Exhibit No.:	
Issues:	Weather Normalization
Witness:	Shawn E. Lange
Sponsoring Party:	MO PSC Staff
Type of Exhibit:	Direct Testimony
Case No.:	ER-2006-0314
Date Testimony Prepared:	August 8, 2006

MISSOURI PUBLIC SERVICE COMMISSION

UTILITY OPERATIONS DIVISION

DIRECT TESTIMONY

OF

SHAWN E. LANGE

KANSAS CITY POWER & LIGHT COMPANY

CASE NO. ER-2006-0314

Jefferson City, Missouri
August 2006

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of the Application of Kansas City Power & Light Company for Approval to Make Certain Changes in its Charges for Electric Service to Begin the Implementation of Its Regulatory Plan	)))))	Case No. ER-2006-0314

AFFIDAVIT OF SHAWN E. LANGE

STATE OF MISSOURI)
) **ss**
COUNTY OF COLE)

Shawn E. Lange, of lawful age, on his oath states: that he has participated in the preparation of the following Direct Testimony in question and answer form, consisting of 9 pages of Direct Testimony to be presented in the above case, that the answers in the following Direct Testimony were given by him; that he has knowledge of the matters set forth in such answers; and that such matters are true to the best of his knowledge and belief.

Shawn E. Lange

Shawn E. Lange

Subscribed and sworn to before me this 7th day of August, 2006.

ROSEMARIE RIEDL
MY COMMISSION EXPIRES
June 1, 2009
NOTARY SEAL
#05509536
COLE COUNTY
NOTARY PUBLIC, STATE OF MISSOURI

Rosemarie Riedl

Notary Public

My commission expires June 1, 2009

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DIRECT TESTIMONY

OF

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KANSAS CITY POWER & LIGHT COMPANY

CASE NO. ER-2006-0314

Q. Please state your name and business address.

A. My name is Shawn E. Lange and my business address is Missouri Public Service Commission, P.O. Box 360, Jefferson City, MO 65102.

Q. What is your present position with the Missouri Public Service Commission (Commission)?

A. I am a Utility Engineering Specialist II in the Engineering Analysis Section, Energy Department, Utility Operations Division.

Q. Would you please review your educational background and work experience?

A. In December 2002, I received a Bachelor of Science Degree in Mechanical Engineering from the University of Missouri, at Rolla. Since then, I have pursued dual Masters Degrees in Mechanical Engineering at the University of Missouri, at Columbia and Business Administration at William Woods University. I joined the Commission Staff (Staff) in January 2005. I am a registered Engineer-in-Training in the State of Missouri.

Q. Have you previously filed testimony before this Commission?

A. Yes, I have. A list of the cases in which I have filed testimony can be found in Schedule 1.

EXECUTIVE SUMMARY

Q. Please summarize your direct testimony.

A. In my testimony I recommend that the Commission adopt the Kansas City Power & Light Company (KCP&L or Company) weather adjustments to class usage for the weather sensitive rate classes of KCP&L. These adjustments are presented by rate class in Schedule 2. Staff witness Curt Wells will discuss the corresponding adjustments to class revenues based on these adjustments to class usage. These adjustments to class usage were also included in my calculation of hourly generation requirements.

Schedule 1 contains a list of cases in which I filed testimony, Schedule 2 contains the adjustments to sales by rate class for KCP&L, Schedule 3 contains adjustments to attain the annual sum of the net-system load, Schedule 4 contains a monthly summary for the normalized net system load for KCP&L, and Schedule 5 contains a list of cases in which Staff's weather normalization method was used in the normalization of net system loads.

I also recommend that the Commission adopt the hourly generation requirements that I calculated. Staff witness Leon Bender used these hourly loads in his fuel model to calculate normal fuel and purchase power expenses for the test year. A monthly summary of the normalized net system load for KCP&L is shown on Schedule 4.

My testimony ends with a discussion of how I calculated the normal weather variables that I used in the weather normalization of net system loads and why this methodology is appropriate for weather normalization.

NORMALIZATION OF USAGE

Q. Why is it necessary to weather normalize electricity usage?

A. Electricity use is very sensitive to weather conditions. Because of the high saturation of air conditioning and the presence of significant electric space heating in KCP&L's Missouri service territories, the magnitude and shape of KCP&L's load is directly related to daily temperatures. The weather during the test year differed from normal conditions. The months of January and February 2005 were warmer than normal. The warmer than normal temperatures resulted in decreased energy consumption due to lower than normal heating usage. The months of June through September 2005 were warmer than normal. These warmer than normal temperatures resulted in increased energy consumption due to higher than normal cooling usage.

Q. Did you independently perform a weather impact analysis on hourly class load data to determine the appropriate weather response functions?

A. No, I did not perform a complete independent weather impact analysis on hourly class load data. However, I did review both KCP&L's weather normalization process and its resulting weather normalization. The methodology used by KCP&L contained the most important characteristics of Staff's weather normalization process; e.g., the use of daily load research data to determine non-linear class responses to weather, the incorporation of different base usage parameters for different times of the year, normal weather variables calculated using Staff's ranking method described below, and "clean" billing usage.

As a check of the resulting weather adjustments, I compared them to the independent net system weather normalization that I conducted, which is described later in this testimony. I compared the magnitude and direction of the adjustments of the class usage to the magnitude and direction of the net system input.

From this review, I determined that KCP&L's weather adjustment to class sales was reasonable for the Staff to use in both normalization of revenues and for the calculation of hourly generation requirements.

Q. Did Staff use KCP&L's weather adjustment to sales?

A. Yes, all but the Large Power (LP) weather normalization was adopted and used in creating the hourly generation requirements.

Q. Why did you not include the weather adjustments to the LP class?

A. I performed a study on KCP&L's hourly class loads to determine which classes were weather sensitive, and from this study I determined that the LP class was not significantly weather sensitive.

Q. How did you determine which rate classes were weather sensitive?

A. KCP&L supplied hourly class load data for the time period dating October 1, 2004 through December 31, 2005. The hourly loads were plotted against mean daily temperature to ascertain the weather sensitivity of each class.

Q. Which classes were deemed to be weather sensitive?

A. The rate classes that were deemed to be weather sensitive were the Residential (RES), Small General Service (SGS), Medium General Service (MGS), and Large General Service (LGS) classes.

Q. Were weather adjustments made to non-Missouri usage?

A. Yes, non-Missouri usage was weather normalized using the same method used for Missouri usage.

HOURLY NET SYSTEM LOADS

Q. What is hourly net system load?

A. Hourly net system load is the hourly electric supply necessary to meet the energy demands of the company's customers and the company's own internal needs. It is net of (i.e., does not include) station use, which is the electricity requirement of the company's generating plants. The hourly loads used in my analysis of the test year January 2005 through December 2005 were provided to Staff in response to Data Request number 13 and the supplements to this request. I also used hourly load data submitted monthly by KCP&L in compliance with the Commission's rule 4 CSR 240-3.190 to cross check and correct errors that were found in the data request response.

Q. Did Staff perform an independent evaluation of the weather normalized net system load that KCP&L calculated?

A. Yes.

Q. What method did Staff use to perform this evaluation?

A. The Staff used the weather normalization procedure that was developed by the Economic Analysis Department of the Commission in 1988. The process is described in detail in the document "Weather Normalization of Electric Loads, Part A: Hourly Net System Loads" (November 28, 1990), written by Dr. Michael Proctor, Manager of the Economic Analysis Department.

Q. Briefly summarize the process you used.

A. In order to reflect normal weather, daily peak and average loads are adjusted independently, but using the same methodology. Independent adjustments are necessary because average loads respond differently to weather than peak loads.

Daily average load is calculated as the daily energy divided by twenty-four hours and the daily peak is the maximum hourly load for the day. Separate regression models

estimate both a base component, which is allowed to fluctuate across time, and a weather sensitive component, which measures the response to daily fluctuations in weather for daily average loads and peak loads. The regression parameters, along with the difference between normal and actual cooling and heating measures, are used to calculate weather adjustments to both the average and peak loads for each day. The adjustments for each day are added respectively to the actual average and peak loads for each day. The starting point for allocating the weather normalized daily peak and average loads to the hours is the actual hourly loads. A unitized load curve is calculated for each day as a function of the actual peak and average loads for that day. The corresponding weather normalized daily peak and average loads, along with the unitized load curves, are used to calculate weather normalized hourly loads.

This process includes many checks and balances, which are included in the spreadsheets that are used. In addition, the analyst is required to examine the data at several points in the process.

As a check of my analysis, I also compared the results of my analysis to KCP&L's updated net system weather normalization. The sum of the annual weather normalization adjustments in my independent study were within 0.18 percent of KCP&L's updated net system weatherization. This is within the margin of error for any weather normalization methodology.

Q. Has this process been used in other general rate cases?

A. Yes, this process has been used in several general rate cases that have come before this Commission. Please refer to Schedule 5 for a list of these cases.

Q. What data was used in this process?

A. Actual hourly net system loads for the time period from July 1, 2004 through December 31, 2005 were provided by KCP&L. The actual daily weather variables from the NOAA Kansas City International Airport (KCI) weather station were used. I calculated the normal weather variables using a method developed by the Staff in 1991. The process is described in the document "Weather Normalization of Electric Loads, Demonstration: Calculation of Weather Normals," October 25, 1991 and summarized in the next section of my testimony.

Q. Were modifications made to the test year weather normalized hourly net system loads to account for Staff adjustments to test year usage?

A. Yes. I adjusted the weather-normalized hourly net system loads to be consistent with the Staff's weather-normalized, annualized test year usage.

Q. How were the hourly loads adjusted to account for the annual adjustments to usage?

A. I applied the appropriate adopted class loss factor, to adjust Staff's annualization adjustment and growth adjustment provided to me by Staff witness Kim Bolin. The Company usage was also adjusted using the adopted annual system loss factor. For more information on the system loss factor, see Staff witness Erin Maloney's testimony. The loss adjusted annualization adjustment, growth adjustment, and Company use was then added to the adopted weather normalized class loads, which included losses. This produces an annual sum of the hourly net system loads that equals the adjusted test year usage, plus losses, and is consistent with normalized revenues. A table showing each of these adjustments to attain the annual requirement of the net-system hours is shown in Schedule 3. A monthly summary of the adjusted loads is shown on Schedule 4.

Q. Which Staff witnesses used your hourly-normalized net system loads?

A. Staff witness Leon Bender used the test year hourly normalized system loads in developing test year fuel and purchased power expense. Staff witness Erin Maloney used the annual requirement of the net system hours in developing her jurisdictional energy allocator.

NORMAL WEATHER VARIABLES

Q. What did you use to represent normal weather in these calculations?

A. The normal weather used in both the normalization of class usage and hourly net system loads was calculated using Staff's ranking method and daily weather values for the time period January 1, 1971 through December 31, 2000. Staff's ranking method estimates daily normal values, which range from the temperature value that is "normally" the hottest to the temperature value that is "normally" the coldest.

Using ranked normals is important in estimating fuel and purchased power expense because these expenses are greatly impacted by daily weather extremes. Since every year has days with extreme temperatures, the daily normals should also contain extremes. The ranking method that was used estimates normal extremes.

Q. How are the daily normals derived?

A. The daily normal variables are calculated by ranking the temperatures in each year of the history. These temperatures are then averaged by rank, not by the day of the year. This results in the normal extreme being the average of the most extreme temperatures in each year of the history. The second extreme normal variable is based on the average of the second most extreme day of each year and so forth. The normal variables calculated from this ranking are then assigned to the days in the test year based

on the rankings of the actual temperatures in the year and the month of the year that rank typically occurs in. This assignment results in as small a weather normalization adjustment to the hourly loads on each day as is possible for a given annual adjustment.

Q. Does this conclude your direct testimony?

A. Yes, it does.

Testimony of Shawn E. Lange

Direct Testimony

ER-2005-0436	(Aquila Inc.)
ER-2006-0315	(Empire District Electric Company)

Rebuttal Testimony

ER-2005-0436	(Aquila Inc.)
ER-2006-0315	(Empire District Electric Company)

Surrebuttal Testimony

ER-2005-0436	(Aquila Inc.)

KANSAS CITY POWER & LIGHT COMPANY
Case No. ER-2006-0314
Actual and Weather Normalized Sales (kWh) *
Jan-Dec 2005
RES-Residential (Missouri Jurisdiction)

Billing Month	Actual	Weather Norm	Weather Adj	% Weather Adj
Jan-05	238,143,185	243,725,635	5,582,450	2.34%
Feb-05	174,495,180	187,520,147	13,024,966	7.46%
Mar-05	176,255,986	176,159,592	(96,394)	-0.05%
Apr-05	143,652,898	143,686,272	33,374	0.02%
May-05	177,895,225	173,491,339	(4,403,886)	-2.48%
Jun-05	277,578,143	258,745,412	(18,832,731)	-6.78%
Jul-05	345,859,906	343,153,302	(2,706,604)	-0.78%
Aug-05	311,905,100	293,761,075	(18,144,025)	-5.82%
Sep-05	246,669,809	207,367,748	(39,302,061)	-15.93%
Oct-05	177,217,602	164,054,053	(13,163,549)	-7.43%
Nov-05	181,304,360	190,304,523	9,000,164	4.96%
Dec-05	249,943,510	247,000,619	(2,942,891)	-1.18%
Total	2,700,920,904	2,628,969,717	(71,951,186)	-2.66%

* Includes losses

KANSAS CITY POWER & LIGHT COMPANY
Case No. ER-2006-0314
Actual and Weather Normalized Sales (kWh) *
Jan-Dec 2005
Small General Service--SGS (Missouri Jurisdiction)

Billing Month	Actual	Weather Norm	Weather Adj	% Weather Adj
Jan-05	44,260,875	44,715,700	454,824	1.03%
Feb-05	34,827,830	35,908,613	1,080,783	3.10%
Mar-05	36,590,004	36,741,811	151,808	0.41%
Apr-05	32,202,573	31,945,939	(256,634)	-0.80%
May-05	37,150,460	36,667,980	(482,480)	-1.30%
Jun-05	44,484,665	42,956,270	(1,528,395)	-3.44%
Jul-05	51,199,643	50,988,224	(211,419)	-0.41%
Aug-05	49,668,738	48,248,408	(1,420,330)	-2.86%
Sep-05	44,232,935	40,831,301	(3,401,634)	-7.69%
Oct-05	36,218,323	34,976,926	(1,241,397)	-3.43%
Nov-05	36,236,695	36,661,648	424,954	1.17%
Dec-05	41,946,517	41,704,950	(241,568)	-0.58%
Total	489,019,258	482,347,770	(6,671,488)	-1.36%

* Includes losses

KANSAS CITY POWER & LIGHT COMPANY
Case No. ER-2006-0314
Actual and Weather Normalized Sales (kWh) *
Jan-Dec 2005
Medium General Service--MGS (Missouri Jurisdiction)

Billing Month	Actual	Weather Norm	Weather Adj	% Weather Adj
Jan-05	83,892,669	84,211,589	318,920	0.38%
Feb-05	70,913,122	71,812,499	899,376	1.27%
Mar-05	79,049,385	79,402,116	352,730	0.45%
Apr-05	76,594,629	75,851,532	(743,097)	-0.97%
May-05	85,727,123	84,860,978	(866,145)	-1.01%
Jun-05	99,520,052	96,865,909	(2,654,143)	-2.67%
Jul-05	111,535,906	111,185,336	(350,570)	-0.31%
Aug-05	109,233,068	106,867,402	(2,365,666)	-2.17%
Sep-05	99,088,540	93,282,915	(5,805,626)	-5.86%
Oct-05	84,049,085	81,916,901	(2,132,183)	-2.54%
Nov-05	76,417,946	76,262,738	(155,208)	-0.20%
Dec-05	83,159,444	82,989,106	(170,339)	-0.20%
Total	1,059,180,969	1,045,509,019	(13,671,950)	-1.29%

* Includes losses

KANSAS CITY POWER & LIGHT COMPANY
Case No. ER-2006-0314
Actual and Weather Normalized Sales (kWh) *
Jan-Dec 2005
Large General Service--LGS (Missouri Jurisdiction)

Billing Month	Actual	Weather Norm	Weather Adj	% Weather Adj
Jan-05	198,457,168	200,605,738	2,148,571	1.08%
Feb-05	166,181,524	171,935,661	5,754,138	3.46%
Mar-05	176,125,515	177,990,891	1,865,376	1.06%
Apr-05	166,623,436	165,581,816	(1,041,621)	-0.63%
May-05	182,514,661	181,273,226	(1,241,435)	-0.68%
Jun-05	201,562,669	197,316,713	(4,245,956)	-2.11%
Jul-05	218,239,614	217,698,108	(541,506)	-0.25%
Aug-05	222,262,338	218,622,894	(3,639,444)	-1.64%
Sep-05	201,682,775	191,989,683	(9,693,092)	-4.81%
Oct-05	182,247,327	178,895,217	(3,352,110)	-1.84%
Nov-05	177,040,396	178,071,299	1,030,903	0.58%
Dec-05	201,052,053	199,987,505	(1,064,549)	-0.53%
Total	2,293,989,475	2,279,968,750	(14,020,725)	-0.61%

* Includes losses

KANSAS CITY POWER & LIGHT COMPANY
COMPONENTS OF ANNUAL NET SYSTEM INPUT
ER-2006-0314

	Energy (kwh) w/losses	Large Customer Annualizations	Normalization for Weather	Additional kWh from Cust Growth	Total KCP&L Normalized kWh
Mo Retail	9,048,186,068	35,091,217	(106,330,915)	28,648,206	9,005,594,576
Non-Mo Retail	6,741,261,990	4,187,176	(108,604,842)	105,733,693	6,742,578,016
Wholesale	143,054,274	-	(1,534,262)	-	141,520,012
Company Use	24,871,625	-	-	-	24,871,625
NSI	15,957,373,958	39,278,393	(216,470,019)	134,381,898	15,914,564,230

KANSAS CITY POWER & LIGHT COMPANY
ER-2006-0314
Net System Load
Normalized for 2005*

	Monthly Usage (MWh)				Monthly Peaks (MW)				Load Factor	
Month	Actual	Normal	Adj	% Adj	Actual	Normal	Adj	% Adj	Actual	Normal
Jan-05	1,338,971	1,379,281	40,310	3.01%	2,313	2,429	116	5.01%	0.78	0.76
Feb-05	1,103,395	1,169,739	66,344	6.01%	2,186	2,357	171	7.81%	0.75	0.74
Mar-05	1,161,632	1,186,278	24,646	2.12%	2,003	2,110	107	5.33%	0.78	0.76
Apr-05	1,071,849	1,081,204	9,355	0.87%	2,042	2,003	(39)	-1.89%	0.73	0.75
May-05	1,211,826	1,209,008	(2,818)	-0.23%	2,615	2,697	82	3.15%	0.62	0.60
Jun-05	1,510,784	1,484,150	(26,634)	-1.76%	3,338	3,332	(6)	-0.17%	0.63	0.62
Jul-05	1,707,780	1,725,145	17,365	1.02%	3,512	3,559	47	1.34%	0.65	0.65
Aug-05	1,652,949	1,631,836	(21,113)	-1.28%	3,426	3,440	14	0.41%	0.65	0.64
Sep-05	1,424,219	1,326,252	(97,967)	-6.88%	3,007	2,977	(30)	-0.99%	0.66	0.62
Oct-05	1,184,197	1,157,812	(26,385)	-2.23%	2,754	2,175	(579)	-21.03%	0.58	0.72
Nov-05	1,148,311	1,182,293	33,982	2.96%	2,209	2,276	67	3.04%	0.72	0.72
Dec-05	1,369,276	1,381,566	12,290	0.90%	2,563	2,573	10	0.38%	0.72	0.72
Annual	15,885,189	15,914,564	29,375	0.18%	3,512	3,559	47	1.34%	0.52	0.51
Summer	6,295,732	6,167,383	(128,349)	-2.04%	3,512	3,559	47	1.34%	0.61	0.59
Other	9,589,457	9,747,181	157,724	1.64%	2,754	2,697	(57)	-2.05%	0.60	0.62

* Normalized for weather, growth, large customers, and including losses

Cases in Which Staff's Weather Normalization Method Was Used
in the Normalization of Net System Loads

EO-87-175	ER-94-163	EM-2000-292
EO-90-101	ER-94-174	ER-2001-299
EO-90-138	ER-95-279	ER-2001-672
ER-93-37	ER-97-81	EC-2002-1
ER-93-41	EM-97-575	ER-2002-424
EO-93-351	ER-2004-0034	ER-2004-0570
ER-2005-0436	ER-2006-0315	