(4,047)	(3,894)	(3,354)	0	(5,682)	12,591	
WTMPA Weather Adjustment (1)	29,427	(5,313)	3,874	11,532	(2,108)	(1,363)	(4,047)	(3,894)	(3,354)	0	(5,682)	12,591	

Southwestern Public Service Company  
Weather Normalization of Firm Wholesale Test Year Sales

Texas Wholesale Weather Impacted Sales Calculation  
Using Lubbock and Amarillo Weather (Normal Period 1986-2015)

Tri County Wholesale Weather Adjustment Summary													
Amarillo Weather													
Heating Degree Days 30-yr normal	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Update
Heating Degree Days Actual	0	1	35	226	555	851	847	686	509	264	85	5	4,064
Variance from Normal	(0)	(1)	(26)	(149)	(176)	(25)	(60)	(206)	(162)	(26)	9	(4)	3,238
Cooling Degree Days 30-yr normal	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Update
Cooling Degree Days Actual	420	380	181	30	1	0	0	0	3	22	118	308	1,463
Variance from Normal	561	349	212	105	3	0	0	5	12	37	76	367	1,727
Precipitation 30-yr normal	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Update
Precipitation Actual	2.80	2.89	1.89	1.45	0.76	0.71	0.68	0.59	1.24	1.38	2.60	3.06	20.05
Variance from Normal	0.71	1.21	(1.07)	0.13	1.10	0.27	3.17	0.51	1.98	1.34	1.15	1.50	19.58
Tri County (2)	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	Total
	2,604	(588)	307	0	0	(99)	(169)	0	0	0	(370)	777	2,462
Tri County Wholesale Weather Adjustment Total	2,604	(588)	307	0	0	(99)	(169)	0	0	0	(370)	777	2,462

TRI County													
Cooling Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	Jul2016	Aug2016	Sep2016	Oct2016	Nov2016	Dec2016	Jan2017	Feb2017	Mar2017	Apr2017	May2017	Jun2017	
Cooling Degree Days Weather Coefficients	141	(31)	31	75	2	0	0	5	9	15	(42)	59	
Cooling Degree Days Weather Adjustment (MWh)	18,423	18,882	9,929	0,000	0,000	0,000	0,000	0,000	0,000	0,000	8,862	13,085	
	2,604	(588)	307	0	0	0	0	0	0	0	(370)	777	
Heating Degree Days Weather Adjustment (30-yr normal)													
Variance from Normal	(0)	(1)	(26)	(149)	(176)	(25)	(60)	(206)	(162)	(26)	9	(4)	
Heating Degree Days Weather Coefficients	0,000	0,000	0,000	0,000	0,000	3,988	2,825	0,000	0,000	0,000	0,000	0,000	
Heating Degree Days Weather Adjustment (MWh)	0	0	0	0	0	(99)	(169)	0	0	0	0	0	
TRI County Weather Adjustment (2)	2,604	(588)	307	0	0	(99)	(169)	0	0	0	(370)	777	

Southwestern Public Service Company

Weather Normalization of Firm Wholesale Test Year Sales

Central Valley Coefficients (Modeled with MWH) Farmers Coefficients (Modeled with MWH)

Year	Month	Model Coefficients			Year	Month	Model Coefficients		
		HDD	CDD	Precip			HDD	CDD	Precip
2016	Apr	0.000	0.000	0.000	2016	Apr	0.000	0.000	0.000
2016	May	0.000	19.488	0.000	2016	May	0.000	32.090	0.000
2016	Jun	0.000	18.001	0.000	2016	Jun	0.000	22.238	0.000
2016	Jul	0.000	23.678	0.000	2016	Jul	0.000	33.313	0.000
2016	Aug	0.000	22.318	0.000	2016	Aug	0.000	31.301	0.000
2016	Sep	0.000	7.999	0.000	2016	Sep	0.000	21.672	0.000
2016	Oct	0.000	0.000	0.000	2016	Oct	0.000	32.609	0.000
2016	Nov	0.000	0.000	0.000	2016	Nov	0.000	0.000	0.000
2016	Dec	0.000	0.000	0.000	2016	Dec	0.000	0.000	0.000
2017	Jan	0.000	0.000	0.000	2017	Jan	0.000	0.000	0.000
2017	Feb	0.000	0.000	0.000	2017	Feb	0.000	0.000	0.000
2017	Mar	0.000	0.000	0.000	2017	Mar	0.000	0.000	0.000
2017	Apr	0.000	0.000	0.000	2017	Apr	0.000	0.000	0.000
2017	May	0.000	19.488	0.000	2017	May	0.000	32.090	0.000
2017	Jun	0.000	18.001	0.000	2017	Jun	0.000	22.238	0.000
2017	Jul	0.000	23.678	0.000	2017	Jul	0.000	33.313	0.000
2017	Aug	0.000	22.318	0.000	2017	Aug	0.000	31.301	0.000
2017	Sep	0.000	7.999	0.000	2017	Sep	0.000	21.672	0.000

Southwestern Public Service Company

Weather Normalization of Firm Wholesale Test Year Sales

Lea County Coefficients (Modeled with MWH) Roosevelt Coefficients (Modeled with MWH)

Year	Month	Model Coefficients			Year	Month	Model Coefficients		
		HDD	CDD	Precip			HDD	CDD	Precip
2016	Apr	0.000	0.000	0.000	2016	Apr	0.000	0.000	0.000
2016	May	0.000	63.285	0.000	2016	May	0.000	14.145	-365.019
2016	Jun	0.000	42.842	0.000	2016	Jun	0.000	11.597	-365.019
2016	Jul	0.000	58.364	0.000	2016	Jul	0.000	15.525	-365.019
2016	Aug	0.000	66.006	0.000	2016	Aug	0.000	15.067	-365.019
2016	Sep	0.000	32.711	0.000	2016	Sep	0.000	9.649	0.000
2016	Oct	0.000	0.000	0.000	2016	Oct	0.000	0.000	0.000
2016	Nov	0.000	0.000	0.000	2016	Nov	0.000	0.000	0.000
2016	Dec	0.000	0.000	0.000	2016	Dec	0.000	0.000	0.000
2017	Jan	0.000	0.000	0.000	2017	Jan	0.000	0.000	0.000
2017	Feb	0.000	0.000	0.000	2017	Feb	0.000	0.000	0.000
2017	Mar	0.000	0.000	0.000	2017	Mar	0.000	0.000	0.000
2017	Apr	0.000	0.000	0.000	2017	Apr	0.000	0.000	0.000
2017	May	0.000	63.285	0.000	2017	May	0.000	14.145	-365.019
2017	Jun	0.000	42.842	0.000	2017	Jun	0.000	11.597	-365.019
2017	Jul	0.000	58.364	0.000	2017	Jul	0.000	15.525	-365.019
2017	Aug	0.000	66.006	0.000	2017	Aug	0.000	15.067	-365.019
2017	Sep	0.000	32.711	0.000	2017	Sep	0.000	9.649	0.000

Southwestern Public Service Company

Weather Normalization of Firm Wholesale Test Year Sales

Tri County Coefficients (Modeled with MWH)				WTMPA Coefficients (Modeled with MWH)			
Year	Month	Model Coefficients		Year	Month	Model Coefficients	
		HDD	CDD			HDD	CDD
2016	Apr	0.000	0.000	2016	Apr	0.0000	0.0000
2016	May	0.000	8.862	2016	May	0.000	152.747
2016	Jun	0.000	13.085	2016	Jun	0.000	177.133
2016	Jul	0.000	18.423	2016	Jul	0.000	199.103
2016	Aug	0.000	18.882	2016	Aug	0.000	210.542
2016	Sep	0.000	9.929	2016	Sep	0.000	194.038
2016	Oct	0.000	0.000	2016	Oct	0.000	168.637
2016	Nov	0.000	0.000	2016	Nov	15.864	0.000
2016	Dec	3.988	0.000	2016	Dec	47.864	0.000
2017	Jan	2.825	0.000	2017	Jan	47.304	0.000
2017	Feb	0.000	0.000	2017	Feb	18.950	0.000
2017	Mar	0.000	0.000	2017	Mar	19.596	0.000
2017	Apr	0.000	0.000	2017	Apr	0.000	0.000
2017	May	0.000	8.862	2017	May	0.000	152.747
2017	Jun	0.000	13.085	2017	Jun	0.000	177.133
2017	Jul	0.000	18.423	2017	Jul	0.000	199.103
2017	Aug	0.000	18.882	2017	Aug	0.000	210.542
2017	Sep	0.000	9.929	2017	Sep	0.000	194.038



Southwestern Public Service Company

Weather Normalization of SPS Test Year Peak Demand

Test Year Peak Day Weather Variance from the 29-yr Average by Concept (Retail and Full Req Wholesale)

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Summer 4-mth Avg
Norm Avg Peak Day Temperature	83.7	83.5	78.8	70.7	34.3	26.7	26.2	27.3	42.6	69.3	77.7	82.9	82.2
Act Avg Peak Day Temperature	90.3	84.0	77.6	68.2	68.2	23.0	23.4	42.9	61.5	59.6	70.2	83.0	83.7
Variance	6.6	0.5	-1.2	-2.5	33.9	-3.7	-2.9	15.6	18.9	-9.8	-7.5	0.1	1.5
% Variance	7.9%	0.6%	-1.6%	-3.6%	98.9%	-13.7%	-10.9%	57.0%	44.4%	-14.1%	-9.6%	0.2%	1.8%
Norm Peak Day Heating Degree Days	0.0	0.0	0.0	0.1	30.7	38.3	38.8	37.7	22.6	0.7	0.0	0.0	0.0
Act Peak Day Heating Degree Days	0.0	0.0	0.0	0.0	0.0	42.0	41.6	22.1	3.5	5.4	0.0	0.0	0.0
Variance	0.0	0.0	0.0	-0.1	-30.7	3.7	2.9	-15.6	-19.1	4.7	0.0	0.0	0.0
% Variance				-100.0%	-100.0%	9.5%	7.4%	-41.4%	-84.4%	644.1%			0.0%
Norm Precipitation for the week prior to the Peak Day	0.25	0.39	0.21	0.05	0.14	0.14	0.13	0.16	0.17	0.04	0.37	0.32	0.3
Act Precipitation for the week prior to the Peak Day	0.06	1.11	0.62	0.00	0.00	0.21	0.14	0.00	0.00	0.45	0.03	0.04	0.5
Variance	-0.19	0.72	0.41	-0.05	-0.14	0.07	0.02	-0.16	-0.17	0.41	-0.34	-0.27	0.2
% Variance	-77.5%	182.8%	200.1%	-100.0%	-100.0%	52.7%	12.2%	-100.0%	-100.0%	1043.1%	-92.6%	-85.9%	57.0%

Test Year Peak Day Weather Variance from the 29-yr Average by Concept (GSEC)

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Summer 4-mth Avg
Norm Avg Peak Day Temperature	83.3	83.3	78.5	70.7	32.7	25.0	24.6	25.3	41.2	69.1	77.4	82.2	81.8
Act Avg Peak Day Temperature	90.5	83.5	77.4	68.0	68.5	20.9	18.8	30.8	69.3	73.6	72.3	86.9	84.6
Variance	7.2	0.3	-1.1	-2.6	35.8	-4.1	-5.8	5.5	28.1	4.6	-5.1	4.7	2.8
% Variance	8.7%	0.3%	-1.3%	-3.7%	109.5%	-16.2%	-23.5%	21.6%	68.2%	6.6%	-6.6%	5.7%	3.4%
Norm Precipitation for the week prior to the Peak Day	0.29	0.44	0.24	0.05	0.15	0.14	0.14	0.16	0.21	0.05	0.44	0.37	0.3
Act Precipitation for the week prior to the Peak Day	0.07	1.47	0.57	0.00	0.00	0.22	0.10	0.00	0.00	0.21	0.04	0.06	0.5
Variance	-0.22	1.03	0.32	-0.05	-0.15	0.08	-0.04	-0.16	-0.21	0.16	-0.40	-0.31	0.2
% Variance	-74.6%	236.6%	132.5%	-100.0%	-100.0%	59.6%	-31.2%	-100.0%	-100.0%	352.7%	-91.9%	-83.9%	62.2%

Southwestern Public Service Company

Weather Normalization of SPS Test Year Peak Demand

Test Year Peak Demand Weather Adjustment Summary

Summary Table of Retail Peak Weather Normal Adjustment

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	4-mth Avg *
WN Peak	3,379	3,393	3,031	2,629	2,723	2,703	2,784	2,748	2,593	2,750	2,851	3,330	3,283
Weather Adj	87	-41	-38	-9	-230	32	22	-113	-112	-111	-2	52	15
Actual Peak	3,466	3,352	2,993	2,620	2,493	2,736	2,807	2,636	2,481	2,639	2,848	3,382	3,298
Percent Chg	-2.5%	1.2%	1.3%	0.4%	9.2%	-1.2%	-0.8%	4.3%	4.5%	4.2%	0.1%	-1.5%	0.5%

Summary Table of Full Requirement Wholesale Peak Weather Normal Adjustment with Precipitation

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	4-mth Avg *
WN Peak	1,053	1,028	890	775	747	791	770	761	813	818	865	930	976
Weather Adj	37	-17	-16	-5	-53	10	7	-36	-41	-27	-14	8	3
Actual Peak	1,090	1,011	874	770	694	801	777	724	772	791	851	938	979
Percent Chg	-3.4%	1.7%	1.9%	0.6%	7.6%	-1.2%	-0.9%	5.0%	5.3%	3.5%	1.7%	-0.9%	0.3%

Summary Table of Golden Spread Full Load Peak Weather Normal Adjustment

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	4-mth Avg *
WN Peak	1,272	1,352	551	557	555	517	541	486	592	611	838	1,044	1,055
Weather Adj	65	-40	-17	-2	0	0	0	0	59	-1	25	64	18
Actual Peak	1,337	1,312	534	555	555	517	541	486	651	610	863	1,108	1,073
Percent Chg	-4.8%	3.0%	3.3%	0.3%	0.0%	0.0%	0.0%	0.0%	-9.1%	0.2%	-2.9%	-5.8%	1.7%

\* the four month average is of June 2017, July 2016, August 2016, and September 2016

Southwestern Public Service Company

Weather Normalization of SPS Test Year Peak Demand

Test Year Retail Peak Demand Weather Adjustment Detail  
Actual Historical Retail Peak Demand (MW)

Test year	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
	3,466	3,352	2,993	2,620	2,493	2,736	2,807	2,636	2,481	2,639	2,848	3,382
<b>Average Temperature Weather Adjustment (29-yr normal)</b>												
Average Temperature Normal	83.7	83.5	78.8	70.7	34.3	26.7	26.2	27.3	42.6	69.3	77.7	82.9
Average Temperature Actual	90.3	84.0	77.6	68.2	68.2	23.0	23.4	42.9	61.5	59.6	70.2	83.0
Variance from Normal	6.6	0.5	-1.2	-2.5	33.9	-3.7	-2.9	15.6	18.9	-9.8	-7.5	0.1
Average Temperature Weather Coefficients	11.1902	11.4263	8.9036	3.7002	0.0000	0.0000	0.0000	0.0000	0.0000	3.5197	8.7182	10.8351
Average Temperature Weather Adjustment (MW)	74.034	5.809	(10.937)	(9.293)	-	-	-	-	-	(34.351)	(65.067)	1.599
<b>Heating Degree Days Weather Adjustment (29-yr normal)</b>												
Heating Degree Days Normal	0.0	0.0	0.0	0.1	30.7	38.3	38.8	37.7	22.6	0.7	0.0	0.0
Heating Degree Days Actual	0.0	0.0	0.0	0.0	0.0	42.0	41.6	22.1	3.5	5.4	0.0	0.0
Variance from Normal	0.0	0.0	0.0	-0.1	-30.7	3.7	2.9	-15.6	-19.1	4.7	0.0	0.0
Heating Degree Days Weather Coefficients	0.0000	0.0000	0.0000	0.0000	7.4932	8.8229	7.8179	7.2138	5.8858	0.0000	0.0000	0.0000
Heating Degree Days Weather Adjustment (MW)	-	-	-	-	(230)	32	22	(113)	(112)	-	-	-
<b>Precipitation 1 week before Peak Day Weather Adjustment (29-yr normal)</b>												
Precipitation Normal	0.25	0.39	0.21	0.05	0.14	0.14	0.13	0.16	0.17	0.04	0.37	0.32
Precipitation Actual	0.06	1.11	0.62	0.00	0.00	0.21	0.14	0.00	0.00	0.45	0.03	0.04
Variance from Normal	-0.19	0.72	0.41	-0.05	-0.14	0.07	0.02	-0.16	-0.17	0.41	-0.34	-0.27
Precipitation Weather Coefficients	-65.308267	-65.308267	-65.308267	0	0	0	0	0	0	-185.44283	-185.44283	-185.44283
Precipitation Weather Adjustment (MW)	13	(47)	(27)	-	-	-	-	-	-	(76)	63	50

Southwestern Public Service Company

Weather Normalization of SPS Test Year Peak Demand

Test Year Full Requirement Wholesale Peak Demand Weather Adjustment Detail  
Actual Historical Full Requirement Wholesale Peak Demand (MW)

Test Year	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
	1,090	1,011	874	770	694	801	777	724	772	791	851	938
<b>Average Temperature Weather Adjustment (29-yr normal)</b>												
Average Temperature Normal	83.7	83.5	78.8	70.7	34.3	26.7	26.2	27.3	42.6	69.3	77.7	82.9
Average Temperature Actual	90.3	84.0	77.6	68.2	68.2	23.0	23.4	42.9	61.5	59.6	70.2	83.0
Variance from Normal	6.6	0.5	-1.2	-2.5	33.9	-3.7	-2.9	15.6	18.9	-9.8	-7.5	0.1
Average Temperature Weather Coefficients	4.8071	5.1759	4.2291	1.8598	0.0000	0.0000	0.0000	0.0000	0.0000	1.6739	3.1552	4.4349
Average Temperature Weather Adjustment (MW)	31.8	2.6	(5.2)	(4.7)	-	-	-	-	-	(16.3)	(23.5)	0.7
<b>Heating Degree Days Weather Adjustment (29-yr normal)</b>												
Heating Degree Days Normal	0.0	0.0	0.0	0.1	30.7	38.3	38.8	37.7	22.6	0.7	0.0	0.0
Heating Degree Days Actual	0.0	0.0	0.0	0.0	0.0	42.0	41.6	22.1	3.5	5.4	0.0	0.0
Variance from Normal	-	-	-	(0.1)	(30.7)	3.7	2.9	(15.6)	(19.1)	4.7	-	-
Heating Degree Days Weather Coefficients	0.0000	0.0000	0.0000	0.0000	1.7087	2.7204	2.4000	2.3342	2.1486	0.0000	0.0000	0.0000
Heating Degree Days Weather Adjustment (MW)	-	-	-	-	(52.5)	9.9	6.9	(36.4)	(41.0)	-	-	-
<b>Precipitation 1 week before Peak Day Weather Adjustment (29-yr normal)</b>												
Precipitation Normal	0.25	0.39	0.21	0.05	0.14	0.14	0.13	0.16	0.17	0.04	0.37	0.32
Precipitation Actual	0.06	1.11	0.62	0.00	0.00	0.21	0.14	0.00	0.00	0.45	0.03	0.04
Variance from Normal	-0.19	0.72	0.41	-0.05	-0.14	0.07	0.02	-0.16	-0.17	0.41	-0.34	-0.27
Precipitation Weather Coefficients	-27.044	-27.044	-27.044	0.000	0.000	0.000	0.000	0.000	0.000	-27.044	-27.044	-27.044
Precipitation Weather Adjustment (MW)	5.2	(19.4)	(11.1)	-	-	-	-	-	-	(11.1)	9.2	7.3

Southwestern Public Service Company

Weather Normalization of SPS Test Year Peak Demand

Test Year Golden Spread Full Load Peak Demand Weather Adjustment Detail  
Actual Historical Golden Spread Full Load Peak Demand (MW)

Test year	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
	1,337	1,312	534	555	555	517	541	486	651	610	863	1,108
<b>Average Temperature Weather Adjustment (29-yr normal)</b>												
Average Temperature Normal	83.30	83.26	78.46	70.7	32.7	25.0	24.6	25.3	41.2	69.1	77.4	82.2
Average Temperature Actual	90.52	83.5	77.4	68.0	68.5	20.9	18.8	30.8	69.3	73.6	72.3	86.9
Variance from Normal	7.2	0.3	-1.1	-2.6	35.8	-4.1	-5.8	5.5	28.1	4.6	-5.1	4.7
Average Temperature Weather Coefficients	7.7369	7.8168	4.1483	0.6409	0.0000	0.0000	0.0000	0.0000	2.1103	3.8965	4.4764	5.9009
Average Temperature Weather Adjustment (MW)	55.8	2.1	(4.4)	(1.7)	-	-	-	-	59.3	17.9	(22.9)	27.6
<b>Precipitation 1 week before Peak Day Weather Adjustment (29-yr normal)</b>												
Precipitation Normal	0.3	0.4	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.4	0.4
Precipitation Actual	0.1	1.5	0.6	0.0	0.0	0.2	0.1	0.0	0.0	0.2	0.0	0.1
Variance from Normal	-0.2	1.0	0.3	-0.1	-0.1	0.1	0.0	-0.2	-0.2	0.2	-0.4	-0.3
Precipitation Weather Coefficients	-40.515	-40.515	-40.515	0.000	0.000	0.000	0.000	0.000	0.000	-119.032	-119.032	-119.032
Precipitation Weather Adjustment (MW)	8.8	(41.8)	(13.1)	-	-	-	-	-	-	(19.2)	47.9	36.5

Southwestern Public Service Company

Weather Normalization of SPS Test Year Peak Demand

Retail Peak Demand										Full Req Wholesale Peak Demand										GSEC Full Load Peak Demand									
Year			Month			Model Coefficients			Precip 1WKBA	Year			Month			Model Coefficients			Precip 1WKBA	Year			Month			Model Coefficients			Precip 1WKBA
Year	Month		PD_HDD	PD_Avg_Temp	PD_HDD	PD_Avg_Temp	PD_HDD	PD_Avg_Temp		Year	Month		PD_HDD	PD_Avg_Temp	PD_HDD	PD_Avg_Temp	PD_HDD	PD_Avg_Temp		Year	Month		PD_HDD	PD_Avg_Temp	PD_HDD	PD_Avg_Temp	PD_HDD	PD_Avg_Temp	
2016	7		0.0000	11.1902					-65.3083	2016	7		0.0000	4.8071					-27.0439	2016	7		0.0000	7.7369					-40.5153
2016	8		0.0000	11.4263					-65.3083	2016	8		0.0000	5.1759					-27.0439	2016	8		0.0000	7.8168					-40.5153
2016	9		0.0000	8.9036					-65.3083	2016	9		0.0000	4.2291					-27.0439	2016	9		0.0000	4.1483					-40.5153
2016	10		0.0000	3.7002					0.0000	2016	10		0.0000	1.8598					0.0000	2016	10		0.0000	0.6499					0.0000
2016	11		7.4932	0.0000					0.0000	2016	11		1.7087	0.0000					0.0000	2016	11		0.0000	0.0000					0.0000
2016	12		8.8229	0.0000					0.0000	2016	12		2.7204	0.0000					0.0000	2016	12		0.0000	0.0000					0.0000
2017	1		7.8179	0.0000					0.0000	2017	1		2.4000	0.0000					0.0000	2017	1		0.0000	0.0000					0.0000
2017	2		7.2138	0.0000					0.0000	2017	2		2.3342	0.0000					0.0000	2017	2		0.0000	0.0000					0.0000
2017	3		5.8858	0.0000					0.0000	2017	3		2.1486	0.0000					0.0000	2017	3		0.0000	2.1103					0.0000
2017	4		0.0000	3.5197					-185.4428	2017	4		0.0000	1.6739					-27.0439	2017	4		0.0000	3.8965					-119.0319
2017	5		0.0000	8.7182					-185.4428	2017	5		0.0000	3.1552					-27.0439	2017	5		0.0000	4.4764					-119.0319
2017	6		0.0000	10.8351					-185.4428	2017	6		0.0000	4.4349					-27.0439	2017	6		0.0000	5.9009					-119.0319

Southwestern Public Service Company

Regression Models and Associated Statistics

New Mexico Residential Service

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	-24634.848	4513.249	-5.458	Constant term
3	CYPperHH_NM	290.373	31.428	9.239	Real Personal Income per Household New Mexico
4	H65_bill_ResSvc_NM_Jan	0.000402	0.000	20.830	Heating degree days (January) multiplied by customers
5	H65_bill_ResSvc_NM_Feb	0.000327	0.000	15.712	Heating degree days (February) multiplied by customers
6	H65_bill_ResSvc_NM_Mar	0.000247	0.000	10.245	Heating degree days (March) multiplied by customers
7	H65_bill_ResSvc_NM_Dec	0.000334	0.000	15.453	Heating degree days (December) multiplied by customers
8	C65_bill_ResSvc_NM_Jun	0.000765	0.000	22.835	Cooling degree days (June) multiplied by customers
9	C65_bill_ResSvc_NM_Jul	0.000906	0.000	33.547	Cooling degree days (July) multiplied by customers
10	C65_bill_ResSvc_NM_Aug	0.000957	0.000	34.932	Cooling degree days (August) multiplied by customers
11	C65_bill_ResSvc_NM_Sep	0.000884	0.000	25.582	Cooling degree days (September) multiplied by customers
12	C65_bill_ResSvc_NM_Oct	0.000660	0.000	9.124	Cooling degree days (October) multiplied by customers
13	BILLINGDAYS	958.583	104.145	9.204	Number of billing days
14	Bin0509	4752.097	1871.891	2.539	Binary variable for May 2009=1, otherwise=0
15	Bin1210	-6285.205	1943.972	-3.233	Binary variable for December 2010=1, otherwise=0
16	AR(1)	0.491	0.075	6.541	First Order Auto Regressive Term
17	<b>Model Statistics</b>				
18	Iterations	8			
19	Adjusted Observations	143			
20	Deg. of Freedom for Error	128			
21	R-Squared	0.968			
22	Adjusted R-Squared	0.964			
23	AIC	15.361			
24	BIC	15.672			
25	F-Statistic	275.945			
26	Prob (F-Statistic)	0.0000			
27	Log-Likelihood	-1,286.21			
28	Model Sum of Squares	16,408,879,105.17			
29	Sum of Squared Errors	543,673,392.02			
30	Mean Squared Error	4,247,448.38			
31	Std. Error of Regression	2,060.93			
32	Mean Abs. Dev. (MAD)	1,569.58			
33	Mean Abs. % Err. (MAPE)	3.68%			
34	Durbin-Watson Statistic	1.888			
35	Durbin-H Statistic				
36	Ljung-Box Statistic	58.79			
37	Prob (Ljung-Box)	0.0001			
38	Skewness	0.180			
39	Kurtosis	2.856			
40	Jarque-Bera	0.897			
41	Prob (Jarque-Bera)	0.6385			

Southwestern Public Service Company

Regression Models and Associated Statistics

New Mexico Residential Space Heat

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	-21192.58160	4318.38798	-4.908	Constant term
3	CYPperHH_NM	117.377830	24.82742	4.728	Real Personal Income per Household New Mexico
4	H65_bill_ResSpHt_NM_Jan	0.001374	0.00004	35.698	Heating degree days (January) multiplied by customers
5	H65_bill_ResSpHt_NM_Feb	0.001386	0.00004	31.477	Heating degree days (February) multiplied by customers
6	H65_bill_ResSpHt_NM_Mar	0.001179	0.00006	21.141	Heating degree days (March) multiplied by customers
7	H65_bill_ResSpHt_NM_Apr	0.000569	0.00010	5.513	Heating degree days (April) multiplied by customers
8	H65_bill_ResSpHt_NM_Nov	0.000386	0.00012	3.206	Heating degree days (November) multiplied by customers
9	H65_bill_ResSpHt_NM_Dec	0.001019	0.00005	20.396	Heating degree days (December) multiplied by customers
10	C65_bill_ResSpHt_NM_Jun	0.000895	0.00007	13.076	Cooling degree days (June) multiplied by customers
11	C65_bill_ResSpHt_NM_Jul	0.001135	0.00005	21.551	Cooling degree days (July) multiplied by customers
12	C65_bill_ResSpHt_NM_Aug	0.001262	0.00005	24.015	Cooling degree days (August) multiplied by customers
13	C65_bill_ResSpHt_NM_Sep	0.00107	0.00007	15.566	Cooling degree days (September) multiplied by customers
14	C65_bill_ResSpHt_NM_Oct	0.00068	0.00016	4.305	Cooling degree days (October) multiplied by customers
15	BILLINGDAYS	1223.76757	117.37720	10.426	Number of Billing Days
16	Bin1210	-5582.88547	1931.70188	-2.890	Binary variable for December 2010=1, otherwise=0
17	Bin1213	5973.24754	1935.30137	3.086	Binary variable for December 2013=1, otherwise=0
18	AR(1)	0.35664	0.08774	4.065	First Order Auto Regressive Term
19	<b>Model Statistics</b>				
20	Iterations	11			
21	Adjusted Observations	138			
22	Deg. of Freedom for Error	121			
23	R-Squared	0.974			
24	Adjusted R-Squared	0.970			
25	AIC	15.240			
26	BIC	15.600			
27	F-Statistic	278.585			
28	Prob (F-Statistic)	0.0000			
29	Log-Likelihood	-1,230.34			
30	Model Sum of Squares	16,505,212,071.61			
31	Sum of Squared Errors	448,051,839.18			
32	Mean Squared Error	3,702,907.76			
33	Std. Error of Regression	1,924.29			
34	Mean Abs. Dev. (MAD)	1,404.70			
35	Mean Abs. % Err. (MAPE)	3.57%			
36	Durbin-Watson Statistic	2.166			
37	Durbin-H Statistic				
38	Ljung-Box Statistic	49.75			
39	Prob (Ljung-Box)	0.0015			
40	Skewness	0.427			
41	Kurtosis	2.942			
42	Jarque-Bera	4.208			
43	Prob (Jarque-Bera)	0.1220			



Southwestern Public Service Company

Regression Models and Associated Statistics

New Mexico Small General Service

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	-5980.308	2464.607	-2.426	Constant term
3	EE_NM	57.710217	22.349	2.582	Non-farm employment, New Mexico service area
4	BILLINGDAYS	251.365737	27.621	9.101	Number of Billing Days
5	H65_bill_SGS_NM_Jan	0.000238	0.000	7.679	Heating degree days (January) multiplied by customers
6	H65_bill_SGS_NM_Feb	0.000253	0.000	7.764	Heating degree days (February) multiplied by customers
7	H65_bill_SGS_NM_Mar	0.000249	0.000	6.506	Heating degree days (March) multiplied by customers
8	H65_bill_SGS_NM_Dec	0.000166	0.000	4.887	Heating degree days (December) multiplied by customers
9	C65_bill_SGS_NM_Jun	0.000588	0.000	10.358	Cooling degree days (June) multiplied by customers
10	C65_bill_SGS_NM_Jul	0.000713	0.000	16.601	Cooling degree days (July) multiplied by customers
11	C65_bill_SGS_NM_Aug	0.000708	0.000	16.352	Cooling degree days (August) multiplied by customers
12	C65_bill_SGS_NM_Sep	0.000676	0.000	12.971	Cooling degree days (September) multiplied by customers
13	C65_bill_SGS_NM_Oct	0.000	0.000	4.826	Cooling degree days (October) multiplied by customers
14	RateShiftSGtoSGS	6595.515	359.491	18.347	Rate change SG to SGS due to demand req change
15	RateShift	-3545.237	327.629	-10.821	SGS customers moved to the SG rate effective June 2012
16	Bin0401	-2497.415	513.764	-4.861	Binary for April 2001=1, otherwise=0
17	Bin0102	-2435.387	524.872	-4.640	Binary for January 2002=1, otherwise=0
18	Bin0304	-3304.855	528.767	-6.250	Binary for March 2004=1, otherwise=0
19	Bin0606	4266.639	542.365	7.867	Binary for June 2006=1, otherwise=0
20	Bin0806	-3967.962	531.508	-7.465	Binary for August 2006=1, otherwise=0
21	Bin1209	-2123.668	542.232	-3.917	Binary for December 2009=1, otherwise=0
22	AR(1)	0.542	0.069	7.803	First order autoregressive term
23	<b>Model Statistics</b>				
24	Iterations	14			
25	Adjusted Observations	179			
26	Deg. of Freedom for Error	158			
27	R-Squared	0.947			
28	Adjusted R-Squared	0.940			
29	AIC	12.827			
30	BIC	13.201			
31	F-Statistic	141.54			
32	Prob (F-Statistic)	0			
33	Log-Likelihood	-1,381.03			
34	Model Sum of Squares	944,086,475.34			
35	Sum of Squared Errors	52,692,763.58			
36	Mean Squared Error	333,498.50			
37	Std. Error of Regression	577.49			
38	Mean Abs. Dev. (MAD)	405.46			
39	Mean Abs. % Err. (MAPE)	4.88%			
40	Durbin-Watson Statistic	2.053			
41	Durbin-H Statistic				
42	Ljung-Box Statistic	20.32			
43	Prob (Ljung-Box)	0.6784			
44	Skewness	0.536			
45	Kurtosis	3.993			
46	Jarque-Bera	15.931			
47	Prob (Jarque-Bera)	0.0003			

Southwestern Public Service Company

Regression Models and Associated Statistics

New Mexico Secondary General Service

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	-34258.057	19331.042	-1.772	Constant term
3	EE_NM	468.291	178.635	2.621	Non-farm employment, New Mexico service area
4	C65_bill_ROS_NM_Jun	27.103	2.298	11.797	Cooling degree days (June)
5	C65_bill_ROS_NM_Jul	30.334	1.631	18.593	Cooling degree days (July)
6	C65_bill_ROS_NM_Aug	31.204	1.654	18.864	Cooling degree days (August)
7	C65_bill_ROS_NM_Sep	30.726	2.003	15.339	Cooling degree days (September)
8	C65_bill_ROS_NM_Oct	26.035	4.481	5.810	Cooling degree days (October)
9	BILLINGDAYS	1931.348	108.627	17.780	Number of Billing Days
10	RateShiftJan09	-19069.463	1377.262	-13.846	Rate Shift January 2009
11	RateShiftSGtoSGS	-8359.741	1829.778	-4.569	Rate change SG to SGS due to demand req change
12	Bin0107	10239.601	2350.793	4.356	Binary variable for January 2007=1, otherwise=0
13	Bin0109	23326.557	2733.754	8.533	Binary variable for January 2009=1, otherwise=0
14	Bin0309	22811.100	2843.077	8.023	Binary variable for March 2009=1, otherwise=0
15	Bin0409	23801.548	2313.898	10.286	Binary variable for April 2009=1, otherwise=0
16	Bin0509	17964.710	2806.708	6.401	Binary variable for May 2009=1, otherwise=0
17	Bin0709	12692.530	2639.225	4.809	Binary variable for July 2009=1, otherwise=0
18	Bin1210	-8675.735	2324.785	-3.732	Binary variable for December 2010=1, otherwise=0
19	Bin0212	-7685.942	2469.548	-3.112	Binary variable for February 2012=1, otherwise=0
20	Bin0312	-70927.810	2284.555	-31.047	Binary variable for March 2012=1, otherwise=0
21	Bin0412	-21321.758	2497.876	-8.536	Binary variable for April 2012=1, otherwise=0
22	AR(1)	0.172	0.088	1.967	First Order Autoregressive Term
23	AR(2)	0.476	0.087	5.470	Second Order Autoregressive Term
24	<b>Model Statistics</b>				
25	Iterations		13		
26	Adjusted Observations		130		
27	Deg. of Freedom for Error		108		
28	R-Squared		0.974		
29	Adjusted R-Squared		0.969		
30	AIC		15.844		
31	BIC		16.330		
32	F-Statistic		193.30		
33	Prob (F-Statistic)		0		
34	Log-Likelihood		-1,192.35		
35	Model Sum of Squares	26,494,664,708.27			
36	Sum of Squared Errors	704,888,543.64			
37	Mean Squared Error	6,526,745.77			
38	Std. Error of Regression	2,554.75			
39	Mean Abs. Dev. (MAD)	1,792.12			
40	Mean Abs. % Err. (MAPE)	2.69%			
41	Durbin-Watson Statistic	2.210			
42	Durbin-H Statistic				
43	Ljung-Box Statistic	26.05			
44	Prob (Ljung-Box)	0.3505			
45	Skewness	0.268			
46	Kurtosis	3.287			
47	Jarque-Bera	2.004			
48	Prob (Jarque-Bera)	0.3671			

Southwestern Public Service Company

Regression Models and Associated Statistics

New Mexico Muni & School Service

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	NR_NM	38.706	0.287	134.782	Population in New Mexico service area
3	C65_bill_MuniSch_NM_Jun	0.00497	0.001	7.342	Cooling degree days (June)
4	C65_bill_MuniSch_NM_Jul	0.00190	0.000	4.887	Cooling degree days (July)
5	C65_bill_MuniSch_NM_Aug	0.00364	0.000	8.578	Cooling degree days (August)
6	C65_bill_MuniSch_NM_Sep	0.00359	0.001	7.068	Cooling degree days (September)
7	C65_bill_MuniSch_NM_Oct	0.01533	0.001	12.071	Cooling degree days (October)
8	PrecipB_Mun_Sch_MarApr	-0.51332	0.172	-2.980	Precipitation inches (March, April)
9	PrecipB_Mun_Sch_MayJun	-0.38080	0.062	-6.096	Precipitation inches (May, June)
10	Bin0409	-1897.639	619.307	-3.064	Binary variable for April 2009=1, otherwise=0
11	Bin0911	2503.708	681.381	3.674	Binary variable for September 2011=1, otherwise =0
12	Bin0613	-1861.796	722.931	-2.575	Binary variable for June 2013=1, otherwise=0
13	Bin0414	1723.309	623.383	2.764	Binary variable for April 2014=1, otherwise=0
14	Bin0815	-2570.316	667.901	-3.848	Binary variable for August 2015=1, otherwise=0
15	Bin1015	-4627.308	752.796	-6.147	Binary variable for October 2015=1, otherwise=0
16	AR(1)	-0.699	0.091	-7.676	First order autoregressive term
17	<b>Model Statistics</b>				
18	Iterations	18			
19	Adjusted Observations	83			
20	Deg. of Freedom for Error	68			
21	R-Squared	0.828			
22	Adjusted R-Squared	0.793			
23	AIC	13.385			
24	BIC	13.822			
25	F-Statistic	23.372			
26	Prob (F-Statistic)				
27	Log-Likelihood	-658.24			
28	Model Sum of Squares	180,861,586			
29	Sum of Squared Errors	37,586,020.41			
30	Mean Squared Error	552,735.59			
31	Std. Error of Regression	743.46			
32	Mean Abs. Dev. (MAD)	535.57			
33	Mean Abs. % Err. (MAPE)	4.84%			
34	Durbin-Watson Statistic	2.056			
35	Durbin-H Statistic				
36	Ljung-Box Statistic	31.02			
37	Prob (Ljung-Box)	0.1531			
38	Skewness	0.326			
39	Kurtosis	2.799			
40	Jarque-Bera	1.609			
41	Prob (Jarque-Bera)	0.4473			

Southwestern Public Service Company

Regression Models and Associated Statistics

New Mexico Irrigation Service

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	2158.253	442.127	4.882	Constant term
3	PrecipB_Irr_Mar	-2.370	0.677	-3.502	precipitation inches (March) multiplied by customer
4	PrecipB_Irr_Apr	-1.369	0.613	-2.234	precipitation inches (April) multiplied by customer
5	PrecipB_Irr_May	-0.592	0.247	-2.399	precipitation inches (May) multiplied by customer
6	PrecipB_Irr_Jun	-0.662	0.168	-3.949	precipitation inches (June) multiplied by customer
7	PrecipB_Irr_Jul	-0.413	0.220	-1.879	precipitation inches (July) multiplied by customer
8	PrecipB_Irr_Aug	-0.526	0.223	-2.360	precipitation inches (August) multiplied by customer
9	PrecipB_Irr_Sep	-1.216	0.161	-7.558	precipitation inches (September) multiplied by customer
10	Jan	-1113.629	329.857	-3.376	Seasonal binary variable, January=1, otherwise=0
11	Feb	-833.690	343.165	-2.429	Seasonal binary variable, February=1, otherwise=0
12	Mar	3144.147	440.479	7.138	Seasonal binary variable, March=1, otherwise=0
13	Apr	7340.097	442.580	16.585	Seasonal binary variable, April=1, otherwise=0
14	May	7353.121	471.522	15.594	Seasonal binary variable, May=1, otherwise=0
15	Jun	8858.163	492.517	17.985	Seasonal binary variable, June=1, otherwise=0
16	Jul	10856.518	594.666	18.256	Seasonal binary variable, July=1, otherwise=0
17	Aug	11719.048	600.769	19.507	Seasonal binary variable, August=1, otherwise=0
18	Sep	10314.977	497.727	20.724	Seasonal binary variable, September=1, otherwise=0
19	Oct	4165.224	339.493	12.269	Seasonal binary variable, October=1, otherwise=0
20	Nov	1278.388	316.868	4.034	Seasonal binary variable, November=1, otherwise=0
21	Bin0607	-1594.161	855.902	-1.863	Binary variable for June 2007=1, otherwise=0
22	Bin0809	-2750.482	810.552	-3.393	Binary variable for August 2009=1, otherwise=0
23	Bin0610	3055.893	818.954	3.731	Binary variable for June 2010=1, otherwise=0
24	Bin1014	-3497.528	816.989	-4.281	Binary variable for October 2014=1, otherwise=0
25	AR(1)	0.448	0.101	4.446	First order autoregressive term
26	AR(2)	0.333	0.103	3.249	Second order autoregressive term
27	<b>Model Statistics</b>				
28	Iterations	16			
29	Adjusted Observations	118			
30	Deg. of Freedom for Error	93			
31	R-Squared	0.967			
32	Adjusted R-Squared	0.958			
33	AIC	13.741			
34	BIC	14.328			
35	F-Statistic	113.067			
36	Prob (F-Statistic)	0			
37	Log-Likelihood	-953.15			
38	Model Sum of Squares	2,091,873,688.80			
39	Sum of Squared Errors	71,692,012.74			
40	Mean Squared Error	770,881.86			
41	Std. Error of Regression	878.00			
42	Mean Abs. Dev. (MAD)	621.75			
43	Mean Abs. % Err. (MAPE)	19.94%			
44	Durbin-Watson Statistic	2.018			
45	Durbin-H Statistic				
46	Ljung-Box Statistic	20.85			
47	Prob (Ljung-Box)	0.6478			
48	Skewness	0.108			
49	Kurtosis	3.148			
50	Jarque-Bera	0.338			
51	Prob (Jarque-Bera)	0.8447			

Southwestern Public Service Company

Regression Models and Associated Statistics

Texas Residential Service

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	-28196.985	8925.434	-3.159	Constant term
3	CYPperHH_TX	398.464	60.803	6.553	Real Personal Income per Household (Texas service area)
4	H65_bill_ResSrv_TX_Jan	0.000281	0.000	20.545	Heating degree days (January) multiplied by customers
5	H65_bill_ResSrv_TX_Feb	0.000205	0.000	15.362	Heating degree days (February) multiplied by customers
6	H65_bill_ResSrv_TX_Mar	0.000160	0.000	11.306	Heating degree days (March) multiplied by customers
7	H65_bill_ResSrv_TX_Dec	0.000203	0.000	13.717	Heating degree days (December) multiplied by customers
8	C65_bill_ResSrv_TX_May	0.000465	0.000	4.394	Cooling degree days (May) multiplied by customers
9	C65_bill_ResSrv_TX_Jun	0.001227	0.000	32.843	Cooling degree days (June) multiplied by customers
10	C65_bill_ResSrv_TX_Jul	0.001403	0.000	57.686	Cooling degree days (July) multiplied by customers
11	C65_bill_ResSrv_TX_Aug	0.001426	0.000	64.482	Cooling degree days (August) multiplied by customers
12	C65_bill_ResSrv_TX_Sep	0.001369	0.000	49.077	Cooling degree days (September) multiplied by customers
13	C65_bill_ResSrv_TX_Oct	0.001095	0.000	16.625	Cooling degree days (October) multiplied by customers
14	ResSvcSalesShift2012	10596.540	2204.974	4.806	Winter Sales Increased - caused by space heat customer moving to res svc
15	BILLINGDAYS	2696.463	210.596	12.804	Number of Billing Days
16	Bin1103	108446.580	3743.049	28.973	Binary variable for November 2003=1, otherwise=0
17	Bin0604	13535.645	3866.091	3.501	Binary variable for June 2004=1, otherwise=0
18	Bin0406	9243.171	3811.257	2.425	Binary variable for April 2006=1, otherwise=0
19	Bin0407	23557.989	4169.733	5.650	Binary variable for April 2007=1, otherwise=0
20	Bin0507	44320.261	4549.712	9.741	Binary variable for May 2007=1, otherwise=0
21	Bin0607	22488.421	4151.050	5.418	Binary variable for June 2007=1, otherwise=0
22	Bin0214	10180.045	3947.878	2.579	Binary variable for February 2014=1, otherwise=0
23	Bin0315	9893.991	3952.127	2.503	Binary variable for March 2015=1, otherwise=0
24	AR(1)	0.513	0.074	6.947	First Order Auto Regressive Term
25	<b>Model Statistics</b>				
26	Iterations	11			
27	Adjusted Observations	166			
28	Deg. of Freedom for Error	143			
29	R-Squared	0.988			
30	Adjusted R-Squared	0.986			
31	AIC	16.779			
32	BIC	17.210			
33	F-Statistic	539.420			
34	Prob (F-Statistic)	0.0000			
35	Log-Likelihood	-1,605.23			
36	Model Sum of Squares	202,271,046,580.72			
37	Sum of Squared Errors	2,437,363,633.12			
38	Mean Squared Error	17,044,500.93			
39	Std. Error of Regression	4,128.50			
40	Mean Abs. Dev. (MAD)	3,005.26			
41	Mean Abs. % Err. (MAPE)	2.49%			
42	Durbin-Watson Statistic	1.931			
43	Durbin-H Statistic				
44	Ljung-Box Statistic	34.40			
45	Prob (Ljung-Box)	0.0779			
46	Skewness	0.104			
47	Kurtosis	2.941			
48	Jarque-Bera	0.326			
49	Prob (Jarque-Bera)	0.8496			

Southwestern Public Service Company

Regression Models and Associated Statistics

Texas Residential Space Heating

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	-19301.32418	5071.63039	-3.806	Constant term
3	TX_ResSpaceHeat_Cust	0.774168	0.08932	8.667	Customer population for Residential Space Heat
4	H65_bill_ResSpHt_TX_Jan	0.001310	0.00003	51.200	Heating degree days (January) multiplied by customers
5	H65_bill_ResSpHt_TX_Feb	0.001206	0.00003	44.743	Heating degree days (February) multiplied by customers
6	H65_bill_ResSpHt_TX_Mar	0.001052	0.00003	33.973	Heating degree days (March) multiplied by customers
7	H65_bill_ResSpHt_TX_Apr	0.000634	0.00005	13.755	Heating degree days (April) multiplied by customers
8	H65_bill_ResSpHt_TX_Nov	0.000404	0.00007	5.568	Heating degree days (November) multiplied by customers
9	H65_bill_ResSpHt_TX_Dec	0.001084	0.00003	33.289	Heating degree days (December) multiplied by customers
10	C65_bill_ResSpHt_TX_Jun	0.001217	0.00006	20.114	Cooling degree days (June) multiplied by customers
11	C65_bill_ResSpHt_TX_Jul	0.001477	0.00004	32.889	Cooling degree days (July) multiplied by customers
12	C65_bill_ResSpHt_TX_Aug	0.001541	0.00004	37.005	Cooling degree days (August) multiplied by customers
13	C65_bill_ResSpHt_TX_Sep	0.001438	0.00006	25.876	Cooling degree days (September) multiplied by customers
14	C65_bill_ResSpHt_TX_Oct	0.001103	0.00014	8.162	Cooling degree days (October) multiplied by customers
15	ResSpHtRateChg2012	-2831.52339	882.62781	-3.208	Residential Space Heat customers moving to Residential Service rate
16	BILLINGDAYS	912.08645	115.75764	7.879	Number of Billing Days
17	Bin1103	44376.63177	2107.66259	21.055	Binary variable for November 2003=1, otherwise=0
18	Bin0304	7323.95592	2134.67658	3.431	Binary variable for March 2004=1, otherwise=0
19	Bin0407	-22595.57296	2390.87025	-9.451	Binary variable for April 2007=1, otherwise=0
20	Bin0507	-42000.23492	2601.76526	-16.143	Binary variable for May 2007=1, otherwise=0
21	Bin0607	-27336.29076	2360.41613	-11.581	Binary variable for June 2007=1, otherwise=0
22	Bin0513	7271.45235	2178.44825	3.338	Binary variable for May 2013=1, otherwise=0
23	Bin1213	8617.77136	2190.82511	3.934	Binary variable for December 2013=1, otherwise=0
24	AR(1)	0.51652	0.06448	8.010	First Order Auto Regressive Term
25	<b>Model Statistics</b>				
26	Iterations	10			
27	Adjusted Observations	191			
28	Deg. of Freedom for Error	168			
29	R-Squared	0.983			
30	Adjusted R-Squared	0.981			
31	AIC	15.631			
32	BIC	16.022			
33	F-Statistic	449.919			
34	Prob (F-Statistic)	0.0000			
35	Log-Likelihood	-1,740.75			
36	Model Sum of Squares	54,328,568,417.03			
37	Sum of Squared Errors	922,105,660.22			
38	Mean Squared Error	5,488,724.17			
39	Std. Error of Regression	2,342.80			
40	Mean Abs. Dev. (MAD)	1,732.84			
41	Mean Abs. % Err. (MAPE)	3.12%			
42	Durbin-Watson Statistic	1.999			
43	Durbin-H Statistic				
44	Ljung-Box Statistic	15.33			
45	Prob (Ljung-Box)	0.9107			
46	Skewness	0.057			
47	Kurtosis	2.971			
48	Jarque-Bera	0.109			
49	Prob (Jarque-Bera)	0.9469			

Southwestern Public Service Company

Regression Models and Associated Statistics

Texas Small General Service

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1	EE_TX_Log	701.863	314.352	2.233	Log of non-farm employment, Texas service area
2	H65_bill_SGS_TX_Jan	0.000198	0.000	9.349	Heating degree days (January) multiplied by customers
3	H65_bill_SGS_TX_Feb	0.000138	0.000	6.411	Heating degree days (February) multiplied by customers
4	H65_bill_SGS_TX_Mar	0.000139	0.000	6.387	Heating degree days (March) multiplied by customers
5	H65_bill_SGS_TX_Dec	0.000146	0.000	6.641	Heating degree days (December) multiplied by customers
6	C65_bill_SGS_TX_Jun	0.000531	0.000	10.562	Cooling degree days (June) multiplied by customers
7	C65_bill_SGS_TX_Jul	0.000629	0.000	16.847	Cooling degree days (July) multiplied by customers
8	C65_bill_SGS_TX_Aug	0.000705	0.000	19.462	Cooling degree days (August) multiplied by customers
9	C65_bill_SGS_TX_Sep	0.000726	0.000	15.724	Cooling degree days (September) multiplied by customers
10	C65_bill_SGS_TX_Oct	0.000	0.000	4.816	Cooling degree days (October) multiplied by customers
11	RateShiftJun12	-5059.867	765.072	-6.614	SGS customers moved to the SG rate effective June 2012=1, prior values=0
12	RateShiftFeb14	5072.220	956.669	5.302	SG customers moved to the SGS rate effective February 2014=1, prior values=0
13	BILLINGDAYS	499.762	56.852	8.791	Number of billing days
14	Bin0405	6056.925	1157.526	5.233	Binary for April 2005=1, otherwise=0
15	Bin0505	-5236.339	1154.440	-4.536	Binary for May 2005=1, otherwise=0
16	Bin1106	-7061.588	1029.098	-6.862	Binary for November 2006=1, otherwise=0
17	Bin0507	-4526.187	1017.452	-4.449	Binary for May 2007=1, otherwise=0
18	bin0109	5364.520	1047.922	5.119	Binary for January 2009=1, otherwise=0
19	Bin0214	4254.345	1180.683	3.603	Binary for February 2014=1, otherwise=0
20	Bin0614	-2592.153	1058.697	-2.448	Binary for June 2014=1, otherwise=0
21	AR(1)	0.672	0.070	9.636	First order autoregressive term
22	<b>Model Statistics</b>				
23	Iterations	11			
24	Adjusted Observations	143			
25	Deg. of Freedom for Error	122			
26	R-Squared	0.927			
27	Adjusted R-Squared	0.915			
28	AIC	14.341			
29	BIC	14.776			
30	F-Statistic	77.174			
31	Prob (F-Statistic)				
32	Log-Likelihood	-1,207.27			
33	Model Sum of Squares	2,280,491,286.88			
34	Sum of Squared Errors	180,254,533.88			
35	Mean Squared Error	1,477,496.18			
36	Std. Error of Regression	1,215.52			
37	Mean Abs. Dev. (MAD)	904.33			
38	Mean Abs. % Err. (MAPE)	4.26%			
39	Durbin-Watson Statistic	1.961			
40	Durbin-H Statistic				
41	Ljung-Box Statistic	43.95			
42	Prob (Ljung-Box)	0.0077			
43	Skewness	-0.084			
44	Kurtosis	2.810			
45	Jarque-Bera	0.382			
46	Prob (Jarque-Bera)	0.8261			

Southwestern Public Service Company

Regression Models and Associated Statistics

Texas Secondary General Service

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	NR_TX	327.361	3.400	96.277	Population in Texas service area
3	Feb	-21438.403	3414.153	-6.279	Seasonal binary variable, February=1, otherwise=0
4	H65_bill_Pan_TX_Jan	19.254	3.839	5.015	Heating degree days (January)
5	H65_bill_Pan_TX_Dec	32.558	5.020	6.486	Heating degree days (December)
6	C65_bill_Pan_TX_Jun	115.509	12.482	9.254	Cooling degree days (June)
7	C65_bill_Pan_TX_Jul	126.129	8.187	15.406	Cooling degree days (July)
8	C65_bill_Pan_TX_Aug	151.279	7.085	21.353	Cooling degree days (August)
9	C65_bill_Pan_TX_Sep	147.500	9.610	15.349	Cooling degree days (September)
10	C65_bill_Pan_TX_Oct	105.160	24.074	4.368	Cooling degree days (October)
11	PAN_TX_PRECIPB_Mar	-7454.138	2613.527	-2.852	Precipitation inches (March)
12	PAN_TX_PRECIPB_Apr	-7820.015	1931.743	-4.048	Precipitation inches (April)
13	Pan_TX_PrecipB_MayJunJulAugSep	-1459.271	670.381	-2.177	Precipitation inches (May, June, July, August, September)
14	SGtoSGSRateChg	-10322.808	2950.868	-3.498	SG to SGS change (10-25KW)
15	RateShiftMay11	-15480.430	2029.295	-7.628	Binary for customers moving from secondary general to primary general, starting May 2011=1, otherwise=0
16	Bin0604	-31943.333	10267.610	-3.111	Binary variable for June 2004=1, otherwise=0
17	Bin0205	30965.562	10213.889	3.032	Binary variable for February 2005=1, otherwise=0
18	Bin0505	-22628.635	9910.182	-2.283	Binary variable for May 2005=1, otherwise=0
19	Bin0105	51945.774	10101.389	5.142	Binary variable for January 2005=1, otherwise=0
20	Bin1108	-27028.883	9940.294	-2.719	Binary variable for November 2008=1, otherwise=0
21	Bin0210	-52991.427	10215.419	-5.187	Binary variable for February 2010=1, otherwise=0
22	Bin0510	-24694.052	9971.418	-2.476	Binary variable for May 2010=1, otherwise=0
23	Bin0311	-24927.302	9917.196	-2.514	Binary variable for March 2011=1, otherwise=0
24	Bin0112	-34793.687	10285.961	-3.383	Binary variable for January 2012=1, otherwise=0
25	<b>Model Statistics</b>				
26	Iterations	1			
27	Adjusted Observations	156			
28	Deg. of Freedom for Error	133			
29	R-Squared	0.905			
30	Adjusted R-Squared	0.889			
31	AIC	18.508			
32	BIC	18.957			
33	F-Statistic	57.625			
34	Prob (F-Statistic)				
35	Log-Likelihood	-1,641.95			
36	Model Sum of Squares	120,789,657,288.74			
37	Sum of Squared Errors	12,672,086,543.85			
38	Mean Squared Error	95,278,846.19			
39	Std. Error of Regression	9,761.09			
40	Mean Abs. Dev. (MAD)	7,281.03			
41	Mean Abs. % Err. (MAPE)	3.91%			
42	Durbin-Watson Statistic	1.816			
43	Durbin-H Statistic				
44	Ljung-Box Statistic	32.24			
45	Prob (Ljung-Box)	0.1211			
46	Skewness	-0.048			
47	Kurtosis	2.463			
48	Jarque-Bera	1.936			
49	Prob (Jarque-Bera)	0.3798			



Southwestern Public Service Company

Regression Models and Associated Statistics

Canadian River Municipal Water Authority

Line No.	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	NR_TX	17.905	0.404	44.364	Population in Texas service area
3	Jan	-1840.848	357.485	-5.149	Seasonal binary variable, January=1, otherwise=0
4	Feb	-1222.757	339.681	-3.600	Seasonal binary variable, February=1, otherwise=0
5	May	1528.856	349.365	4.376	Seasonal binary variable, May=1, otherwise=0
6	Dec	-1529.009	341.201	-4.481	Seasonal binary variable, December=1, otherwise=0
7	C65_Cal_Pan_TX_Jun	4.907	0.855	5.738	Cooling degree days (June)
8	C65_Cal_Pan_TX_Jul	5.578	0.777	7.177	Cooling degree days (July)
9	C65_Cal_Pan_TX_Aug	4.995	0.762	6.555	Cooling degree days (August)
10	C65_Cal_Pan_TX_Sep	5.481	1.447	3.789	Cooling degree days (September)
11	Pan_TX_PrecipCal_AprtoSep	-195.322	57.965	-3.370	Precipitation inches (April, May, June, July, August, September) Binary variable for sales shift starting January 2010=1, otherwise=0
12	SalesShift	1551.240	241.899	6.413	
13	Bin0506	3297.163	914.706	3.605	Binary variable for May 2006=1, otherwise=0
14	Bin1206	-1894.602	916.338	-2.068	Binary variable for December 2006=1, otherwise=0
15	Bin0108	-8108.873	913.486	-8.877	Binary variable for January 2008=1, otherwise=0
16	Bin0308	8962.577	873.302	10.263	Binary variable for March 2008=1, otherwise=0
17	Bin1008	-1668.120	869.143	-1.919	Binary variable for October 2008=1, otherwise=0
18	Bin1009	-10008.864	878.788	-11.389	Binary variable for October 2009=1, otherwise=0
19	Bin0210	-3730.421	951.376	-3.921	Binary variable for February 2010=1, otherwise=0
20	Bin0310	-3459.838	903.445	-3.830	Binary variable for March 2010=1, otherwise=0
21	Bin1110	-2262.699	903.686	-2.504	Binary variable for November 2010=1, otherwise=0
22	Bin1210	-2741.481	977.656	-2.804	Binary variable for December 2010=1, otherwise=0
23	Bin0111	-2594.789	947.634	-2.738	Binary variable for January 2011=1, otherwise=0
24	Bin0213	-2242.810	916.325	-2.448	Binary variable for February 2013=1, otherwise=0
25	Bin1013	2230.818	878.327	2.540	Binary variable for October 2013=1, otherwise=0
26	Bin1115	-2188.487	871.975	-2.510	Binary variable for November 2015=1, otherwise=0
27	AR(1)	0.273	0.106	2.586	First Order Auto Regressive Term
28	<b>Model Statistics</b>				
29	Iterations	15			
30	Adjusted Observations	120			
31	Deg. of Freedom for Error	94			
32	R-Squared	0.907			
33	Adjusted R-Squared	0.883			
34	AIC	13.781			
35	BIC	14.385			
36	F-Statistic	36.761			
37	Prob (F-Statistic)				
38	Log-Likelihood	-971.16			
39	Model Sum of Squares	735,149,536.50			
40	Sum of Squared Errors	75,192,945.87			
41	Mean Squared Error	799,924.96			
42	Std. Error of Regression	894.39			
43	Mean Abs. Dev. (MAD)	600.54			
44	Mean Abs. % Err. (MAPE)	5.71%			
45	Durbin-Watson Statistic	1.992			
46	Durbin-H Statistic				
47	Ljung-Box Statistic	21.41			
48	Prob (Ljung-Box)	0.6145			
49	Skewness	-0.068			
50	Kurtosis	3.124			
51	Jarque-Bera	0.169			
52	Prob (Jarque-Bera)	0.9188			

Southwestern Public Service Company

Regression Models and Associated Statistics

Texas Municipals and Schools

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1	NR_TX	52.470	0.461	113.775	Population in Texas service area
2	C65_bill_MSS_TX_May	0.004709	0.002	2.171	Cooling degree days (May) multiplied by customers
3	C65_bill_MSS_TX_Jun	0.003800	0.001	5.937	Cooling degree days (June) multiplied by customers
4	C65_bill_MSS_TX_Jul	0.002609	0.000	6.091	Cooling degree days (July) multiplied by customers
5	C65_bill_MSS_TX_Aug	0.002745	0.000	7.038	Cooling degree days (August) multiplied by customers
6	C65_bill_MSS_TX_Sep	0.005	0.000	11.065	Cooling degree days (September) multiplied by customers
7	C65_bill_MSS_TX_Oct	0.012	0.001	10.683	Cooling degree days (October) multiplied by customers
8	Bin0604	-25331.515	2182.776	-11.605	Binary variable for June 2004=1, otherwise=0
9	Bin0804	-13852.717	2146.608	-6.453	Binary variable for August 2004=1, otherwise=0
10	Bin0904	26453.517	2137.234	12.377	Binary variable for September 2004=1, otherwise=0
11	Bin0806	22484.954	2191.424	10.260	Binary variable for August 2006=1, otherwise=0
12	Bin1206	-13538.495	2112.190	-6.410	Binary variable for December 2006=1, otherwise=0
13	Bin1107	9306.026	2112.326	4.406	Binary variable for November 2007=1, otherwise=0
14	PrecipB_MSS_TX_Apr	-0.265	0.093	-2.864	Bill Month Precipitation (April) multiplied by customers
15	PrecipB_MSS_TX_May	-0.157	0.066	-2.395	Bill Month Precipitation (May) multiplied by customers
16	PrecipB_MSS_TXJunJulAug	-0.077	0.038	-2.047	Bill Month Precipitation (June, July, August) multiplied by customers
17					
18	<b>Model Statistics</b>				
19	Iterations	1			
20	Adjusted Observations	144			
21	Deg. of Freedom for Error	128			
22	R-Squared	0.875			
23	Adjusted R-Squared	0.860			
24	AIC	15.401			
25	BIC	15.731			
26	F-Statistic	59.735			
27	Prob (F-Statistic)				
28	Log-Likelihood	-1,297.20			
29	Model Sum of Squares	3,940,545,656.04			
30	Sum of Squared Errors	562,921,979.96			
31	Mean Squared Error	4,397,827.97			
32	Std. Error of Regression	2,097.10			
33	Mean Abs. Dev. (MAD)	1,529.11			
34	Mean Abs. % Err. (MAPE)	4.91%			
35	Durbin-Watson Statistic	2.048			
36	Durbin-H Statistic				
37	Ljung-Box Statistic	33.59			
38	Prob (Ljung-Box)	0.0922			
39	Skewness	0.059			
40	Kurtosis	3.751			
41	Jarque-Bera	3.472			
42	Prob (Jarque-Bera)	0.1762			

Southwestern Public Service Company

Regression Models and Associated Statistics

Wholesale Central Valley

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CGSPNM_MA12	0.76782	0.01546	49.672	Real Gross State Product New Mexico 12 month moving average
3	Feb	-5123.16765	596.26988	-8.592	Seasonal binary February
4	Mar	2965.31425	713.95270	4.153	Seasonal binary March
5	Apr	3173.13693	770.61179	4.118	Seasonal binary April
6	C65_cal_ROS_NM_May	19.48753	3.75079	5.196	Cooling degree days (May) Roswell NM
7	C65_cal_ROS_NM_Jun	18.00147	1.66338	10.822	Cooling degree days (Jun) Roswell NM
8	C65_cal_ROS_NM_Jul	23.67775	1.53270	15.448	Cooling degree days (July) Roswell NM
9	C65_cal_ROS_NM_Aug	22.31761	1.41689	15.751	Cooling degree days (August) Roswell NM
10	C65_cal_ROS_NM_Sep	7.99866	2.02872	3.943	Cooling degree days (September) Roswell NM
11	Nov	-2946.08074	520.95437	-5.655	Seasonal binary November
12	Dec	-969.25636	513.13796	-1.889	Seasonal binary December
13	Bin0908	-7884.29213	1459.92897	-5.400	Binary variable for September 2008=1, otherwise=0
14	Bin0710	-4654.38611	1489.28544	-3.125	Binary variable for July 2010=1, otherwise=0
15	Bin0211	-7633.02685	1514.00693	-5.042	Binary variable for February 2011=1, otherwise=0
16	Bin1114	3832.87076	1506.49921	2.544	Binary variable for November 2014=1, otherwise=0
17	Bin0215	-4578.58375	1515.64089	-3.021	Binary variable for February 2015=1, otherwise=0
18	AR(1)	0.86349	0.04736	18.234	First order autoregressive term
19	<b>Model Statistics</b>				
20	Iterations	9			
21	Adjusted Observations	131			
22	Deg. of Freedom for Error	114			
23	R-Squared	0.929			
24	Adjusted R-Squared	0.919			
25	AIC	15.225			
26	BIC	15.599			
27	F-Statistic	93.777			
28	Prob (F-Statistic)				
29	Log-Likelihood	-1,166.15			
30	Model Sum of Squares	5,447,637,803.98			
31	Sum of Squared Errors	413,901,477.20			
32	Mean Squared Error	3,630,714.71			
33	Std. Error of Regression	1,905.44			
34	Mean Abs. Dev. (MAD)	1,403.66			
35	Mean Abs. % Err. (MAPE)	2.18%			
36	Durbin-Watson Statistic	2.091			
37	Durbin-H Statistic				
38	Ljung-Box Statistic	21.92			
39	Prob (Ljung-Box)	0.5843			
40	Skewness	-0.098			
41	Kurtosis	3.025			
42	Jarque-Bera	0.213			
43	Prob (Jarque-Bera)	0.8988			

Southwestern Public Service Company

Regression Models and Associated Statistics

Wholesale Farmers

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CGSP_NM	0.308	0.020	15.692	Real Gross State Product New Mexico
3	Feb	-1316.068	667.152	-1.973	Seasonal binary February
4	Mar	4370.106	855.190	5.110	Seasonal binary March
5	Apr	7414.297	931.260	7.962	Seasonal binary April
6	C65_cal_ROS_NM_May	32.090	4.416	7.267	Cooling degree days (May) Roswell NM
7	C65_cal_ROS_NM_Jun	22.238	2.088	10.651	Cooling degree days (June) Roswell NM
8	C65_cal_ROS_NM_Jul	33.313	1.918	17.369	Cooling degree days (July) Roswell NM
9	C65_cal_ROS_NM_Aug	31.301	1.878	16.669	Cooling degree days (August) Roswell NM
10	C65_cal_ROS_NM_Sep	21.672	3.038	7.133	Cooling degree days (September) Roswell NM
11	C65_cal_ROS_NM_Oct	32.609	11.359	2.871	Cooling degree days (October) Roswell NM
12	Bin1004	-4425.399	1938.476	-2.283	Binary variable for October 2004=1, otherwise=0
13	AR(1)	0.871	0.039	22.261	First order autoregressive term
14	<b>Model Statistics</b>				
15	Iterations	6			
16	Adjusted Observations	167			
17	Deg. of Freedom for Error	155			
18	R-Squared	0.906			
19	Adjusted R-Squared	0.899			
20	AIC	15.759			
21	BIC	15.983			
22	F-Statistic	135.085			
23	Prob (F-Statistic)				
24	Log-Likelihood	-1,540.84			
25	Model Sum of Squares	9,683,357,068.45			
26	Sum of Squared Errors	1,010,084,793.13			
27	Mean Squared Error	6,516,676.08			
28	Std. Error of Regression	2,552.78			
29	Mean Abs. Dev. (MAD)	1,946.36			
30	Mean Abs. % Err. (MAPE)	6.92%			
31	Durbin-Watson Statistic	2.070			
32	Durbin-H Statistic				
33	Ljung-Box Statistic	45.47			
34	Prob (Ljung-Box)	0.0051			
35	Skewness	-0.010			
36	Kurtosis	3.183			
37	Jarque-Bera	0.235			
38	Prob (Jarque-Bera)	0.8892			

Southwestern Public Service Company

Regression Models and Associated Statistics

Wholesale Lea County

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	20743.720	5242.676	3.957	Constant term
3	CGCPNM_MA12	6.280	0.500	12.562	Real Gross County Product New Mexico 12 month moving average
4	Feb	-7423.932	1275.573	-5.820	Seasonal binary variable for February
5	Mar	5268.577	1493.892	3.527	Seasonal binary variable for March
6	Apr	9169.699	1553.405	5.903	Seasonal binary variable for April
7	C65_cal_ROS_NM_May	63.285	7.186	8.807	Cooling degree days (May) Roswell NM
8	C65_cal_ROS_NM_Jun	42.842	3.400	12.600	Cooling degree days (June) Roswell NM
9	C65_cal_ROS_NM_Jul	58.364	3.010	19.387	Cooling degree days (July) Roswell NM
10	C65_cal_ROS_NM_Aug	66.006	3.017	21.880	Cooling degree days (August) Roswell NM
11	C65_cal_ROS_NM_Sep	32.711	4.744	6.896	Cooling degree days (September) Roswell NM
12	Bin0510	9254.396	4210.200	2.198	Binary variable for May 2010=1, otherwise=0
13	Bin0614	-11104.262	4268.350	-2.602	Binary variable for June 2014=1, otherwise=0
14	Bin0914	-12997.509	4201.850	-3.093	Binary variable for September 2014=1, otherwise=0
15	LeaLoadDecreaseWind	-12816.905	2734.806	-4.687	Binary for behind the meter wind
16	AR(1)	0.505	0.067	7.545	First order autoregressive term
17	<b>Model Statistics</b>				
18	Iterations	9			
19	Adjusted Observations	179			
20	Deg. of Freedom for Error	164			
21	R-Squared	0.920			
22	Adjusted R-Squared	0.914			
23	AIC	16.955			
24	BIC	17.222			
25	F-Statistic	135.42			
26	Prob (F-Statistic)	0.0000			
27	Log-Likelihood	-1,756.49			
28	Model Sum of Squares	40,425,629,036.99			
29	Sum of Squared Errors	3,496,834,116.55			
30	Mean Squared Error	21,322,159.25			
31	Std. Error of Regression	4,617.59			
32	Mean Abs. Dev. (MAD)	3,378.85			
33	Mean Abs. % Err. (MAPE)	3.63%			
34	Durbin-Watson Statistic	1.964			
35	Durbin-H Statistic				
36	Ljung-Box Statistic	31.80			
37	Prob (Ljung-Box)	0.1321			
38	Skewness	-0.245			
39	Kurtosis	3.769			
40	Jarque-Bera	6.204			
41	Prob (Jarque-Bera)	0.0449			

Southwestern Public Service Company

Regression Models and Associated Statistics

Wholesale Roosevelt

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CGSP_NM	0.163	0.006	28.854	Real Gross State Product New Mexico
3	Feb	-765.548	337.650	-2.267	Seasonal binary variable for February
4	Mar	2238.921	426.049	5.255	Seasonal binary variable for March
5	Apr	3586.565	460.606	7.787	Seasonal binary variable for April
6	C65_cal_ROS_NM_May	14.145	2.153	6.572	Cooling degree days (May) Roswell NM
7	C65_cal_ROS_NM_Jun	11.597	1.030	11.263	Cooling degree days (June) Roswell NM
8	C65_cal_ROS_NM_Jul	15.525	0.911	17.049	Cooling degree days (July) Roswell NM
9	C65_cal_ROS_NM_Aug	15.067	0.888	16.960	Cooling degree days (August) Roswell NM
10	C65_cal_ROS_NM_Sep	9.649	1.249	7.725	Cooling degree days (September) Roswell NM
11	Nov	-849.200	266.705	-3.184	Seasonal binary variable for November
12	NM_PRECIP_MaythruAug	-365.019	104.890	-3.480	Precipitation inches (May, June, July, August)
13	Bin1004	-2255.412	1038.961	-2.171	Binary variable October 2004=1, otherwise=0
14	Bin0614	-2861.738	1093.272	-2.618	Binary variable June 2014=1, otherwise=0
15	AR(1)	0.763	0.051	15.060	First order autoregressive term
16	<b>Model Statistics</b>				
17	Iterations	6			
18	Adjusted Observations	179			
19	Deg. of Freedom for Error	165			
20	R-Squared	0.867			
21	Adjusted R-Squared	0.856			
22	AIC	14.399			
23	BIC	14.648			
24	F-Statistic	82.52			
25	Prob (F-Statistic)				
26	Log-Likelihood	-1,528.67			
27	Model Sum of Squares	1,783,330,557.63			
28	Sum of Squared Errors	274,277,588.47			
29	Mean Squared Error	1,662,288.41			
30	Std. Error of Regression	1,289.30			
31	Mean Abs. Dev. (MAD)	939.07			
32	Mean Abs. % Err. (MAPE)	6.28%			
33	Durbin-Watson Statistic	1.998			
34	Durbin-H Statistic				
35	Ljung-Box Statistic	33.59			
36	Prob (Ljung-Box)	0.0922			
37	Skewness	0.120			
38	Kurtosis	3.483			
39	Jarque-Bera	2.169			
40	Prob (Jarque-Bera)	0.3381			

Southwestern Public Service Company

Regression Models and Associated Statistics

Wholesale Tri County

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CGCP_TRI	19.014	0.459	41.399	Real Gross County Product Tri County
3	H65_cal_AMAR_TX_Jan	2.825	0.382	7.403	Heating degree days (Jan) Amarillo TX
4	H65_cal_AMAR_TX_Dec	3.988	0.372	10.712	Heating degree days (Dec) Amarillo TX
5	C65_cal_AMAR_TX_May	8.862	2.471	3.587	Cooling degree days (May) Amarillo TX
6	C65_cal_AMAR_TX_Jun	13.085	1.054	12.409	Cooling degree days (June) Amarillo TX
7	C65_cal_AMAR_TX_Jul	18.423	0.854	21.561	Cooling degree days (July) Amarillo TX
8	C65_cal_AMAR_TX_Aug	18.882	0.841	22.459	Cooling degree days (August) Amarillo TX
9	C65_cal_AMAR_TX_Sep	9.929	1.578	6.293	Cooling degree days (September) Amarillo TX
10	Bin0300	19416.347	2390.178	8.123	Binary variable March 2000=1, otherwise=0
11	Bin0706	-9810.249	1231.566	-7.966	Binary variable July 2006=1, otherwise=0
12	Bin0615	5706.917	1222.779	4.667	Binary variable June 2015=1, otherwise=0
13	AR(1)	0.532	0.068	7.842	First order autoregressive term
14	AR(2)	0.315	0.067	4.724	Second order autoregressive term
15	<b>Model Statistics</b>				
16	Iterations	13			
17	Adjusted Observations	190			
18	Deg. of Freedom for Error	177			
19	R-Squared	0.924			
20	Adjusted R-Squared	0.919			
21	AIC	14.565			
22	BIC	14.788			
23	F-Statistic	178.920			
24	Prob (F-Statistic)				
25	Log-Likelihood	-1,640.31			
26	Model Sum of Squares	4,254,532,773.36			
27	Sum of Squared Errors	350,739,587.45			
28	Mean Squared Error	1,981,579.59			
29	Std. Error of Regression	1,407.69			
30	Mean Abs. Dev. (MAD)	1,047.53			
31	Mean Abs. % Err. (MAPE)	3.66%			
32	Durbin-Watson Statistic	2.063			
33	Durbin-H Statistic				
34	Ljung-Box Statistic	44.32			
35	Prob (Ljung-Box)	0.0070			
36	Skewness	0.184			
37	Kurtosis	3.268			
38	Jarque-Bera	1.640			
39	Prob (Jarque-Bera)	0.4405			

Southwestern Public Service Company

Regression Models and Associated Statistics

Wholesale WTMPA

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	CONST	183950.366	5337.962	34.461	Constant term
3	CGSP_TX	0.009	0.004	2.179	Real Gross State Product TX
4	H65_cal_LUBB_TX_Jan	47.304	3.011	15.713	Heating degree days (Jan) Lubbock TX
5	H65_cal_LUBB_TX_Feb	18.950	3.672	5.161	Heating degree days (Feb) Lubbock TX
6	H65_cal_LUBB_TX_Mar	19.596	5.523	3.548	Heating degree days (Mar) Lubbock TX
7	H65_cal_LUBB_TX_Nov	15.864	5.147	3.082	Heating degree days (Nov) Lubbock TX
8	H65_cal_LUBB_TX_Dec	47.864	2.994	15.987	Heating degree days (Dec) Lubbock TX
9	C65_cal_LUBB_TX_May	152.747	8.957	17.053	Cooling degree days (May) Lubbock TX
10	C65_cal_LUBB_TX_Jun	177.133	4.659	38.019	Cooling degree days (Jun) Lubbock TX
11	C65_cal_LUBB_TX_Jul	199.103	4.412	45.125	Cooling degree days (Jul) Lubbock TX
12	C65_cal_LUBB_TX_Aug	210.542	4.424	47.586	Cooling degree days (Aug) Lubbock TX
13	C65_cal_LUBB_TX_Sep	194.038	8.330	23.293	Cooling degree days (Sep) Lubbock TX
14	C65_cal_LUBB_TX_Oct	168.637	31.691	5.321	Cooling degree days (Oct) Lubbock TX
15	Bin0312	19313.188	5453.762	3.541	Binary variable March 2012=1, otherwise=0
16	Bin0914	-19766.343	5541.980	-3.567	Binary variable September 2014=1, otherwise=0
17	AR(1)	0.201	0.092	2.187	First order autoregressive term
18	<b>Model Statistics</b>				
19	Iterations	11			
20	Adjusted Observations	131			
21	Deg. of Freedom for Error	115			
22	R-Squared	0.980			
23	Adjusted R-Squared	0.978			
24	AIC	17.317			
25	BIC	17.668			
26	F-Statistic	383.397			
27	Prob (F-Statistic)	0.0000			
28	Log-Likelihood	-1,304.13			
29	Model Sum of Squares	170,149,396,145.90			
30	Sum of Squared Errors	3,402,421,858.68			
31	Mean Squared Error	29,586,277.03			
32	Std. Error of Regression	5,439.33			
33	Mean Abs. Dev. (MAD)	4,003.97			
34	Mean Abs. % Err. (MAPE)	1.77%			
35	Durbin-Watson Statistic	1.988			
36	Durbin-H Statistic				
37	Ljung-Box Statistic	19.01			
38	Prob (Ljung-Box)	0.7514			
39	Skewness	0.113			
40	Kurtosis	2.979			
41	Jarque-Bera	0.279			
42	Prob (Jarque-Bera)	0.8697			



Southwestern Public Service Company

Regression Models and Associated Statistics

Retail Peak Demand

Line  
No.

1	Variable	Coefficient	StdErr	T-Stat	Definition
2	MA_Retail_Sales	0.001	0.000	55.471	12-month moving average of actual total retail sales adjusted for DSM savings, sale of Lubbock assets, wind generation, and forecasted new load additions.
3	HDD_Jan_PD	7.818	1.115	7.010	Heating Degree Days, Peak Day, January Calendar Month
4	HDD_Feb_PD	7.214	1.045	6.905	Heating Degree Days, Peak Day, February Calendar Month
5	HDD_Mar_PD	5.886	1.537	3.828	Heating Degree Days, Peak Day, March Calendar Month
6	AvgTemp_SPS_Apr	3.520	0.614	5.733	Average peak day temperature for the month of April
7	AvgTemp_SPS_May	8.718	0.608	14.340	Average peak day temperature for the month of May
8	AvgTemp_SPS_Jun	10.835	0.562	19.268	Average peak day temperature for the month of June
9	AvgTemp_SPS_Jul	11.190	0.563	19.868	Average peak day temperature for the month of July
10	AvgTemp_SPS_Aug	11.426	0.561	20.372	Average peak day temperature for the month of August
11	AvgTemp_SPS_Sep	8.904	0.593	15.022	Average peak day temperature for the month of September
12	AvgTemp_SPS_Oct	3.700	0.642	5.765	Average peak day temperature for the month of October
13	HDD_Nov_PD	7.493	1.381	5.427	Heating Degree Days, Peak Day, November Calendar Month
14	HDD_Dec_PD	8.823	1.080	8.167	Heating Degree Days, Peak Day, December Calendar Month
15	AprMayJun_Precip_1WKB4	-185.443	38.391	-4.830	Sum of the number of precipitation inches in the week prior to the peak day, Calendar Months April, May, June
16	JulAugSep_Precip_1WKB4	-65.308	33.302	-1.961	Sum of the number of precipitation inches in the week prior to the peak day, Calendar Months July, August, September
17	Bin0415	-296.876	99.692	-2.978	Binary variable April 2015=1, otherwise=0
18	Bin0615	-256.964	100.357	-2.560	Binary variable June 2015=1, otherwise=0
19	AR(1)	0.382	0.074	5.178	First order autoregressive term
20	<b>Model Statistics</b>				
21	Iterations	9			
22	Adjusted Observations	179			
23	Deg. of Freedom for Error	161			
24	R-Squared	0.942			
25	Adjusted R-Squared	0.936			
26	AIC	9.309			
27	BIC	9.629			
28	F-Statistic	154.98			
29	Prob (F-Statistic)				
30	Log-Likelihood	-1,069.11			
31	Model Sum of Squares	26,430,284.70			
32	Sum of Squared Errors	1,615,114.22			
33	Mean Squared Error	10,031.77			
34	Std. Error of Regression	100.16			
35	Mean Abs. Dev. (MAD)	73.72			
36	Mean Abs. % Err. (MAPE)	2.97%			
37	Durbin-Watson Statistic	2.036			
38	Durbin-H Statistic				
39	Ljung-Box Statistic	29.62			
40	Prob (Ljung-Box)	0.1976			
41	Skewness	-0.266			
42	Kurtosis	3.208			
43	Jarque-Bera	2.431			
44	Prob (Jarque-Bera)	0.2966			

Southwestern Public Service Company

Regression Models and Associated Statistics

Full Requirements Wholesale Peak Demand

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	REC_Sales_12MA	0.0014	0.000	41.820	12-month moving average of actual total wholesale sales
3	HDD_Jan_PD	2.4000	0.473	5.077	Heating Degree Days, Peak Day, January Calendar Month
4	HDD_Feb_PD	2.3342	0.440	5.310	Heating Degree Days, Peak Day, February Calendar Month
5	HDD_Mar_PD	2.1486	0.647	3.321	Heating Degree Days, Peak Day, March Calendar Month
6	AvgTemp_SPS_Apr	1.6739	0.261	6.402	Average peak day temperature for the month of April
7	AvgTemp_SPS_May	3.1552	0.260	12.127	Average peak day temperature for the month of May
8	AvgTemp_SPS_Jun	4.4349	0.249	17.826	Average peak day temperature for the month of June
9	AvgTemp_SPS_Jul	4.8071	0.252	19.060	Average peak day temperature for the month of July
10	AvgTemp_SPS_Aug	5.1759	0.251	20.605	Average peak day temperature for the month of August
11	AvgTemp_SPS_Sep	4.2291	0.264	15.999	Average peak day temperature for the month of September
12	AvgTemp_SPS_Oct	1.8598	0.284	6.551	Average peak day temperature for the month of October
13	HDD_Nov_PD	1.7087	0.598	2.856	Heating Degree Days, Peak Day, November Calendar Month
14	HDD_Dec_PD	2.7204	0.461	5.906	Heating Degree Days, Peak Day, December Calendar Month
15	AprthruSep_Precip_1WkB4	-27.0439	10.034	-2.695	Sum of the number of precipitation inches in the week prior to the peak day, Calendar Months April thru September
16	AR(1)	0.5785	0.064	9.068	First order autoregressive term
17	<b>Model Statistics</b>				
18	Iterations	9			
19	Adjusted Observations	179			
20	Deg. of Freedom for Error	164			
21	R-Squared	0.935			
22	Adjusted R-Squared	0.929			
23	AIC	7.671			
24	BIC	7.938			
25	F-Statistic	168.468			
26	Prob (F-Statistic)				
27	Log-Likelihood	-925.52			
28	Model Sum of Squares	4,669,095.77			
29	Sum of Squared Errors	324,661.73			
30	Mean Squared Error	1,979.64			
31	Std. Error of Regression	44.49			
32	Mean Abs. Dev. (MAD)	33.78			
33	Mean Abs. % Err. (MAPE)	3.81%			
34	Durbin-Watson Statistic	2.104			
35	Durbin-H Statistic				
36	Ljung-Box Statistic	10.68			
37	Prob (Ljung-Box)	0.9911			
38	Skewness	-0.083			
39	Kurtosis	2.902			
40	Jarque-Bera	0.275			
41	Prob (Jarque-Bera)	0.8713			

Southwestern Public Service Company

Regression Models and Associated Statistics

Golden Spread Electric Cooperative Full Requirements Peak Demand

Line  
No.

	Variable	Coefficient	StdErr	T-Stat	Definition
1					
2	GSEC_Sales_12MA	0.001	0.000	23.794	12 month moving average of Golden Spread sales
3	Mar_Pan_AvgPDTemp	2.110	0.443	4.760	Average Panhandle Peak Day temperature for the month of March
4	Apr_Pan_AvgPDTemp	3.896	0.337	11.559	Average Panhandle Peak Day temperature for the month of April
5	May_Pan_AvgPDTemp	4.476	0.352	12.709	Average Panhandle Peak Day temperature for the month of May
6	Jun_Pan_AvgPDTemp	5.901	0.327	18.039	Average Panhandle Peak Day temperature for the month of June
7	Jul_Pan_AvgPDTemp	7.737	0.322	24.040	Average Panhandle Peak Day temperature for the month of July
8	Aug_Pan_AvgPDTemp	7.817	0.312	25.075	Average Panhandle Peak Day temperature for the month of August
9	Sep_Pan_AvgPDTemp	4.148	0.316	13.108	Average Panhandle Peak Day temperature for the month of September
10	Oct_Pan_AvgPDTemp	0.641	0.282	2.276	Average Panhandle Peak Day temperature for the month of October
11	AprMayJun_Precip_1WkB4_Pan	-119.032	19.623	-6.066	Sum of the number of Panhandle precipitation inches in the week prior to the peak day, Calendar Months April, May, June
12	JulAugSep_1WkB4_Pan	-40.515	17.124	-2.366	Sum of the number of Panhandle precipitation inches in the week prior to the peak day, Calendar Months July, August, September
13	Bin0906	-227.228	63.978	-3.552	Binary variable September 2006=1, otherwise=0
14	Bin1008	381.927	63.049	6.058	Binary variable October 2008=1, otherwise=0
15	Bin0614	-312.363	63.674	-4.906	Binary variable June 2014=1, otherwise=0
16	Bin0914	286.563	63.767	4.494	Binary variable September 2014=1, otherwise=0
17	AR(1)	0.601	0.064	9.404	First order autoregressive term
18	<b>Model Statistics</b>				
19	Iterations		7		
20	Adjusted Observations		179		
21	Deg. of Freedom for Error		163		
22	R-Squared		0.942		
23	Adjusted R-Squared		0.936		
24	AIC		8.628		
25	BIC		8.912		
26	F-Statistic		175.60		
27	Prob (F-Statistic)				
28	Log-Likelihood		-1,010.16		
29	Model Sum of Squares	13,506,607.12			
30	Sum of Squared Errors	835,840.18			
31	Mean Squared Error	5,127.85			
32	Std. Error of Regression	71.61			
33	Mean Abs. Dev. (MAD)	51.47			
34	Mean Abs. % Err. (MAPE)	9.31%			
35	Durbin-Watson Statistic	2.018			
36	Durbin-H Statistic				
37	Ljung-Box Statistic	28.32			
38	Prob (Ljung-Box)	0.2468			
39	Skewness	0.565			
40	Kurtosis	3.439			
41	Jarque-Bera	10.974			
42	Prob (Jarque-Bera)	0.0041			