DOCKETED

Docket Number:	17-IEPR-03
Project Title:	Electricity and Natural Gas Demand Forecast
TN #:	217077-3
Document Title:	SMUD Form 4
Description:	Report on Forecast Methods and Models
Filer:	Nate Toyama
Organization:	SMUD
Submitter Role:	Applicant
Submission Date:	4/17/2017 11:18:01 AM
Docketed Date:	4/17/2017

SMUD

17-IEPR-03

Form 4

Demand Forecast Methods and Models

2017-2036

Resource Planning and Pricing

Sacramento Municipal Utility District

April 2017

SMUD 2016 Retail Sales, Load and Customer Forecast

This report presents the results of SMUD's long term forecast for 2017 to 2036. The forecast includes retail sales, system energy, system peak and customer accounts for SMUD's retail service territory. The forecast is used by SMUD for budget and retail revenue projections, resource procurement, transmission and distribution planning and SMUD services program planning. The forecast presented in Table 1 are for SMUD's managed system energy, system peak, retail sales and net customers. Managed loads and sales are adjusted for SMUD's energy efficiency programs, behind the meter photovoltaic installations, home electric vehicle charging, and rate impacts from the proposed residential time of use program. The Net Customer forecast includes residential, commercial, agricultural, and streetlight accounts.

Table 1

Summary of Managed Load and Sales Forecasts

Year	Sales (GWH)	Energy (GWH)	Peak (MW)	Net Customers
2017	10,420	10,855	2,913	623,277
2018	10,362	10,794	2,904	627,825
2019	10,280	10,709	2,827	633,395
2020	10,251	10,678	2,815	639,766
2021	10,318	10,748	2,835	646,172
2022	10,248	10,675	2,819	652,729
2023	10,192	10,616	2,812	659,465
2024	10,126	10,548	2,795	666,372
2025	10,104	10,525	2,799	673,430
2026	10,088	10,509	2,799	680,604
2027	10,109	10,530	2,808	687,899
2028	10,103	10,524	2,802	695,292
2029	10,144	10,567	2,814	702,785
2030	10,196	10,621	2,824	710,313
2031	10,322	10,752	2,848	717,826
2032	10,433	10,868	2,865	725,395
2033	10,574	11,015	2,903	733,092
2034	10,681	11,126	2,930	740,881
2035	10,809	11,260	2,956	748,673
2036	10,921	11,377	2,973	756,400
Annual Growth Rates				
2017 - 2026	-0.32%	-0.32%	-0.40%	0.88%
2017 - 2036	0.24%	0.24%	0.10%	0.97%

The growth in SMUD loads and sales are predicted to be slightly lower over the next 10 years due to the slow growth in net additions to the housing stock and business activity, SMUD's energy efficiency programs (EE), and the installation of customer owned/lease photovoltaic (PV) panels. The market penetration of electric vehicles (EV) will help reduce the impact of these forces in the long term. The forecasted impact of SMUD's default residential Time-of-Day (RTOU) program will result in a modest reduction in both sales and system energy but will have a major impact on system peak due to the structure of the time of day periods and electricity prices.

Table 2 below presents unmanaged and managed system energy. Unmanaged system energy includes net energy imports, gross generation from SMUD-owned thermal generation plants, selective customer-side distributed generation metered in SMUD's EMS system, and energy losses for final delivery to SMUD's retail customers. Managed system energy are the unmanaged loads net of SMUD programs impacts (EE, PV, and EV), parasitic house loads for SMUD owned thermal generation units (station), customer owned generation monitored in SMUD's EMS system (private gen), incremental sales to existing retail customers, and RTOU impacts. The sum of these impacts decreases the long term annual growth rate from 0.75 percent to 0.24 percent per year. (Note: the sum of individual impacts may not exactly equal the managed loads due to rounding).

Table 2

Managed and Unmanaged System Energy (GWH)

Year	Unmanaged	EE	PV	EV	Station	Private Gen	Incremental	RTOU	Managed
2017	11,277	(131)	(73)	11	(151)	(153)	74	-	10,855
2018	11,354	(247)	(146)	23	(151)	(153)	114	-	10,794
2019	11,445	(406)	(219)	34	(152)	(153)	163	(4)	10,709
2020	11,576	(555)	(292)	46	(152)	(153)	213	(4)	10,678
2021	11,648	(701)	(321)	72	(151)	(153)	358	(4)	10,748
2022	11,711	(827)	(350)	98	(158)	(153)	358	(4)	10,675
2023	11,789	(960)	(379)	124	(158)	(153)	358	(4)	10,616
2024	11,867	(1,102)	(409)	150	(159)	(153)	359	(4)	10,548
2025	11,923	(1,180)	(438)	176	(158)	(153)	358	(4)	10,525
2026	12,002	(1,272)	(467)	202	(158)	(153)	358	(4)	10,509
2027	12,090	(1,335)	(496)	229	(158)	(153)	358	(4)	10,530
2028	12,175	(1,423)	(526)	255	(159)	(153)	359	(4)	10,524
2029	12,280	(1,482)	(554)	281	(158)	(153)	358	(4)	10,567
2030	12,360	(1,505)	(583)	307	(158)	(153)	358	(4)	10,621
2031	12,486	(1,500)	(613)	336	(158)	(153)	358	(4)	10,752
2032	12,601	(1,501)	(643)	368	(159)	(153)	359	(4)	10,868
2033	12,732	(1,493)	(671)	404	(158)	(153)	358	(4)	11,015
2034	12,849	(1,508)	(700)	442	(158)	(153)	358	(4)	11,126
2035	12,980	(1,517)	(729)	484	(158)	(153)	358	(4)	11,260
2036	13,097	(1,535)	(759)	531	(159)	(153)	359	(4)	11,377
Annual Growth Rates									
2017 - 2026	0.63%								-0.32%
2017 - 2036	0.75%								0.24%

The RTOU impacts are based on the proposed residential time-of-day rate design in "Chief Executive Officer and General Manager's Report and Recommendations on Rates and Services," SMUD, March 16, 2017. The rate design includes a weekday peak period from 5 PM to 8 PM, a summer time (June to September) weekday mid-peak period from noon to 5 PM and from 8 PM to midnight. The off-peak period are the remaining hours including weekends and holidays. The proposed implementation of RTOU will be the default rate for new customers starting in September 2018. Existing customer accounts will transition to RTOU by December 2019.

Table 3 presents unmanaged and managed system peak loads. The system peak load forecast is the coincident system peak for the SMUD retail service territory. SMUD's system peak usually occurs during summer months of July or August between the hours of 5 and 6 P.M. For forecasting purposes, the system peaks is designed to occur on a Wednesday during the month of July where the maximum daily temperature reaches 106 degree Fahrenheit. The managed system peak is net of EE, PV, EV, incremental load impacts, station service, private generation, and RTOU impacts. The PV generation impact on system peak is about 35 percent of the installed capacity. EV peak load impacts, in comparison to energy impacts, are negligible because of the assumption that most of the EVs will charge at night or in the early morning. In the short term (2017 to 2026) the net impacts reduce the unmanaged system peak growth from 0.65 to -0.40 percent per year. In the long term (2017 to 2036) the annual growth in peak loads decrease from at 0.76 to 0.1 percent per year.

Table 3

Unmanaged and Managed System Peak (MW)

Year	Unmanaged	EE	PV	EV	Station	Private Gen	Incremental	RTOU	Managed
2017	2,998	(22)	(16)	0	(21)	(36)	9	0	2,913
2018	3,016	(39)	(33)	0	(21)	(36)	15	0	2,904
2019	3,047	(65)	(49)	1	(21)	(36)	22	(75)	2,827
2020	3,064	(85)	(65)	1	(21)	(32)	29	(76)	2,815
2021	3,094	(107)	(72)	1	(21)	(32)	47	(76)	2,835
2022	3,122	(142)	(79)	2	(21)	(35)	47	(76)	2,819
2023	3,144	(165)	(85)	2	(21)	(35)	47	(75)	2,812
2024	3,156	(189)	(92)	3	(21)	(35)	47	(75)	2,795
2025	3,179	(203)	(98)	3	(21)	(35)	47	(74)	2,799
2026	3,199	(218)	(105)	4	(21)	(35)	47	(71)	2,799
2027	3,224	(232)	(111)	4	(21)	(35)	47	(68)	2,808
2028	3,240	(245)	(118)	5	(21)	(35)	47	(71)	2,802
2029	3,273	(253)	(124)	5	(21)	(35)	47	(78)	2,814
2030	3,298	(259)	(131)	6	(21)	(35)	47	(80)	2,824
2031	3,330	(262)	(137)	6	(21)	(35)	47	(80)	2,848
2032	3,354	(263)	(144)	7	(21)	(35)	47	(80)	2,865
2033	3,397	(264)	(151)	7	(21)	(35)	47	(78)	2,903
2034	3,429	(261)	(157)	8	(21)	(35)	47	(80)	2,930
2035	3,461	(261)	(164)	9	(21)	(35)	47	(80)	2,956
2036	3,485	(261)	(170)	10	(21)	(35)	47	(82)	2,973
					Annual Growth Rates				
2017 - 2026	0.65%								-0.40%
2017 - 2036	0.76%								0.10%

Table 4 presents unmanaged and managed retail sales. Retail sales are the electricity sales to SMUD's retail customers measured at the customer's meter. Managed sales are net of EE, PV, EV, incremental sales from existing customers, and RTOU impacts. In the long run, these impacts decrease the annual growth rate from 0.77 to 0.24 percent per year.

Table 4

Unmanaged and Managed Retail Sales (GWH)

Year	Unmanaged	EE	PV	EV	Incremental	RTOU	Managed
2017	10,534	(126)	(70)	11	71	-	10,420
2018	10,607	(237)	(140)	22	110	-	10,362
2019	10,695	(390)	(210)	33	156	(4)	10,280
2020	10,820	(533)	(281)	44	205	(4)	10,251
2021	10,890	(673)	(308)	69	344	(4)	10,318
2022	10,944	(793)	(336)	94	344	(4)	10,248
2023	11,018	(922)	(364)	119	344	(4)	10,192
2024	11,092	(1,058)	(393)	144	345	(4)	10,126
2025	11,147	(1,133)	(420)	169	344	(4)	10,104
2026	11,223	(1,221)	(448)	194	344	(4)	10,088
2027	11,307	(1,281)	(476)	219	344	(4)	10,109
2028	11,388	(1,366)	(505)	244	345	(4)	10,103
2029	11,490	(1,423)	(532)	270	344	(4)	10,144
2030	11,566	(1,445)	(560)	295	344	(4)	10,196
2031	11,687	(1,440)	(588)	323	344	(4)	10,322
2032	11,797	(1,441)	(618)	354	345	(4)	10,433
2033	11,924	(1,433)	(644)	388	344	(4)	10,574
2034	12,036	(1,448)	(672)	425	344	(4)	10,681
2035	12,161	(1,456)	(700)	465	344	(4)	10,809
2036	12,273	(1,474)	(729)	508	345	(3)	10,921
Annual Growth Rates							
2017 - 2026	0.64%						-0.32%
2017 - 2036	0.77%						0.24%

The EE impacts are based on SMUD's Board Policy Strategic Direction SD-9 adopted on September 17, 2015. SMUD's goal is to:

> *Achieve Energy Efficiency equal to 15% of retail load over the next 10-year period. On an annual basis, SMUD will achieve energy efficiency savings of 1.5% of the average annual retail energy sales over the three-year period ending with the current year.*

Table 5 presents SMUD's EE annual goals for retail sales and peak demand. In addition to SMUD program impacts, these figures also include future codes and standards. The energy efficiency impacts are measured at the customer's meter. For the system energy forecast, the EE savings are adjusted by 4.2 percent (system level EE = 1.042*EE savings) to reflect line and voltage losses. The figures presented in Table 5 are first year EE impacts.

Table 5

EE Board Goals for Retail Sales (GWH) and System Peak (MW)

Year	First Year Savings (GWH)	First Year Savings (MW)
2017	126	24
2018	124	22
2019	160	23
2020	159	23
2021	157	24
2022	157	24
2023	157	24
2024	158	24
2025	158	24
2026	160	24
2027	161	25
2028	164	25
2029	165	24
2030	167	23
2031	167	22
2032	167	22
2033	167	22
2034	167	21
2035	167	21
2036	167	21

Table 6 shows the relationship between first year EE savings and cumulative savings included in the forecast, measured at the billing meter. A decay factor based on the expected life of the program are factored in the calculation of the cumulative saving figures.

Table 6

First Year EE Savings and Cumulative Savings		
Year	**First Year Savings (GWH)**	**Cumulative Savings (GWH)**
2017	126	126
2018	124	240
2019	160	383
2020	159	524
2021	157	664
2022	157	791
2023	157	921
2024	158	1,054
2025	158	1,136
2026	160	1,234
2027	161	1,311
2028	164	1,380
2029	165	1,400
2030	167	1,417
2031	167	1,420
2032	167	1,426
2033	167	1,438
2034	167	1,447
2035	167	1,459
2036	167	1,472

Table 7 presents the first year peak savings and cumulative savings included in the forecast, measured at the billing meter.

Table 7

First Year EE Peak Demand Savings and Cumulative Savings

Year	First Year Savings (MW)	Cumulative Savings (MW)
2017	24	24
2018	22	46
2019	23	69
2020	23	92
2021	24	116
2022	24	137
2023	24	159
2024	24	182
2025	24	196
2026	24	211
2027	25	224
2028	25	236
2029	24	244
2030	23	250
2031	22	253
2032	22	254
2033	22	254
2034	21	252
2035	21	252
2036	21	251

Table 8 presents the annual installation of PVs beginning in 2017. Approximately 122 MWs of PV capacity were installed between 2007 through 2016. The reductions in sales, system energy and peak from PV installation prior to 2017 are assumed to be incorporated in the unmanaged forecasts.

The figures for PV installations and generation are measured at the billing meter. PV generation and peak impacts are based on data from PV panels metered by SMUD. The annual capacity factor from the metered PV systems is about 18 percent. The peak impact, measured at hour ending 6 PM in July, is about 35 percent of the installed capacity. The peak impacts in Table 8 are measured at the system level which reflects a loss factor of 4.2 percent.

Table 8

Customer Installed PV Capacity and Generation

Year	Installed PV (MW)	Cumulative PV (MW	PV Generation (MWH)	Peak Impact (MW)
2017	44	44	70,000	16
2018	44	88	140,000	31
2019	44	132	210,000	47
2020	44	175	280,555	63
2021	18	193	308,000	69
2022	18	210	336,000	75
2023	18	228	364,000	82
2024	18	245	393,074	88
2025	18	263	420,000	94
2026	18	280	448,000	101
2027	18	298	476,000	107
2028	18	315	505,381	113
2029	18	333	532,000	119
2030	18	350	560,000	126
2031	18	368	588,000	132
2032	18	385	617,688	138
2033	18	403	644,000	145
2034	18	420	672,000	151
2035	18	438	700,000	157
2036	18	456	728,800	163

Table 9 presents the plug-in electric vehicle forecast and the electricity sales from battery charging. The sales forecast is based on metered interval data for customers who are currently

receiving service on one of SMUD's electric vehicle charging rate schedules. On the average, EV home charging amounts to about 8.8 kWh per day/vehicle.

Table 9

Electric Vehicle and Retail Sales Forecast

Year	Plug-In Vehicles	Sales (MWH)
2017	3,431	11,020
2018	6,858	22,027
2019	10,285	33,035
2020	13,671	44,033
2021	21,512	69,094
2022	29,312	94,149
2023	37,112	119,205
2024	44,786	144,245
2025	52,712	169,309
2026	60,512	194,362
2027	68,312	219,418
2028	75,900	244,460
2029	83,912	269,524
2030	91,712	294,580
2031	100,429	322,582
2032	109,776	353,569
2033	120,666	387,579
2034	132,185	424,577
2035	144,638	464,578
2036	157,818	509,704

Forecast Methods Overview

SMUD's forecast models are based on statistical regression techniques which normalized electricity use for variation in temperatures, seasonal use, number of customer accounts, and recent trends in electricity use behaviors. The forecast is based on four regression models: daily system energy, daily system peak, system hourly loads (24 separate equations), and the retail class sales models. In each model, loads and retail sales are normalized by customer accounts.

The daily energy and peak models serve as the foundation for the load forecast. These models normalize SMUD's EMS system loads for variations in daily temperatures, weekdays and weekends, months, seasons and holidays. The system hourly load equations provide a daily load shape which is calibrated to daily energy and peak model estimates with the following restrictions:

- Maximum of estimated hourly loads for day (i) = estimated peak for day (i) for each day of the forecast year.
- Sum of the estimated hourly loads for day (i) = estimated daily energy for day (i) for each day of the forecast year.

The predicted values from these models are:

- kwh/day/account,
- peak kW/day/account, and
- kW/hour/account.

The retail sales model includes separate regression equations for each major rate class (major rate codes in parentheses). They are:

- Residential Electric Space Heat (Rate Codes RSE, RSC, RWE, RWC)
- Residential Non-Electric Space Heat (RSG, RWG)
- Small General Services with maximum demands below 20 kW (GSN)
- Small General Services with maximum demands between 20 and 299 kW (GSS)
- Small General Service Time of Use with maximum demands between 300 and 499 kW (GSTOU3)
- Medium General Service Time of Use with maximum demands between 500 and 999 kW (GSTOU2)
- Large General Service Time of Use with maximum demands greater than 1,000 kW (GSTOU1)
- Other includes Agricultural (AGR), Street (ST and TF) and Night Lighting (NL) accounts.

The dependent variable for the sales models is kWh/customer per billing period. The regression model normalized class sales for variations in monthly use, temperature conditions (monthly heating and cooling degree days), and for recent sales trend with a binary variable. For the small

general service classes (under 299 kW maximum demands), commercial vacancy rates were included in the regression equation to explain the recent trends in economic activity.

In the long term (2020-2036), the unmanaged sales forecast includes changes in end-use saturations, federal efficiency standards, and new construction. The ITRON Statistically Adjusted End-Use (SAE) modeling framework is used to simulate end-use saturations and efficiency standards. This model is applied to residential and small commercial customer accounts with less than 299 kW maximum demands. The SAE modeling framework incorporates end-use energy use, appliance saturations and efficiencies to develop heating, cooling and "other" appliances end-use indices. The indices are used as independent variables in a regression model where the dependent variable is electricity sales per account. Simulation of energy use is based on the indices, which change overtime to incorporate marginal saturation rates and improvements in efficiency standards. For the residential model, saturations are based on the SMUD 2013 RASS survey results. For the commercial model, appliance saturations are from the 2014 SMUD Commercial Building Survey (CBS). Energy use per appliance and appliance efficiency levels are provided by ITRON. In the SAE models, price and income elasticity parameters are assumed to be zero.

The regression models, estimated parameters, and summary statistics are presented in Table 18.

Residential sales are further adjusted by new construction energy use factors. Based on SMUD's billing data between 2007 and 2016, the average monthly electricity use for these units, relative to class average electricity use, are 22 percent lower for non-electric space heat and 5 percent lower for electric space heat accounts.

For both residential and commercial rate classes, the SAE adjustments are made to current customer sales, while the new construction adjustments are applied to incremental customer growth beginning in 2022.

Load and Sales projections

The monthly retail sales forecast for each rate class is projected by multiplying the forecasted sales per customer times the forecasted number of customers for each rate class. The unmanaged retail sales forecast in Table 4 is the sum of the rate class sales forecast. For system energy, peak and hourly loads, the forecast is based on the estimated loads per account times the net customer forecast (total customers minus nightlight customer accounts). System energy, peak and hourly loads are calibrated to the unmanaged sales forecast after adjusting for line and voltage distribution losses (i.e. system energy = 1.042*unmanaged sales forecast).

Economic and Demographic Data

The primary driver for the sales and load forecasts is the customer account forecast. Table 10 presents the customer account forecast for the major customer classes.

Table 10

SMUD Customer Account Forecast

Year	Residential	Small GS	Medium GS	Large GS	Other	Net Customers
2017	553,099	64,369	250	159	5,401	623,277
2018	557,320	64,627	251	161	5,467	627,825
2019	562,479	64,972	253	163	5,529	633,395
2020	568,401	65,358	255	165	5,587	639,766
2021	574,323	65,784	258	167	5,641	646,172
2022	580,348	66,261	261	168	5,691	652,729
2023	586,518	66,773	264	170	5,740	659,465
2024	592,820	67,323	267	172	5,790	666,372
2025	599,235	67,912	270	174	5,840	673,430
2026	605,728	68,539	273	175	5,890	680,604
2027	612,299	69,206	276	177	5,941	687,899
2028	618,944	69,895	279	179	5,994	695,292
2029	625,682	70,591	282	181	6,048	702,785
2030	632,448	71,295	285	183	6,103	710,313
2031	639,190	72,005	288	185	6,158	717,826
2032	645,983	72,722	291	187	6,213	725,395
2033	652,896	73,447	294	189	6,267	733,092
2034	659,895	74,178	297	190	6,320	740,881
2035	666,891	74,917	300	192	6,373	748,673
2036	673,815	75,664	303	194	6,424	756,400
2016 - 2026	0.91%	0.63%	0.89%	1.00%	0.87%	0.88%
2016 - 2036	0.99%	0.81%	0.97%	1.01%	0.87%	0.97%

Notes:

Residential includes both electric and non-electric space heat accounts.

Small General Service (GS) includes accounts on rate schedules GSN (0-20 kW maximum demands), GSS (20-299 kW maximum demands), and GSTOU3 (300 to 499 kW maximum demands).

Medium GS includes customers on rate schedule GSTOU2 (500-1,000 Maximum Demands).

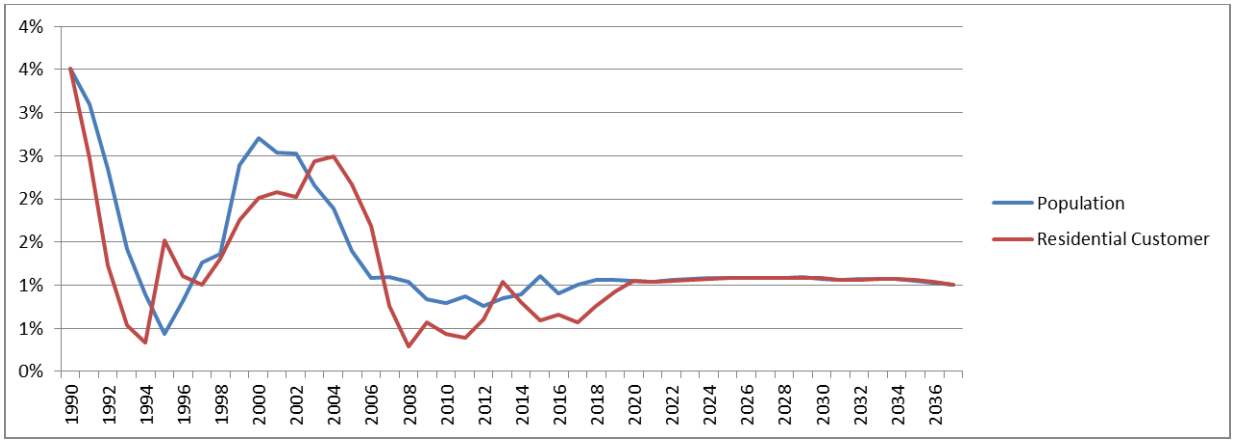
Large GS includes customers on rate schedule GSTOU1 (Maximum Demand >=1,000kW).

Other includes customers on the Agriculture, street lighting and traffic signals rate schedules.

The forecast for residential customers is based on the population forecast for Sacramento County. Figure 1 shows the historical and forecasted growth rates for the Sacramento County's population and SMUD's residential customer accounts.

Figure 1

Sacramento County Population and Residential Customer Annual Growth



During the last residential building cycle, Sacramento county population acted as a leading indicator for new residential customer growth. For the forecast period, however, residential customer growth is expected to keep pace with the population growth.

The forecast for Small General Service accounts are based on economic driver such as employment and gross county product. The Medium General Service accounts (between 500 and 1,000 kW maximum demands) and Large General Service accounts (greater than or equal to 1,000 kW maximum demands), and other customer accounts (Agriculture and Lighting) are based on their historical growth rates.

Sacramento Weather

A key component in normalizing sales and loads is weather. Both sales and load models use cooling degrees and heating degrees as independent variables in the regression equations. In the load model, daily high temperatures are also used to explain the rapid change in loads during heat storms.

Temperature data is from the National Weather Service's Sacramento City and Executive Airport weather stations. The daily temperatures from these weather stations are averaged to develop a composite temperature index for the Sacramento area. Daily composite temperatures are used to construct cooling and heating degree day variables in the regressions models.

Table 11 presents the normal temperatures and degree days used in forecast based on temperature data from 1981 to 2010. The average daily temperature is the average of the daily high and low temperatures. The High and Low temperatures are the maximum and minimum daily temperatures, respectively, for each month. The cooling degree (CDD65) and heating degree (HDD65) variables are the sum of the daily cooling and heating degrees for the calendar month with 65 degrees Fahrenheit as the base temperature. The SumCdd65 and SumHdd65 are the sum

of the cumulative degree days for the previous 30 days for each day during the month. The Sumcdd65 and SumHdd65 are used to reflect the number of degrees days over the billing month period.

Table 11

Normal Average Daily Temperatures

	Avg Daily	Avg High	Avg Low	High	Low
January	48	55	40	65	32
February	52	61	43	72	33
March	56	67	45	79	34
April	62	76	49	89	41
May	67	81	53	97	45
June	74	90	58	104	51
July	78	95	60	106	54
August	76	93	60	105	55
September	73	88	58	101	51
October	65	78	52	93	44
November	55	65	44	77	34
December	47	55	40	65	30

Table 11 (continued)

Normal Cooling and Heating Degree Days per Month

	CDD65	HDD65	SumCdd65	SumHdd65
January	-	542	-	18,275
February	-	361	-	13,886
March	2	277	18	10,813
April	25	165	313	6,975
May	112	52	2,072	3,425
June	239	6	5,355	804
July	362	0	10,142	61
August	339	0	11,369	4
September	240	5	9,407	56
October	69	65	5,069	799
November	1	318	734	5,507
December	-	551	4	14,432

Variability of Load Forecast: Extreme Temperature Scenarios

The normal temperature scenario is referred to as the "1 in 2" load condition scenario. That is, there is a 1 in 2 chance of this weather scenario occurring. Because the Sacramento area often experiences extremes in temperatures during the summer months, extreme temperature scenarios are used to examine these changes in system peak loads. Table 12 below presents the extreme temperatures for each load condition scenario.

Table 12

Extreme Temperature Scenarios

Load Condition Scenario	Daily High Temperature
1 in 2	106
1 in 5	108
1 in 10	110
1 in 20	112
1 in 40	114

The peak load forecasts under extreme conditions are estimated using the parameter estimates from daily peak model. Table 13 presents the 1 in 10 unmanaged and managed system peak load forecast.

Table 13

1 in 10 Unmanaged and Managed System Peak Loads

Year	Gross EMS	Net EMS	EE	PV	EV	Managed	Net Managed with RTOU	Net Managed with RTOU/Incremental
2017	3,321	3,264	(22)	(16)	0	3,226	3,226	3,236
2018	3,337	3,280	(39)	(33)	0	3,209	3,138	3,153
2019	3,359	3,302	(65)	(49)	1	3,189	3,114	3,136
2020	3,381	3,328	(85)	(65)	1	3,178	3,102	3,131
2021	3,407	3,354	(107)	(72)	1	3,176	3,100	3,147
2022	3,436	3,380	(142)	(79)	2	3,161	3,086	3,133
2023	3,463	3,407	(165)	(85)	2	3,159	3,085	3,132
2024	3,491	3,435	(189)	(92)	3	3,158	3,084	3,131
2025	3,520	3,464	(203)	(98)	3	3,166	3,092	3,139
2026	3,549	3,493	(218)	(105)	4	3,173	3,100	3,147
2027	3,578	3,522	(232)	(111)	4	3,183	3,109	3,156
2028	3,608	3,552	(245)	(118)	5	3,194	3,120	3,168
2029	3,638	3,582	(253)	(124)	5	3,210	3,136	3,183
2030	3,668	3,612	(259)	(131)	6	3,228	3,153	3,200
2031	3,698	3,642	(262)	(137)	6	3,249	3,173	3,220
2032	3,728	3,672	(263)	(144)	7	3,272	3,195	3,242
2033	3,759	3,703	(264)	(151)	7	3,296	3,217	3,264
2034	3,790	3,734	(261)	(157)	8	3,324	3,244	3,291
2035	3,820	3,764	(261)	(164)	9	3,348	3,268	3,315
2036	3,851	3,795	(261)	(170)	10	3,373	3,292	3,339

Table 14 presents the managed peak loads for the weather scenarios in Table 12.

Table 14

Managed System Peak Loads for Load Condition Scenarios

Year	1 in 2	1 in 5	1 in 10	1 In 20	1 in 40
2017	2,913	3,089	3,236	3,393	3,525
2018	2,904	3,077	3,224	3,382	3,515
2019	2,827	2,988	3,136	3,295	3,428
2020	2,815	2,982	3,131	3,291	3,425
2021	2,835	2,996	3,147	3,308	3,444
2022	2,819	2,981	3,132	3,295	3,432
2023	2,812	2,979	3,131	3,295	3,433
2024	2,795	2,976	3,130	3,295	3,434
2025	2,799	2,984	3,139	3,306	3,446
2026	2,799	2,992	3,149	3,317	3,458
2027	2,808	3,004	3,162	3,331	3,473
2028	2,802	3,011	3,170	3,341	3,484
2029	2,814	3,018	3,179	3,351	3,496
2030	2,824	3,033	3,195	3,369	3,515
2031	2,848	3,053	3,216	3,391	3,539
2032	2,865	3,075	3,239	3,416	3,564
2033	2,903	3,099	3,265	3,443	3,593
2034	2,930	3,124	3,291	3,470	3,621
2035	2,956	3,147	3,315	3,496	3,648
2036	2,973	3,168	3,338	3,521	3,674

Forecast Errors

Tables 15, 16, and 17 present the annual errors (actual – predicted) for the retail sales, system peak, and customer forecasts, respectively.

Table 15

Retail Sales Errors

(MWH)

Year	Actual	Forecast	% Error
2005	10,604,025	10,325,332	-2.6%
2006	10,891,871	10,608,307	-2.6%
2007	10,913,372	10,940,472	0.2%
2008	10,959,168	11,238,188	2.5%
2009	10,757,807	10,958,626	1.9%
2010	10,389,858	10,560,255	1.6%
2011	10,459,022	10,527,298	0.7%
2012	10,519,497	10,513,856	-0.1%
2013	10,480,762	10,432,362	-0.5%
2014	10,585,750	10,572,551	-0.1%
2015	10,523,765	10,548,236	0.2%
2016	10,477,398	10,530,677	0.5%

Note: Retail sales based on SMUD's 21 day cycle read billing data

Table 16

System Peak Errors

Year	Actual	Forecast	% Error
2005	2,959	2,953	-0.2%
2006	3,280	2,983	-9.1%
2007	3,099	3,124	0.8%
2008	3,086	3,062	-0.8%
2009	2,848	3,038	6.7%
2010	2,990	2,976	-0.5%
2011	2,840	2,979	4.9%
2012	2,953	2,974	0.7%
2013	3,014	2,946	-2.3%
2014	3,003	2,987	-0.5%
2015	2,956	3,008	1.8%
2016	2,972	3,028	1.9%

Table 17

Customers Account Forecast Errors

Year	Actual	Forecast	% Error
2005	572,832	573,832	0.2%
2006	582,745	592,242	1.6%
2007	588,107	595,130	1.2%
2008	590,607	598,717	1.4%
2009	593,971	594,838	0.1%
2010	596,367	593,975	-0.4%
2011	598,730	599,098	0.1%
2012	602,141	600,904	-0.2%
2013	607,997	605,887	-0.3%
2014	612,592	614,694	0.3%
2015	615,930	618,560	0.4%
2016	619,563	626,243	1.1%

The remainder of the report presents the regression equations, variable definitions, estimated parameters and standard errors, and summary statistics in Table 18. Historical SMUD sales, system energy, annual system peaks, and net customers are presented in Table 19. Sacramento County population, employment, and income are presented in Table 20.

Table 18

Regression Parameters Coefficients, Standard Errors, and Summary Statistics

Regression Parameters Coefficients, Standard Errors, and Summary Statistics					
Daily System Energy Model Parameters					
Variable		Coefficient	StdErr	T-Stat	P-Value
CONST	Constant Variable	44.528	0.181	245.675	0.00%
loads.monday	if day=Monday then=1 else=0	4.231	0.095	44.704	0.00%
loads.Tuesday	if day=Tuesday then=1 else=0	3.978	0.118	33.733	0.00%
loads.Wednesday	if day=Wednesday then=1 else=0	4.006	0.126	31.709	0.00%
loads.Thursday	if day=Thursday then=1 else=0	3.954	0.126	31.284	0.00%
loads.Friday	if day=Friday then=1 else=0	3.768	0.117	32.095	0.00%
loads.Saturday	if day=Saturday then=1 else=0	0.385	0.094	4.087	0.01%
loads.February	if month=February then=1 else=0	0.196	0.358	0.548	58.41%
loads.March	if month=March then=1 else=0	0.659	0.244	2.706	0.68%
loads.April	if month=April then=1 else=0	-0.637	0.235	-2.706	0.68%
loads.May	if month=May then=1 else=0	-1.396	0.258	-5.402	0.00%
loads.June	if month=June then=1 else=0	-1.506	0.298	-5.06	0.00%
loads.July	if month=July then=1 else=0	-1.2	0.353	-3.401	0.07%
loads.August	if month=August then=1 else=0	-1.176	0.347	-3.39	0.07%
loads.September	if month=September then=1 else=0	-1.265	0.29	-4.363	0.00%
loads.December	if month=December then=1 else=0	1.965	0.398	4.942	0.00%
loads.summer_monday	if day=Monday and season=Summer then=1 else=0	0.654	0.12	5.457	0.00%
loads.summer_tuesday	if day=Tuesday and season=Summer then=1 else=0	0.95	0.15	6.327	0.00%
loads.summer_wednesday	if day=Wednesday and season=Summer then=1 else=0	0.846	0.162	5.233	0.00%
loads.Summer_thursday	if day=Thursday and season=Summer then=1 else=0	1.017	0.161	6.3	0.00%
loads.summer_friday	if day=Friday and season=Summer then=1 else=0	0.767	0.15	5.126	0.00%
loads.summer_saturday	if day=Saturday and season=Summer then=1 else=0	0.213	0.12	1.78	7.51%
loads.winter_monday	if day=Monday and season=Winter then=1 else=0	-0.355	0.124	-2.859	0.43%
loads.winter_tuesday	if day=Tuesday and season=Winter then=1 else=0	-0.152	0.153	-0.991	32.17%
loads.winter_wednesday	if day=Wednesday and season=Winter then=1 else=0	-0.254	0.164	-1.549	12.14%
loads.winter_thursday	if day=Thursday and season=Winter then=1 else=0	-0.399	0.164	-2.436	1.49%
loads.winter_friday	if day=Friday and season=Winter then=1 else=0	-0.414	0.153	-2.716	0.66%
loads.winter_saturday	if day=Saturday and season=Winter then=1 else=0	-0.109	0.123	-0.89	37.37%
loads.cdd65	Cooling Degree Day Base 65°	0.345	0.026	13.471	0.00%
loads.cdd70	Cooling Degree Day Base 70°	0.278	0.03	9.118	0.00%
loads.lag1_cdd65	Cooling Degree Day Lagged 1 day Base 65°	0.281	0.008	33.729	0.00%
loads.lag2_cdd65	Cooling Degree Day Lagged 2 day Base 65°	0.031	0.008	3.776	0.02%
loads.lag3_cdd65	Cooling Degree Day Lagged 3 day Base 65°	0.017	0.008	2.106	3.53%
loads.lag4_cdd65	Cooling Degree Day Lagged 4 day Base 65°	0.023	0.008	2.984	0.29%
loads.cdd65_may	Cooling Degree Day Base 65° * May	0.214	0.03	7.168	0.00%
loads.cdd65_june	Cooling Degree Day Base 65° * June	0.39	0.029	13.419	0.00%
loads.cdd65_july	Cooling Degree Day Base 65° * July	0.401	0.031	12.807	0.00%
loads.cdd65_august	Cooling Degree Day Base 65° * August	0.331	0.032	10.466	0.00%
loads.cdd65_september	Cooling Degree Day Base 65° * September	0.178	0.03	5.964	0.00%
loads.holiday	if day=Calif. Or Federal holiday then=1, else=0	-1.835	0.085	-21.693	0.00%
loads.Hdd65_Novermber	Heating Degree Day Base 65° * November	0.164	0.019	8.657	0.00%
loads.Hdd65_December	Heating Degree Day Base 65° * December	0.156	0.024	6.38	0.00%
loads.Hdd65_January	Heating Degree Day Base 65° * January	0.254	0.017	14.806	0.00%
loads.hdd65_February	Heating Degree Day Base 65° * February	0.174	0.024	7.158	0.00%
loads.hdd50	Heating Degree Day Base 50º	0.066	0.034	1.93	5.37%
loads.hdd65	Heating Degree Day Base 65°	0.013	0.012	1.098	27.22%
loads.cai	exp(.2+2*(max daily temps-95)/(1+exp(2+2*max daily temps-95))	6.185	0.36	17.166	0.00%
loads.maxtemp_105	if Maxtemp>=105, then=1 , else=0	1.314	0.174	7.561	0.00%
loads.holiday_july	if day=Calif. Or Federal holiday in July then=1, else=0	-1.664	0.276	-6.027	0.00%
loads.year_2011	If year=2011 then=1 else=0	-1.774	0.21	-8.44	0.00%
loads.year_2012	If year=2012 then=1 else=0	-2.735	0.211	-12.979	0.00%
loads.Year_2013	If year=2013 then=1 else=0	-3.222	0.211	-15.271	0.00%
loads.year_2014	If year=2014 then=1 else=0	-3.899	0.212	-18.425	0.00%
loads.year_2015_trend	If year>=2015 then=1 else=0	-4.488	0.179	-25.014	0.00%
loads.mintemphdd	Heating Degree Day with Min Temp. Base = 40	0.083	0.021	3.926	0.01%
loads.maxtemphdd	Heating Degree Day with Max Temp. Base = 55	0.189	0.026	7.211	0.00%
AR(1)	Autoregressive rho Estimate	0.717	0.012	61.659	0.00%
Observations: January1, 2006 to July 2016					

Table 18 (continued)

Regression Parameters Coefficients, Standard Errors, and Summary Statistics					
Daily System Peak Model Parameters					
Variable		Coefficient	StdErr	T-Stat	P-Value
CONST	Constant Variable	2.218	0.012	186.125	0.00%
loads.monday	if day=Monday then=1 else=0	0.115	0.009	13.384	0.00%
loads.Tuesday	if day=Tuesday then=1 else=0	0.089	0.01	8.47	0.00%
loads.Wednesday	if day=Wednesday then=1 else=0	0.083	0.011	7.47	0.00%
loads.Thursday	if day=Thursday then=1 else=0	0.075	0.011	6.8	0.00%
loads.Friday	if day=Friday then=1 else=0	0.029	0.01	2.759	0.58%
loads.Saturday	if day=Saturday then=1 else=0	-0.084	0.009	-9.845	0.00%
loads.February	if month=February then=1 else=0	0.01	0.027	0.38	70.36%
loads.March	if month=March then=1 else=0	0.061	0.016	3.751	0.02%
loads.April	if month=April then=1 else=0	-0.041	0.015	-2.631	0.85%
loads.May	if month=May then=1 else=0	-0.125	0.016	-7.596	0.00%
loads.June	if month=June then=1 else=0	-0.012	0.018	-0.698	48.52%
loads.July	if month=July then=1 else=0	0.085	0.02	4.332	0.00%
loads.August	if month=August then=1 else=0	0.05	0.019	2.584	0.98%
loads.September	if month=September then=1 else=0	-0.116	0.018	-6.461	0.00%
loads.December	If month=December then=1 else=0	0.17	0.03	5.608	0.00%
loads.summer_monday	if day=Monday and season=Summer then=1 else=0	0.129	0.011	11.83	0.00%
loads.summer_tuesday	if day=Tuesday and season=Summer then=1 else=0	0.143	0.013	10.716	0.00%
loads.summer_wednesday	if day=Wednesday and season=Summer then=1 else=0	0.145	0.014	10.207	0.00%
loads.Summer_thursday	if day=Thursday and season=Summer then=1 else=0	0.164	0.014	11.594	0.00%
loads.summer_friday	if day=Friday and season=Summer then=1 else=0	0.181	0.013	13.565	0.00%
loads.summer_saturday	if day=Saturday and season=Summer then=1 else=0	0.061	0.011	5.59	0.00%
loads.winter_monday	if day=Monday and season=Winter then=1 else=0	0.042	0.011	3.755	0.02%
loads.winter_tuesday	if day=Tuesday and season=Winter then=1 else=0	0.052	0.013	3.819	0.01%
loads.winter_wednesday	if day=Wednesday and season=Winter then=1 else=0	0.049	0.014	3.47	0.05%
loads.winter_thursday	if day=Thursday and season=Winter then=1 else=0	0.039	0.014	2.715	0.67%
loads.winter_friday	if day=Friday and season=Winter then=1 else=0	0.044	0.013	3.273	0.11%
loads.winter_saturday	if day=Saturday and season=Winter then=1 else=0	0.025	0.011	2.218	2.66%
loads.cdd65	Cooling Degree Day Base 65°	0.05	0.002	32.962	0.00%
loads.lag1_cdd65	Cooling Degree Day Lagged 1 day Base 65°	0.016	0.001	21.756	0.00%
loads.lag2_cdd65	Cooling Degree Day Lagged 2 day Base 65°	0.003	0.001	3.886	0.01%
loads.lag3_cdd65	Cooling Degree Day Lagged 3 day Base 65°	0.001	0.001	1.926	5.41%
loads.lag4_cdd65	Cooling Degree Day Lagged 4 day Base 65°	0.003	0.001	4.852	0.00%
loads.holiday	if day=Calif. Or Federal holiday then=1, else=0	-0.089	0.008	-11.517	0.00%
loads.Hdd65_Novermber	Heating Degree Day Base 65° * November	0.009	0.001	6.265	0.00%
loads.Hdd65_December	Heating Degree Day Base 65° * December	0.006	0.002	3.166	0.16%
loads.Hdd65_January	Heating Degree Day Base 65° * January	0.013	0.001	10.787	0.00%
loads.hdd65_February	Heating Degree Day Base 65° * February	0.008	0.002	4.328	0.00%
loads.hdd65	Heating Degree Day Base 65°	0.004	0.001	4.256	0.00%
loads.cai	exp(.2+2*(max daily temps-95)/(1+exp(2+2*max daily temps-95))	1.162	0.029	40.702	0.00%
loads.holiday_july	if day=Calif. Or Federal holiday in July then=1, else=0	-0.149	0.025	-5.9	0.00%
loads.year_2011	If year=2011 then=1 else=0	-0.11	0.012	-8.867	0.00%
loads.year_2012	If year=2012 then=1 else=0	-0.154	0.012	-12.36	0.00%
loads.Year_2013	If year=2013 then=1 else=0	-0.188	0.012	-15.067	0.00%
loads.year_2014	If year=2014 then=1 else=0	-0.221	0.013	-17.579	0.00%
loads.year_2015_trend	If year>=2015 then=1 else=0	-0.262	0.011	-24.794	0.00%
loads.maxtemphdd	Heating Degree Day with Max temp, Base=55	0.012	0.002	7.139	0.00%
AR(1)	Autoregressive rho Estimate	0.58	0.013	43.275	0.00%
Observations: January1, 2006 to July 2016					

Table 18 (continued)

Daily Model				
Forecast Statistics			Forecast Statistics	
Iterations	15		Forecast Observations	0
Adjusted Observations	3859		Mean Abs. Dev. (MAD)	0
Deg. of Freedom for Error	3802		Mean Abs. % Err. (MAPE)	0.00%
R-Squared	0.983		Avg. Forecast Error	0
Adjusted R-Squared	0.982		Mean % Error	0.00%
AIC	0.13719		Root Mean-Square Error	0
BIC	0.22962		Theil's Inequality Coefficient	0
F-Statistic	3822.088			
Prob (F-Statistic)	0			
Log-Likelihood	-5,683.39			
Model Sum of Squares	241,936.42			
Sum of Squared Errors	4,297.59			
Mean Squared Error	1.1303			
Std. Error of Regression	1.0632			
Mean Abs. Dev. (MAD)	0.7858			
Mean Abs. % Err. (MAPE)	1.50%			
Durbin-Watson Statistic	2.133			
Durbin-H Statistic	#NA			
Ljung-Box Statistic	324.02			
Prob (Ljung-Box)	0			
Skewness	0.06			
Kurtosis	4.904			
Jarque-Bera	585.101			
Prob (Jarque-Bera)	0			
Peak Model				
Model Statistics			Forecast Statistics	
Iterations	10		Forecast Observations	0
Adjusted Observations	3859		Mean Abs. Dev. (MAD)	0
Deg. of Freedom for Error	3811		Mean Abs. % Err. (MAPE)	0.00%
R-Squared	0.981		Avg. Forecast Error	0
Adjusted R-Squared	0.981		Mean % Error	0.00%
AIC	-4.75756		Root Mean-Square Error	0
BIC	-4.67972		Theil's Inequality Coefficient	0
F-Statistic	4285.536			
Prob (F-Statistic)	0			
Log-Likelihood	3,752.04			
Model Sum of Squares	1,708.25			
Sum of Squared Errors	32.32			
Mean Squared Error	0.0085			
Std. Error of Regression	0.0921			
Mean Abs. Dev. (MAD)	0.0655			
Mean Abs. % Err. (MAPE)	2.38%			
Durbin-Watson Statistic	2.112			
Durbin-H Statistic	#NA			
Ljung-Box Statistic	273.15			
Prob (Ljung-Box)	0			
Skewness	-0.086			
Kurtosis	7.422			
Jarque-Bera	3149.579			
Prob (Jarque-Bera)	0			

Table 18 (continued)

Hourly Model											
Model Statistics	Obs	DF	AdjRSq	DW	StdErr	MAD	MAPE	FObs	FMAD	FMAPE	FAvgErr
Hour1	3865	3820	0.907	1.245	0.064	0.042	2.27%	0	0	0.00%	0
Hour2	3861	3816	0.826	1.578	0.077	0.039	2.19%	0	0	0.00%	0
Hour3	3865	3820	0.9	1.027	0.049	0.034	2.07%	0	0	0.00%	0
Hour4	3865	3820	0.898	0.97	0.046	0.033	2.01%	0	0	0.00%	0
Hour5	3865	3820	0.9	0.921	0.047	0.033	2.02%	0	0	0.00%	0
Hour6	3865	3820	0.906	0.855	0.054	0.04	2.25%	0	0	0.00%	0
Hour7	3865	3820	0.917	0.815	0.071	0.053	2.74%	0	0	0.00%	0
Hour8	3865	3820	0.915	0.823	0.078	0.057	2.83%	0	0	0.00%	0
Hour9	3865	3820	0.905	0.835	0.074	0.054	2.57%	0	0	0.00%	0
Hour10	3865	3820	0.894	0.89	0.077	0.056	2.55%	0	0	0.00%	0
Hour11	3865	3819	0.897	0.943	0.086	0.062	2.71%	0	0	0.00%	0
Hour12	3865	3820	0.915	0.985	0.096	0.069	2.94%	0	0	0.00%	0
Hour13	3865	3819	0.937	1.059	0.104	0.074	3.07%	0	0	0.00%	0
Hour14	3865	3820	0.956	1.109	0.108	0.078	3.14%	0	0	0.00%	0
Hour15	3865	3821	0.969	1.116	0.108	0.079	3.14%	0	0	0.00%	0
Hour16	3865	3821	0.973	1.203	0.115	0.084	3.31%	0	0	0.00%	0
Hour17	3865	3821	0.976	1.008	0.114	0.085	3.31%	0	0	0.00%	0
Hour18	3865	3820	0.97	0.934	0.125	0.095	3.63%	0	0	0.00%	0
Hour19	3865	3820	0.964	0.838	0.123	0.092	3.55%	0	0	0.00%	0
Hour20	3865	3819	0.962	0.918	0.109	0.081	3.12%	0	0	0.00%	0
Hour21	3865	3819	0.957	1.024	0.099	0.072	2.76%	0	0	0.00%	0
Hour22	3865	3819	0.949	1.091	0.094	0.067	2.69%	0	0	0.00%	0
Hour23	3864	3819	0.938	1.118	0.082	0.057	2.54%	0	0	0.00%	0
Hour24	3865	3819	0.918	1.288	0.075	0.048	2.37%	0	0	0.00%	0

Note: Hourly model estimated parameters and standard errors available upon request

Table 18 (continued)

Residential Electric Space Heat Sales

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	507.45	12.93	39.26	0.00%
Account_Forecast.january	if month=january then=1 else=0	103.30	11.15	9.26	0.00%
Account_Forecast.february	if month=february then=1 else=0	40.24	9.54	4.22	0.01%
Account_Forecast.march	if month=march then=1 else=0	-64.93	9.26	-7.01	0.00%
Account_Forecast.april	if month=april then=1 else=0	-83.38	9.64	-8.65	0.00%
Account_Forecast.may	if month=may then=1 else=0	-67.53	9.67	-6.98	0.00%
Account_Forecast.July	if month=July then=1 else=0	28.93	8.67	3.34	0.12%
Account_Forecast.October	if month=October then=1 else=0	-42.18	8.99	-4.69	0.00%
Account_Forecast.November	if month=November then=1 else=0	-64.51	10.16	-6.35	0.00%
Account_Forecast.sumcdd65	Sum Cooling Degree Day Base 65°	0.03	0.00	24.86	0.00%
Account_Forecast.sumhdd65	Sum Heating Degree Day Base 65°	0.03	0.00	35.11	0.00%
Account_Forecast.year_2006	If year=2006 then=1 else=0	56.99	9.36	6.09	0.00%
Account_Forecast.year_2007	If year=2007 then=1 else=0	58.79	9.33	6.30	0.00%
Account_Forecast.year_2008	If year=2008 then=1 else=0	37.85	9.36	4.04	0.01%
Account_Forecast.year_2009	If year=2009 then=1 else=0	31.85	9.37	3.40	0.10%
Account_Forecast.year_2010	If year=2010 then=1 else=0	12.17	9.36	1.30	19.64%
Account_Forecast.year_2011	If year=2011 then=1 else=0	15.00	9.40	1.60	11.34%
Account_Forecast.year_2012	If year=2012 then=1 else=0	8.90	9.33	0.95	34.24%
Account_Forecast.year_2013	If year=2013 then=1 else=0	9.09	9.32	0.98	33.16%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	-11.20	8.49	-1.32	19.00%

Residential Non-Electric Space Heat Sales

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	579.48	11.33	51.13	0.00%
Account_Forecast.january	if month=january then=1 else=0	43.60	7.07	6.17	0.00%
Account_Forecast.february	if month=february then=1 else=0	-30.77	6.16	-4.99	0.00%
Account_Forecast.march	if month=march then=1 else=0	-75.62	6.39	-11.84	0.00%
Account_Forecast.april	if month=april then=1 else=0	-100.58	7.57	-13.28	0.00%
Account_Forecast.may	if month=may then=1 else=0	-107.41	8.04	-13.36	0.00%
Account_Forecast.June	if month=June then=1 else=0	-52.48	7.17	-7.32	0.00%
Account_Forecast.August	if month=August then=1 else=0	-56.24	7.53	-7.47	0.00%
Account_Forecast.September	if month=September then=1 else=0	-38.64	6.54	-5.91	0.00%
Account_Forecast.October	if month=October then=1 else=0	-100.58	7.92	-12.69	0.00%
Account_Forecast.November	if month=November then=1 else=0	-83.84	8.26	-10.16	0.00%
Account_Forecast.sumcdd65	Sum Cooling Degree Day Base 65°	0.03	0.00	22.64	0.00%
Account_Forecast.sumhdd65	Sum Heating Degree Day Base 65°	0.01	0.00	8.00	0.00%
Account_Forecast.lag_cdd75	Cooling Degree Day Lagged 1 day Base 65°	0.55	0.10	5.51	0.00%
Account_Forecast.year_2006	If year=2006 then=1 else=0	35.64	4.81	7.40	0.00%
Account_Forecast.year_2007	If year=2007 then=1 else=0	29.41	4.79	6.14	0.00%
Account_Forecast.year_2008	If year=2008 then=1 else=0	24.42	4.80	5.09	0.00%
Account_Forecast.year_2009	If year=2009 then=1 else=0	18.72	4.81	3.89	0.02%
Account_Forecast.year_2010	If year=2010 then=1 else=0	12.64	4.82	2.62	1.00%
Account_Forecast.year_2011	If year=2011 then=1 else=0	12.35	4.82	2.56	1.19%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	-13.94	4.20	-3.32	0.12%

Table 18 (continued)

Small Commercial Sales (<20kW)

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	1095.87	9.35	117.20	0.00%
Account_Forecast.january	if month=january then=1 else=0	82.92	9.79	8.47	0.00%
Account_Forecast.february	if month=february then=1 else=0	26.22	9.79	2.68	0.86%
Account_Forecast.march	if month=march then=1 else=0	-56.43	9.78	-5.77	0.00%
Account_Forecast.april	if month=april then=1 else=0	-127.10	9.80	-12.97	0.00%
Account_Forecast.may	if month=may then=1 else=0	-159.31	10.98	-14.51	0.00%
Account_Forecast.June	if month=June then=1 else=0	-128.88	15.47	-8.33	0.00%
Account_Forecast.July	if month=July then=1 else=0	-141.72	26.00	-5.45	0.00%
Account_Forecast.August	if month=August then=1 else=0	-154.06	26.83	-5.74	0.00%
Account_Forecast.September	if month=September then=1 else=0	-130.39	24.34	-5.36	0.00%
Account_Forecast.October	if month=October then=1 else=0	-134.01	15.22	-8.80	0.00%
Account_Forecast.November	if month=November then=1 else=0	-116.44	10.13	-11.49	0.00%
Account_Forecast.sumcdd65	Sum Cooling Degree Day Base 65°	0.02	0.00	10.87	0.00%
Account_Forecast.year_2007	If year=2007 then=1 else=0	-20.22	9.17	-2.20	2.97%
Account_Forecast.year_2008	If year=2008 then=1 else=0	-60.35	9.13	-6.61	0.00%
Account_Forecast.year_2009	If year=2009 then=1 else=0	-115.35	9.13	-12.63	0.00%
Account_Forecast.year_2010	If year=2010 then=1 else=0	-132.80	9.28	-14.31	0.00%
Account_Forecast.year_2011	If year=2011 then=1 else=0	-126.99	9.21	-13.79	0.00%
Account_Forecast.year_2012	If year=2012 then=1 else=0	-159.68	9.13	-17.48	0.00%
Account_Forecast.year_2013	If year=2013 then=1 else=0	-162.85	9.13	-17.83	0.00%
Account_Forecast.year_2014	If year=2014 then=1 else=0	41.68	9.29	4.49	0.00%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	17.27	8.50	2.03	4.47%

Small Commercial Sales (21-299 kW)

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	14,903.73	93.85	158.81	0.00%
Account_Forecast.march	if month=march then=1 else=0	-706.44	132.13	-5.35	0.00%
Account_Forecast.april	if month=april then=1 else=0	-1,194.22	131.18	-9.10	0.00%
Account_Forecast.may	if month=may then=1 else=0	-927.69	126.32	-7.34	0.00%
Account_Forecast.November	if month=Novenber then=1 else=0	-550.10	135.01	-4.07	0.01%
Account_Forecast.sumcdd65	Sum Cooling Degree Day Base 65°	0.29	0.01	32.13	0.00%
Account_Forecast.year_2008	If year=2008 then=1 else=0	-796.68	135.89	-5.86	0.00%
Account_Forecast.year_2009	If year=2009 then=1 else=0	-1,502.72	135.90	-11.06	0.00%
Account_Forecast.year_2010	If year=2010 then=1 else=0	-1,920.76	135.97	-14.13	0.00%
Account_Forecast.year_2011	If year=2011 then=1 else=0	-2,226.16	135.92	-16.38	0.00%
Account_Forecast.year_2012	If year=2012 then=1 else=0	-2,603.75	135.91	-19.16	0.00%
Account_Forecast.year_2013	If year=2013 then=1 else=0	-1,697.19	140.11	-12.11	0.00%
Account_Forecast.dec13	if year=2013 and month=december then =1 else=0	6,195.57	405.63	15.27	0.00%
Account_Forecast.year_2014	If year=2014 then=1 else=0	3,530.93	136.16	25.93	0.00%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	3,437.82	120.07	28.63	0.00%

Table 18 (continued)

Small Commercial Sales (300-499 kW)

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	89,664.11	3,560.28	25.18	0.00%
Account_Forecast.march	if month=march then=1 else=0	-3,152.64	1,192.83	-2.64	0.94%
Account_Forecast.april	if month=april then=1 else=0	-6,014.85	1,184.59	-5.08	0.00%
Account_Forecast.may	if month=may then=1 else=0	-5,259.14	1,147.95	-4.58	0.00%
Account_Forecast.year_2009	If year=2009 then=1 else=0	-5,700.27	1,921.85	-2.97	0.37%
Account_Forecast.year_2010	If year=2010 then=1 else=0	-7,849.73	2,244.78	-3.50	0.07%
Account_Forecast.year_2011	If year=2011 then=1 else=0	-8,872.83	2,366.90	-3.75	0.03%
Account_Forecast.year_2012	If year=2012 then=1 else=0	-4,124.03	2,482.17	-1.66	9.94%
Account_Forecast.year_2013	If year=2013 then=1 else=0	19,778.33	2,454.02	8.06	0.00%
Account_Forecast.year_2014	If year=2014 then=1 else=0	31,021.04	2,433.69	12.75	0.00%
Account_Forecast.sumcdd65	Sum Cooling Degree Day Base 65°	0.99	0.08	12.37	0.00%
Account_Forecast.Jan15	if year=2015 and month=January then =1 else=0	-30,722.96	3,673.88	-8.36	0.00%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	28,641.55	2,309.49	12.40	0.00%
Vancancies.Vacancies	Quarterly vacancies rate	-717.20	242.26	-2.96	0.38%

Medium Commercial Sales (500-999 kW)

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	208,774.71	2,213.00	94.34	0.00%
Account_Forecast.february	if month=februay then=1 else=0	-4,875.12	2,368.47	-2.06	4.19%
Account_Forecast.march	if month=march then=1 else=0	-5,787.73	2,220.38	-2.61	1.04%
Account_Forecast.april	if month=april then=1 else=0	-14,904.03	2,298.70	-6.48	0.00%
Account_Forecast.may	if month=may then=1 else=0	-10,071.44	2,722.67	-3.70	0.03%
Account_Forecast.November	if month=Novenber then=1 else=0	-5,947.55	2,322.54	-2.56	1.18%
Account_Forecast.sumhdd65	Sum Cooling Degree Day Base 65°	-0.51	0.15	-3.52	0.06%
Account_Forecast.lag_cdd65	Cooling Degree Day Lagged 1 day Base 65°	60.59	7.26	8.35	0.00%
Account_Forecast.year_2009	If year=2009 then=1 else=0	-8,988.56	1,538.82	-5.84	0.00%
Account_Forecast.year_2010	If year=2010 then=1 else=0	-8,327.61	1,535.71	-5.42	0.00%
Account_Forecast.year_2011	If year=2011 then=1 else=0	-4,019.93	1,533.17	-2.62	1.00%
Account_Forecast.year_2012	If year=2012 then=1 else=0	-15,231.95	1,531.74	-9.94	0.00%
Account_Forecast.year_2013	If year=2013 then=1 else=0	-15,138.91	1,534.21	-9.87	0.00%
Account_Forecast.year_2014	If year=2014 then=1 else=0	-7,288.17	1,540.13	-4.73	0.00%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	-7,690.80	1,332.63	-5.77	0.00%
AR(1)	Autoregressive rho Estimate	-0.36	0.09	-4.09	0.01%

Large Commecial Sales (>1000 kW)

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	999,434.28	8,669.60	115.28	0.00%
Account_Forecast.january	if month=january then=1 else=0	80,780.86	19,362.75	4.17	0.01%
Account_Forecast.may	if month=may then=1 else=0	-47,245.64	17,791.16	-2.66	0.91%
Account_Forecast.November	if month=Novenber then=1 else=0	36,545.11	18,759.73	1.95	5.39%
Account_Forecast.year_2008	If year=2008 then=1 else=0	-26,802.75	14,480.81	-1.85	6.68%
Account_Forecast.year_2009	If year=2009 then=1 else=0	-88,927.55	14,465.74	-6.15	0.00%
Account_Forecast.year_2010	If year=2010 then=1 else=0	-91,967.42	14,478.92	-6.35	0.00%
Account_Forecast.year_2011	If year=2011 then=1 else=0	-74,677.11	14,465.88	-5.16	0.00%
Account_Forecast.year_2012	If year=2012 then=1 else=0	-54,342.87	14,450.13	-3.76	0.03%
Account_Forecast.year_2013	If year=2013 then=1 else=0	-82,977.22	14,488.19	-5.73	0.00%
Account_Forecast.sumcdd65	Sum Cooling Degree Day Base 65°	9.83	1.06	9.31	0.00%
AR(1)	Autoregressive rho Estimate	-0.19	0.09	-2.06	4.17%

Table 18 (continued)

Agricultural Sales

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	763.46	52.20	14.63	0.00%
Account_Forecast.april	if month=april then=1 else=0	398.59	96.60	4.13	0.01%
Account_Forecast.may	if month=may then=1 else=0	1,225.87	115.04	10.66	0.00%
Account_Forecast.June	if month=June then=1 else=0	2,365.18	178.08	13.28	0.00%
Account_Forecast.July	if month=July then=1 else=0	2,904.09	315.19	9.21	0.00%
Account_Forecast.August	if month=August then=1 else=0	2,963.00	325.85	9.09	0.00%
Account_Forecast.September	if month=September then=1 else=0	2,378.24	294.00	8.09	0.00%
Account_Forecast.October	if month=October then=1 else=0	1,181.65	175.01	6.75	0.00%
Account_Forecast.November	if month=November then=1 else=0	467.23	102.33	4.57	0.00%
Account_Forecast.sumcdd65	Sum Cooling Degree Day Base 65°	0.09	0.03	3.14	0.22%
Account_Forecast.year_2008	If year=2008 then=1 else=0	366.87	90.36	4.06	0.01%
Account_Forecast.year_2012	If year=2012 then=1 else=0	236.44	90.81	2.60	1.05%
Account_Forecast.year_2013	If year=2013 then=1 else=0	409.76	90.59	4.52	0.00%
Account_Forecast.year_2014	If year=2014 then=1 else=0	427.15	95.02	4.50	0.00%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	269.74	81.75	3.30	0.13%

Streelight and Signal Sales

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	2,513.12	41.29	60.86	0.00%
Account_Forecast.year_2011	If year=2011 then=1 else=0	-177.18	102.01	-1.74	8.50%
Account_Forecast.year_2012	If year=2012 then=1 else=0	-183.10	101.76	-1.80	7.45%
Account_Forecast.year_2013	If year=2013 then=1 else=0	-396.88	101.76	-3.90	0.02%
Account_Forecast.year_2014	If year=2014 then=1 else=0	-206.69	101.75	-2.03	4.45%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	-672.16	86.19	-7.80	0.00%
AR(1)	Autoregressive rho Estimate	-0.30	0.09	-3.43	0.08%

Nightlights Sales

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
CONST	Constant term	64.16	0.04	1,494.88	0.00%
Account_Forecast.year_2006	If year=2006 then=1 else=0	-1.55	0.07	-20.82	0.00%
Account_Forecast.year_2007	If year=2007 then=1 else=0	-1.48	0.07	-19.95	0.00%
Account_Forecast.year_2008	If year=2008 then=1 else=0	-1.03	0.07	-13.89	0.00%
Account_Forecast.year_2009	If year=2009 then=1 else=0	-0.72	0.07	-9.75	0.00%
Account_Forecast.year_2010	If year=2010 then=1 else=0	-0.46	0.07	-6.20	0.00%
Account_Forecast.year_2013	If year=2013 then=1 else=0	0.29	0.07	3.92	0.02%
Account_Forecast.year_2014	If year=2014 then=1 else=0	0.77	0.07	10.35	0.00%
Account_Forecast.year2015plus	If year>=2015 then=1 else=0	1.03	0.07	15.67	0.00%

Table 18 (continued)

Model Statistics	Residential Electric Space Heat	Residential Electric Space Heat	Small Commecial Sales (<29)	Small Commecial Sales (30-299)	Small Commecial Sales (300-499)
Iterations	1.00	1.00	1.00	1.00	1.00
Adjusted Observations	126.00	126.00	126.00	126.00	126.00
Deg. of Freedom for Error	106.00	105.00	104.00	111.00	112.00
R-Squared	0.99	0.99	0.97	0.98	0.95
Adjusted R-Squared	0.98	0.99	0.97	0.98	0.95
AIC	6.39	5.47	6.37	12.01	16.45
BIC	6.84	5.95	6.87	12.35	16.76
F-Statistic	389.33	552.00	165.76	448.40	181.71
Prob (F-Statistic)	0.00	0.00	0.00	0.00	0.00
Log-Likelihood	-561.49	-502.69	-558.26	-920.70	-1,200.99
Model Sum of Squares	3,822,261.07	2,264,618.44	1,741,669.17	927,328,793.17	29,587,433,862.69
Sum of Squared Errors	54,771.18	21,538.57	52,033.98	16,397,040.12	1,402,860,754.80
Mean Squared Error	516.71	205.13	500.33	147,721.08	12,525,542.45
Std. Error of Regression	22.73	14.32	22.37	384.35	3,539.14
Mean Abs. Dev. (MAD)	16.95	10.02	16.20	287.67	2,417.17
Mean Abs. % Err. (MAPE)	0.02	0.01	0.02	0.02	0.03
Durbin-Watson Statistic	1.79	1.66	1.40	1.48	1.44
Durbin-H Statistic	-	-	-	-	-
Ljung-Box Statistic	36.98	32.42	35.46	109.16	37.47
Prob (Ljung-Box)	0.04	0.12	0.06	0.00	0.04
Skewness	0.22	0.12	0.38	0.33	0.71
Kurtosis	2.95	3.35	2.91	2.82	5.08
Jarque-Bera	1.00	0.99	3.13	2.44	33.16
Prob (Jarque-Bera)	0.61	0.61	0.21	0.30	0.00

Model Statistics	Medium Commecial	Large Commecial Sales	Agricultural Sales	Streetlight & Signal	Nightlight Sales
Iterations	9.00	10.00	1.00	5.00	1.00
Adjusted Observations	125.00	125.00	126.00	125.00	126.00
Deg. of Freedom for Error	109.00	113.00	111.00	118.00	117.00
R-Squared	0.87	0.58	0.97	0.31	0.95
Adjusted R-Squared	0.85	0.54	0.97	0.27	0.95
AIC	17.58	21.87	11.41	12.11	-3.05
BIC	17.95	22.14	11.75	12.27	-2.85
F-Statistic	48.48	14.31	253.74	8.65	271.12
Prob (F-Statistic)	0.00	0.00	0.00	0.00	0.00
Log-Likelihood	-1,260.31	-1,532.32	-882.91	-927.07	22.36
Model Sum of Squares	27,939,392,529.19	452,824,555,514.61	288,065,841.36	8,902,733.95	95.89
Sum of Squared Errors	4,187,906,192.17	325,175,661,265.35	9,001,073.65	20,248,722.44	5.17
Mean Squared Error	38,421,157.73	2,877,660,719.16	81,090.75	171,599.34	0.04
Std. Error of Regression	6,198.48	53,643.83	284.76	414.25	0.21
Mean Abs. Dev. (MAD)	4,516.31	39,450.09	206.17	243.64	0.16
Mean Abs. % Err. (MAPE)	0.02	0.04	0.12	0.12	0.00
Durbin-Watson Statistic	1.82	1.94	1.08	2.10	1.88
Durbin-H Statistic	-	-	-	-	-
Ljung-Box Statistic	37.10	16.49	54.87	32.59	31.21
Prob (Ljung-Box)	0.04	0.87	0.00	0.11	0.15
Skewness	-0.39	0.30	0.11	0.58	-0.74
Kurtosis	3.93	4.08	3.62	6.36	3.92
Jarque-Bera	7.71	7.86	2.29	65.81	16.03
Prob (Jarque-Bera)	0.02	0.02	0.32	0.00	0.00

Table 18 (continued)

SAE Residential Electric Space Heat

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
ResidentialVars.XHeat	Heating Index	1.64	0.08	20.46	0.00
ResidentialVars.XCool	Cooling Index	1.11	0.12	8.94	0.00
ResidentialVars.XOther	Non-HVAC indes	-0.34	0.26	-1.31	0.19
BinaryVars.Jan	if month=Jan then=1 else=0	928.07	218.29	4.25	0.00
BinaryVars.Feb	if month=Feb then=1 else=0	810.71	197.04	4.11	0.00
BinaryVars.Mar	if month=Mar then=1 else=0	755.42	197.77	3.82	0.00
BinaryVars.Apr	if month=Apr then=1 else=0	704.59	191.34	3.68	0.00
BinaryVars.May	if month=May then=1 else=0	707.98	179.10	3.95	0.00
BinaryVars.Jun	if month=Jun then=1 else=0	756.23	176.03	4.30	0.00
BinaryVars.Jul	if month=Jul then=1 else=0	834.77	166.03	5.03	0.00
BinaryVars.Aug	if month=Aug then=1 else=0	799.69	161.76	4.94	0.00
BinaryVars.Sep	if month=Sep then=1 else=0	830.36	170.59	4.87	0.00
BinaryVars.Oct	if month=Oct then=1 else=0	777.15	179.38	4.33	0.00
BinaryVars.Nov	if month=Nov then=1 else=0	625.11	191.52	3.26	0.00
BinaryVars.Dec	if month=Dec then=1 else=0	760.53	209.24	3.63	0.00
AR(1)	Autoregressive rho Estimate	-0.31	0.11	-2.82	0.01

SAE Residential Non-Electric Space Heat

Variable	Definition	Coefficient	StdErr	T-Stat	P-Value
ResidentialVars.XHeat	Heating Index	1.24	0.16	7.58	0.00
ResidentialVars.XCool	Cooling Index	1.20	0.09	13.22	0.00
ResidentialVars.XOther	Non-HVAC indes	-0.33	0.19	-1.74	0.09
BinaryVars.Jan	if month=Jan then=1 else=0	744.36	120.13	6.20	0.00
BinaryVars.Feb	if month=Feb then=1 else=0	669.90	108.33	6.18	0.00
BinaryVars.Mar	if month=Mar then=1 else=0	655.28	108.10	6.06	0.00
BinaryVars.Apr	if month=Apr then=1 else=0	627.41	105.77	5.93	0.00
BinaryVars.May	if month=May then=1 else=0	625.86	99.47	6.29	0.00
BinaryVars.Jun	if month=Jun then=1 else=0	661.03	98.99	6.68	0.00
BinaryVars.Jul	if month=Jul then=1 else=0	772.76	97.72	7.91	0.00
BinaryVars.Aug	if month=Aug then=1 else=0	740.30	96.18	7.70	0.00
BinaryVars.Sep	if month=Sep then=1 else=0	762.83	98.90	7.71	0.00
BinaryVars.Oct	if month=Oct then=1 else=0	722.17	101.45	7.12	0.00
BinaryVars.Nov	if month=Nov then=1 else=0	630.80	107.50	5.87	0.00
BinaryVars.Dec	if month=Dec then=1 else=0	694.28	115.50	6.01	0.00
AR(1)	Autoregressive rho Estimate	-0.36	0.11	-3.36	0.00

SAE Small Commercial (<500kW Max Demand)

Variable		Coefficient	StdErr	T-Stat	P-Value
CommercialVars.XHeat	Heating Index	-0.16	0.05	-3.17	0.00
CommercialVars.XCool	Cooling Index	0.05	0.01	6.29	0.00
CommercialVars.XOther	Non-HVAC indes	0.02	0.00	63.16	0.00
BinaryVars.Mar	if month=Mar then=1 else=0	-169.82	27.81	-6.11	0.00
BinaryVars.Apr	if month=Apr then=1 else=0	-362.22	31.71	-11.42	0.00
BinaryVars.May	if month=May then=1 else=0	-270.41	32.54	-8.31	0.00
BinaryVars.Jun	if month=Jun then=1 else=0	-215.57	25.98	-8.30	0.00
BinaryVars.Jul	if month=Jul then=1 else=0	-79.17	26.57	-2.98	0.00
BinaryVars.Oct	if month=Oct then=1 else=0	-86.25	33.07	-2.61	0.01
BinaryVars.Nov	if month=Nov then=1 else=0	-201.38	29.73	-6.77	0.00
BinaryVars.Dec	if month=Dec then=1 else=0	-83.23	25.54	-3.26	0.00
BinaryVars.Aft11	if year>=2011	64.33	20.97	3.07	0.00
BinaryVars.Aft10	if year>=2010	-56.51	21.38	-2.64	0.01

Table 18 (continued)

Model Statistics	Electric Space Heat	Non-Electric Spact Heat	Small Commercial
Iterations	11.00	12.00	1.00
Adjusted Observations	89.00	90.00	126.00
Deg. of Freedom for Error	73.00	74.00	113.00
R-Squared	0.98	0.98	0.94
Adjusted R-Squared	0.97	0.97	0.93
AIC	6.69	6.29	8.49
BIC	7.14	6.74	8.78
F-Statistic	-	-	-
Prob (F-Statistic)	-	-	-
Log-Likelihood	-408.20	-394.83	-700.76
Model Sum of Squares	2,299,780.21	1,497,981.05	7,886,816.42
Sum of Squared Errors	50,196.27	34,064.09	499,641.01
Mean Squared Error	687.62	460.33	4,421.60
Std. Error of Regression	26.22	21.46	66.50
Mean Abs. Dev. (MAD)	18.92	15.84	47.03
Mean Abs. % Err. (MAPE)	0.02	0.02	0.02
Durbin-Watson Statistic	2.10	1.91	1.90
Durbin-H Statistic	-	-	-
Ljung-Box Statistic	31.94	50.85	19.28
Prob (Ljung-Box)	0.13	0.00	0.74
Skewness	0.10	0.31	0.53
Kurtosis	2.76	3.00	4.11
Jarque-Bera	0.36	1.41	12.33
Prob (Jarque-Bera)	0.83	0.49	0.00

Table 18 (continued)

Residential Gas Heat Equipment Shares

Year	EFurn	HPHeat	GHPHeat	SecHt	CAC	HPCool	GHPCool	RAC	EWHeat	ECook	Ref1	Ref2	Frz	Dish	CWash	EDry	TV	FurnFan	Light	Misc
1995	31%	3%	0%	20%	27%	3%	0%	30%	25%	41%	100%	24%	24%	51%	76%	43%	100%	58%	100%	100%
1996	31%	3%	0%	20%	28%	3%	0%	30%	25%	42%	100%	24%	23%	51%	76%	43%	100%	59%	100%	100%
1997	31%	3%	0%	20%	28%	3%	0%	30%	25%	42%	100%	24%	23%	51%	76%	43%	100%	59%	100%	100%
1998	31%	3%	0%	20%	29%	3%	0%	30%	25%	43%	100%	24%	22%	52%	76%	43%	100%	59%	100%	100%
1999	31%	3%	0%	21%	29%	3%	0%	30%	25%	43%	100%	24%	22%	52%	76%	44%	100%	59%	100%	100%
2000	30%	3%	0%	21%	30%	3%	0%	30%	25%	44%	100%	24%	22%	52%	76%	44%	100%	59%	100%	100%
2001	30%	3%	0%	21%	31%	3%	0%	30%	25%	44%	100%	24%	21%	53%	77%	44%	100%	59%	100%	100%
2002	30%	3%	0%	21%	31%	3%	0%	30%	25%	45%	100%	24%	21%	53%	77%	44%	100%	59%	100%	100%
2003	30%	3%	0%	21%	32%	3%	0%	30%	25%	45%	100%	24%	21%	54%	77%	44%	100%	59%	100%	100%
2004	30%	3%	0%	21%	32%	3%	0%	29%	25%	46%	100%	24%	21%	55%	77%	45%	100%	59%	100%	100%
2005	30%	3%	0%	22%	33%	3%	0%	29%	25%	47%	100%	24%	21%	55%	77%	45%	100%	59%	100%	100%
2006	29%	3%	0%	22%	33%	3%	0%	29%	25%	47%	100%	24%	21%	56%	77%	45%	100%	59%	100%	100%
2007	29%	3%	0%	22%	34%	3%	0%	29%	26%	47%	100%	24%	21%	56%	77%	46%	100%	59%	100%	100%
2008	29%	3%	0%	22%	34%	3%	0%	29%	26%	47%	100%	24%	21%	57%	77%	46%	100%	59%	100%	100%
2009	10%	6%	0%	26%	89%	6%	0%	12%	7%	40%	100%	23%	24%	85%	91%	64%	100%	68%	100%	100%
2010	10%	6%	0%	25%	89%	6%	0%	12%	7%	40%	100%	23%	24%	85%	91%	65%	100%	68%	100%	100%
2011	10%	6%	0%	25%	89%	6%	0%	12%	7%	40%	100%	23%	24%	86%	91%	65%	100%	68%	100%	100%
2012	9%	6%	0%	25%	89%	6%	0%	12%	7%	40%	100%	23%	24%	86%	91%	65%	100%	69%	100%	100%
2013	9%	7%	0%	25%	89%	7%	0%	12%	7%	40%	100%	23%	24%	87%	91%	65%	100%	69%	100%	100%
2014	9%	7%	0%	25%	89%	7%	0%	12%	8%	40%	100%	23%	24%	87%	92%	65%	100%	69%	100%	100%
2015	9%	7%	0%	25%	90%	7%	0%	12%	8%	41%	100%	23%	24%	88%	92%	65%	100%	69%	100%	100%
2016	9%	7%	0%	25%	90%	7%	0%	12%	8%	41%	100%	23%	24%	88%	92%	66%	100%	69%	100%	100%
2017	8%	7%	0%	25%	90%	7%	0%	12%	8%	41%	100%	23%	24%	89%	92%	66%	100%	70%	100%	100%
2018	8%	7%	0%	25%	90%	7%	0%	11%	8%	41%	100%	23%	24%	89%	92%	66%	100%	70%	100%	100%
2019	8%	7%	0%	25%	91%	7%	0%	11%	8%	41%	100%	24%	24%	90%	92%	66%	100%	70%	100%	100%
2020	8%	7%	0%	25%	91%	7%	0%	11%	8%	42%	100%	24%	24%	91%	92%	67%	100%	70%	100%	100%
2021	7%	7%	0%	25%	91%	7%	0%	11%	8%	42%	100%	24%	24%	91%	92%	67%	100%	71%	100%	100%
2022	7%	7%	0%	25%	91%	7%	0%	11%	8%	42%	100%	24%	24%	92%	93%	67%	100%	71%	100%	100%
2023	7%	7%	0%	24%	91%	7%	0%	11%	7%	42%	100%	24%	24%	92%	93%	67%	100%	71%	100%	100%
2024	7%	7%	0%	24%	92%	7%	0%	11%	7%	43%	100%	24%	24%	93%	93%	68%	100%	71%	100%	100%
2025	6%	7%	0%	24%	92%	7%	0%	10%	7%	43%	100%	24%	24%	93%	93%	68%	100%	72%	100%	100%
2026	6%	7%	0%	24%	92%	7%	0%	10%	7%	43%	100%	24%	24%	94%	93%	68%	100%	72%	100%	100%
2027	6%	7%	0%	24%	92%	7%	0%	10%	7%	43%	100%	24%	24%	94%	93%	68%	100%	72%	100%	100%
2028	6%	7%	0%	24%	93%	7%	0%	10%	7%	43%	100%	24%	24%	95%	93%	68%	100%	72%	100%	100%
2029	6%	7%	0%	24%	93%	7%	0%	10%	6%	44%	100%	25%	24%	95%	93%	69%	100%	73%	100%	100%
2030	6%	8%	0%	24%	93%	8%	0%	10%	6%	44%	100%	25%	24%	96%	93%	69%	100%	73%	100%	100%
2031	6%	8%	0%	24%	93%	8%	0%	10%	6%	44%	100%	25%	24%	96%	94%	69%	100%	73%	100%	100%
2032	6%	8%	0%	24%	93%	8%	0%	10%	6%	44%	100%	25%	24%	96%	94%	69%	100%	73%	100%	100%
2033	6%	8%	0%	24%	93%	8%	0%	9%	6%	44%	100%	25%	24%	96%	94%	70%	100%	73%	100%	100%
2034	6%	8%	0%	24%	94%	8%	0%	9%	6%	45%	100%	25%	24%	96%	94%	70%	100%	74%	100%	100%
2035	6%	8%	0%	24%	94%	8%	0%	9%	5%	45%	100%	25%	24%	96%	94%	70%	100%	74%	100%	100%
2036	6%	8%	0%	24%	94%	8%	0%	9%	5%	45%	100%	25%	24%	96%	94%	70%	100%	74%	100%	100%
2037	6%	8%	0%	24%	94%	8%	0%	9%	5%	45%	100%	25%	24%	96%	94%	71%	100%	74%	100%	100%
2038	6%	8%	0%	23%	94%	8%	0%	9%	5%	45%	100%	25%	24%	96%	94%	71%	100%	74%	100%	100%
2039	6%	8%	0%	23%	94%	8%	0%	9%	5%	45%	100%	25%	24%	96%	95%	71%	100%	74%	100%	100%
2040	6%	8%	0%	23%	95%	8%	0%	9%	4%	46%	100%	25%	24%	96%	95%	71%	100%	75%	100%	100%

Table 18 (continued)

Residential Electric Heat Equipment Shares

Year	EFurn	HPHeat	GHPHeat	SecHt	CAC	HPCool	GHPCool	RAC	EWHeat	ECook	Ref1	Ref2	Frz	Dish	CWash	EDry	TV	FurnFan	Light	Misc
1995	31%	3%	0%	20%	27%	3%	0%	30%	25%	41%	100%	24%	24%	51%	76%	43%	100%	58%	100%	100%
1996	31%	3%	0%	20%	28%	3%	0%	30%	25%	42%	100%	24%	23%	51%	76%	43%	100%	59%	100%	100%
1997	31%	3%	0%	20%	28%	3%	0%	30%	25%	42%	100%	24%	23%	51%	76%	43%	100%	59%	100%	100%
1998	31%	3%	0%	20%	29%	3%	0%	30%	25%	43%	100%	24%	22%	52%	76%	43%	100%	59%	100%	100%
1999	31%	3%	0%	21%	29%	3%	0%	30%	25%	43%	100%	24%	22%	52%	76%	44%	100%	59%	100%	100%
2000	30%	3%	0%	21%	30%	3%	0%	30%	25%	44%	100%	24%	22%	52%	76%	44%	100%	59%	100%	100%
2001	30%	3%	0%	21%	31%	3%	0%	30%	25%	44%	100%	24%	21%	53%	77%	44%	100%	59%	100%	100%
2002	30%	3%	0%	21%	31%	3%	0%	30%	25%	45%	100%	24%	21%	53%	77%	44%	100%	59%	100%	100%
2003	30%	3%	0%	21%	32%	3%	0%	30%	25%	45%	100%	24%	21%	54%	77%	44%	100%	59%	100%	100%
2004	30%	3%	0%	21%	32%	3%	0%	29%	25%	46%	100%	24%	21%	55%	77%	45%	100%	59%	100%	100%
2005	30%	3%	0%	22%	33%	3%	0%	29%	25%	47%	100%	24%	21%	55%	77%	45%	100%	59%	100%	100%
2006	29%	3%	0%	22%	33%	3%	0%	29%	25%	47%	100%	24%	21%	56%	77%	45%	100%	59%	100%	100%
2007	29%	3%	0%	22%	34%	3%	0%	29%	26%	47%	100%	24%	21%	56%	77%	46%	100%	59%	100%	100%
2008	29%	3%	0%	22%	34%	3%	0%	29%	26%	47%	100%	24%	21%	57%	77%	46%	100%	59%	100%	100%
2009	29%	33%	0%	25%	82%	33%	0%	11%	100%	88%	100%	14%	33%	86%	80%	69%	100%	30%	100%	100%
2010	29%	33%	0%	25%	82%	33%	0%	11%	100%	88%	100%	14%	33%	87%	80%	69%	100%	30%	100%	100%
2011	29%	33%	0%	25%	82%	33%	0%	11%	100%	88%	100%	14%	33%	87%	80%	69%	100%	30%	100%	100%
2012	29%	33%	0%	24%	82%	33%	0%	11%	100%	88%	100%	15%	33%	88%	80%	69%	100%	30%	100%	100%
2013	28%	33%	0%	24%	82%	33%	0%	11%	100%	89%	100%	15%	33%	88%	80%	69%	100%	30%	100%	100%
2014	28%	33%	0%	24%	83%	33%	0%	11%	100%	89%	100%	15%	33%	89%	80%	69%	100%	31%	100%	100%
2015	28%	33%	0%	24%	83%	33%	0%	11%	100%	89%	100%	15%	33%	89%	81%	69%	100%	31%	100%	100%
2016	28%	33%	0%	24%	83%	33%	0%	11%	100%	89%	100%	15%	33%	90%	81%	70%	100%	31%	100%	100%
2017	28%	33%	0%	24%	83%	33%	0%	11%	100%	89%	100%	15%	33%	90%	81%	70%	100%	31%	100%	100%
2018	27%	33%	0%	24%	84%	33%	0%	11%	100%	90%	100%	15%	33%	91%	81%	70%	100%	32%	100%	100%
2019	27%	33%	0%	24%	84%	33%	0%	10%	100%	90%	100%	15%	33%	91%	81%	70%	100%	32%	100%	100%
2020	27%	33%	0%	24%	84%	33%	0%	10%	100%	90%	100%	15%	33%	92%	81%	71%	100%	32%	100%	100%
2021	27%	33%	0%	24%	84%	33%	0%	10%	100%	90%	100%	16%	33%	93%	81%	71%	100%	32%	100%	100%
2022	26%	34%	0%	24%	84%	34%	0%	10%	100%	91%	100%	16%	33%	93%	81%	71%	100%	33%	100%	100%
2023	26%	34%	0%	24%	85%	34%	0%	10%	100%	91%	100%	16%	33%	94%	82%	71%	100%	33%	100%	100%
2024	26%	34%	0%	24%	85%	34%	0%	10%	100%	91%	100%	16%	33%	94%	82%	72%	100%	33%	100%	100%
2025	26%	34%	0%	24%	85%	34%	0%	10%	100%	91%	100%	16%	33%	95%	82%	72%	100%	33%	100%	100%
2026	25%	34%	0%	23%	85%	34%	0%	9%	100%	91%	100%	16%	33%	95%	82%	72%	100%	34%	100%	100%
2027	25%	34%	0%	23%	86%	34%	0%	9%	100%	92%	100%	16%	33%	96%	82%	72%	100%	34%	100%	100%
2028	25%	34%	0%	23%	86%	34%	0%	9%	100%	92%	100%	16%	33%	96%	82%	73%	100%	34%	100%	100%
2029	25%	34%	0%	23%	86%	34%	0%	9%	100%	92%	100%	16%	33%	97%	82%	73%	100%	34%	100%	100%
2030	25%	34%	0%	23%	86%	34%	0%	9%	100%	92%	100%	16%	33%	97%	82%	73%	100%	34%	100%	100%
2031	25%	34%	0%	23%	86%	34%	0%	9%	100%	92%	100%	17%	33%	97%	83%	73%	100%	35%	100%	100%
2032	25%	34%	0%	23%	87%	34%	0%	9%	100%	93%	100%	17%	33%	97%	83%	73%	100%	35%	100%	100%
2033	25%	34%	0%	23%	87%	34%	0%	9%	100%	93%	100%	17%	33%	97%	83%	74%	100%	35%	100%	100%
2034	25%	34%	0%	23%	87%	34%	0%	8%	100%	93%	100%	17%	33%	97%	83%	74%	100%	35%	100%	100%
2035	25%	34%	0%	23%	87%	34%	0%	8%	100%	93%	100%	17%	34%	97%	83%	74%	100%	35%	100%	100%
2036	25%	34%	0%	23%	87%	34%	0%	8%	100%	93%	100%	17%	34%	97%	83%	74%	100%	36%	100%	100%
2037	25%	34%	0%	23%	87%	34%	0%	8%	100%	94%	100%	17%	34%	97%	83%	75%	100%	36%	100%	100%
2038	25%	34%	0%	23%	88%	34%	0%	8%	100%	94%	100%	17%	34%	97%	83%	75%	100%	36%	100%	100%
2039	25%	34%	0%	23%	88%	34%	0%	8%	100%	94%	100%	17%	34%	97%	83%	75%	100%	36%	100%	100%
2040	25%	34%	0%	23%	88%	34%	0%	8%	100%	94%	100%	17%	34%	97%	84%	75%	100%	36%	100%	100%

Table 18 (continued)

Commercial Equipment Intensity

Year	Heat	Cool	Vent	EWHeat	Cooking	Refrig	O. Light	I.Light	Office	Misc	PV
1995	0.50	1.54	1.92	0.29	0.08	1.48	0.45	3.99	0.70	2.77	0.00
1996	0.50	1.54	1.91	0.30	0.08	1.48	0.45	4.00	0.71	2.84	0.00
1997	0.50	1.55	1.91	0.31	0.08	1.47	0.45	4.00	0.71	2.92	0.00
1998	0.50	1.53	1.86	0.31	0.08	1.46	0.45	4.00	0.72	2.99	0.00
1999	0.50	1.52	1.81	0.31	0.08	1.45	0.45	4.01	0.72	3.07	0.00
2000	0.50	1.51	1.77	0.31	0.08	1.44	0.45	4.01	0.73	3.14	0.00
2001	0.49	1.50	1.73	0.31	0.08	1.43	0.45	4.01	0.73	3.22	0.00
2002	0.49	1.49	1.70	0.31	0.08	1.43	0.45	4.01	0.74	3.31	0.00
2003	0.49	1.48	1.67	0.31	0.08	1.42	0.44	3.97	0.74	3.39	0.00
2004	0.48	1.47	1.65	0.31	0.08	1.42	0.44	3.95	0.75	3.48	0.00
2005	0.47	1.45	1.66	0.31	0.08	1.40	0.43	3.83	0.75	3.52	0.00
2006	0.46	1.43	1.67	0.30	0.08	1.38	0.41	3.69	0.75	3.57	0.00
2007	0.45	1.40	1.68	0.29	0.08	1.37	0.39	3.55	0.75	3.68	0.00
2008	0.44	1.38	1.68	0.29	0.08	1.36	0.38	3.38	0.75	3.79	0.00
2009	0.43	1.36	1.68	0.28	0.07	1.32	0.35	3.18	0.75	3.85	0.00
2010	0.43	1.34	1.68	0.27	0.07	1.29	0.34	3.02	0.75	3.93	0.00
2011	0.42	1.31	1.67	0.26	0.07	1.25	0.32	2.89	0.75	3.94	0.00
2012	0.42	1.29	1.66	0.26	0.07	1.22	0.31	2.78	0.76	3.99	0.00
2013	0.42	1.27	1.66	0.26	0.07	1.18	0.30	2.69	0.76	4.05	0.00
2014	0.41	1.25	1.65	0.25	0.07	1.16	0.29	2.64	0.76	4.13	0.00
2015	0.40	1.23	1.65	0.25	0.07	1.13	0.29	2.60	0.76	4.22	0.00
2016	0.39	1.21	1.64	0.24	0.07	1.11	0.28	2.56	0.76	4.30	0.00
2017	0.38	1.20	1.64	0.24	0.07	1.09	0.28	2.53	0.76	4.38	0.00
2018	0.38	1.18	1.64	0.24	0.06	1.07	0.28	2.51	0.76	4.46	0.00
2019	0.37	1.17	1.63	0.23	0.06	1.05	0.28	2.49	0.76	4.54	0.00
2020	0.36	1.15	1.63	0.23	0.06	1.04	0.27	2.46	0.76	4.61	0.00
2021	0.35	1.13	1.62	0.22	0.06	1.02	0.27	2.43	0.76	4.69	0.00
2022	0.34	1.12	1.61	0.22	0.06	1.01	0.27	2.40	0.76	4.76	0.00
2023	0.34	1.11	1.61	0.22	0.06	1.00	0.26	2.38	0.76	4.85	0.00
2024	0.33	1.10	1.60	0.21	0.06	0.99	0.26	2.36	0.76	4.94	0.00
2025	0.33	1.09	1.60	0.21	0.06	0.98	0.26	2.35	0.77	5.03	0.00
2026	0.32	1.08	1.60	0.21	0.06	0.98	0.26	2.34	0.77	5.11	0.00
2027	0.32	1.07	1.59	0.21	0.06	0.97	0.26	2.33	0.77	5.20	0.00
2028	0.31	1.06	1.59	0.20	0.06	0.97	0.26	2.32	0.77	5.29	0.00
2029	0.31	1.06	1.59	0.20	0.06	0.97	0.26	2.31	0.77	5.37	0.00
2030	0.31	1.05	1.58	0.20	0.06	0.96	0.25	2.28	0.77	5.46	0.00
2031	0.30	1.03	1.57	0.19	0.05	0.96	0.25	2.25	0.77	5.53	0.00
2032	0.30	1.02	1.57	0.19	0.05	0.96	0.25	2.22	0.77	5.60	0.00
2033	0.29	1.01	1.56	0.19	0.05	0.95	0.24	2.20	0.77	5.67	0.00
2034	0.29	1.00	1.55	0.18	0.05	0.95	0.24	2.18	0.77	5.74	0.00
2035	0.28	0.99	1.55	0.18	0.05	0.95	0.24	2.15	0.77	5.80	0.00
2036	0.28	0.98	1.54	0.18	0.05	0.94	0.24	2.14	0.77	5.86	0.00
2037	0.27	0.97	1.54	0.17	0.05	0.94	0.24	2.12	0.77	5.92	0.00
2038	0.27	0.96	1.53	0.17	0.05	0.93	0.23	2.10	0.78	5.97	0.00
2039	0.26	0.94	1.53	0.17	0.05	0.93	0.23	2.08	0.78	6.02	0.00
2040	0.26	0.93	1.52	0.16	0.05	0.92	0.23	2.07	0.78	6.06	0.00

Table 19

Retail Sales, System Energy, Peak, and Customer Accounts

Retail Sales, System Energy , Peak and Customer Accounts

Year	Sales (GWH)	System Energy (GWH)	System Peak (MW)	Net Customers	System Load Factor
2000	9,578	10,269	2,688	513,644	43%
2001	9,406	9,781	2,484	524,348	45%
2002	9,485	10,094	2,779	535,118	41%
2003	9,955	10,583	2,809	547,667	43%
2004	10,206	10,894	2,672	560,937	46%
2005	10,604	11,133	2,959	572,832	43%
2006	10,892	11,688	3,280	582,745	41%
2007	10,913	11,643	3,099	588,107	46%
2008	10,959	11,718	3,086	590,607	43%
2009	10,758	11,448	2,848	593,971	46%
2010	10,390	11,086	2,990	596,367	42%
2011	10,459	11,195	2,840	598,730	45%
2012	10,519	11,240	2,953	602,141	43%
2013	10,481	11,226	3,014	607,997	43%
2014	10,586	11,260	3,003	612,592	43%
2015	10,524	11,252	2,956	615,930	43%
2016	10,477	11,247	2,972	619,934	43%
Annual Growth	0.56%	0.57%	0.63%	1.18%	

Class Retail Sales by Rate Class (GWH)

Year	Residential	C&I Small	C&I Meduim	C&I Large	Other	Total
2000	4,132	3,192	761	1,358	136	9,579
2001	4,024	3,193	744	1,307	137	9,405
2002	4,092	3,260	709	1,286	138	9,485
2003	4,366	3,319	773	1,363	133	9,954
2004	4,409	3,362	799	1,495	142	10,207
2005	4,562	3,482	814	1,610	136	10,604
2006	4,747	3,536	779	1,694	136	10,892
2007	4,635	3,524	821	1,790	143	10,913
2008	4,694	3,478	828	1,806	153	10,959
2009	4,708	3,340	793	1,770	147	10,758
2010	4,504	3,222	755	1,768	140	10,389
2011	4,604	3,224	717	1,776	138	10,459
2012	4,648	3,243	680	1,799	149	10,519
2013	4,639	3,236	655	1,804	147	10,481
2014	4,664	3,233	647	1,883	158	10,585
2015	4,642	3,165	621	1,952	143	10,523
2016	4,678	3,157	587	1,920	136	10,477
Annual Growth	0.78%	-0.07%	-1.60%	2.19%	-0.01%	0.56%

Customer Accounts by Class

Year	Residential	C&I Small	C&I Meduim	C&I Large	Other	Total
2000	455,455	53,055	293	130	4,712	513,645
2001	464,909	54,306	291	128	4,715	524,349
2002	474,293	55,682	289	126	4,728	535,118
2003	485,858	56,656	304	125	4,725	547,668
2004	497,969	57,743	320	130	4,775	560,937
2005	508,760	58,832	315	131	4,794	572,832
2006	517,369	60,099	307	136	4,834	582,745
2007	521,300	61,452	330	141	4,883	588,106
2008	522,819	62,353	332	149	4,955	590,608
2009	525,784	62,686	331	155	5,016	593,972
2010	528,065	62,781	316	156	5,049	596,367
2011	530,104	63,064	294	154	5,114	598,730
2012	533,318	63,238	291	152	5,142	602,141
2013	538,863	63,510	282	157	5,185	607,997
2014	543,177	63,784	264	149	5,217	612,591
2015	546,383	63,856	254	155	5,282	615,930
2016	549,980	64,195	246	158	5,356	619,934
Annual Growth	1.19%	1.20%	-1.09%	1.23%	0.80%	1.18%

Table 19 (continued)

2016 Billed Sales by Rate Code

Rate Class	Description	Customers	Avg. kWh/month	Annual GWh	Share of Total Sales
Residential	Electric Space Heat	124,313	780	1,164	11%
Residential	Non Electric Space Heat	425,667	688	3,514	34%
GSN	Max kW <=20	55,875	1,136	762	7%
GSS	21 to 299 Max kW	7,849	19,232	1,811	17%
GSTOU3	300 to 400 Max kW	472	103,129	584	6%
GSTOU2	400 to 999 Max kW	246	199,063	587	6%
GSTOU1	>=1,000 Max kW	158	1,012,457	1,920	18%
AGR	0 to 499 Max kW	2,444	2,494	73	1%
Street/Traffic		2,912	1,685	59	1%
Nightlights		4,668	65	4	0%
Total		624,602		10,477	
Net Customers		619,934			

Table 20

Sacramento County Economic and Population History and Forecast

Year	Population	Non-Farm Employment	Personal Income ($ Mil)
2000	1,235,492	570,837	36,523
2001	1,271,059	580,217	39,276
2002	1,304,626	589,833	40,965
2003	1,331,368	591,928	43,425
2004	1,350,629	599,112	45,868
2005	1,362,610	616,661	47,875
2006	1,371,641	629,951	50,551
2007	1,383,397	630,986	52,401
2008	1,396,379	618,035	54,201
2009	1,410,321	587,276	53,648
2010	1,423,556	572,818	54,672
2011	1,437,118	568,930	57,562
2012	1,450,407	581,092	60,727
2013	1,464,788	593,742	62,440
2014	1,483,978	606,427	65,126
2015	1,503,801	620,973	69,065
2016	1,523,767	632,457	72,569
2017	1,543,960	641,693	76,487
2018	1,565,064	650,884	80,890
2019	1,586,078	659,726	85,347
2020	1,606,330	668,125	89,730
2021	1,625,943	675,891	94,445
2022	1,644,643	685,485	99,334
2023	1,662,643	695,445	104,313
2024	1,680,534	704,800	109,338
2025	1,698,140	712,989	114,402
2026	1,715,289	720,496	119,588
2027	1,733,197	728,752	125,253
2028	1,751,509	737,113	131,365
2029	1,770,160	746,205	137,837
2030	1,788,738	756,047	144,530
2031	1,807,745	765,176	151,846
2032	1,826,494	774,123	159,274
2033	1,844,955	783,000	167,071
2034	1,863,027	792,434	175,457
2035	1,880,782	802,180	184,345
2036	1,898,092	812,138	193,524

Data and Sources

The regression models were estimated with data from SMUD's billing system for the period 2004-2016. The hourly load, daily peak and daily energy models were estimated using hourly load data from SMUD's Energy Management System (EMS) for its retail service territory for the period 1-1-2005 to 8-31-2016.

The population, personal income, and employment data is from the IHS Global Insight Regional Forecast for Sacramento County (June 2016).

Office building vacancy rates are from "Market View Sacramento Office," CB Richard Ellis, Second Quarter 2016.