VOLUME 3:

LOAD ANALYSIS AND FORECASTING

KCP&L GREATER MISSOURI OPERATIONS COMPANY (GMO)

INTEGRATED RESOURCE PLAN

CASE NO. EE-2009-0237

4 CSR 240-22.030

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF CHARTS

TABLE OF TABLES

TABLE OF EQUATIONS

TABLE OF APPENDICES

TABLE OF RULES COMPLIANCE

VOLUME 3 – LOAD FORECAST

SECTION 1: EXECUTIVE SUMMARY

Table 1 summarizes KCP&L Greater Missouri Operations Company (“GMO”) 2008-2030 load forecast. For Missouri Public Service (MPS), system energy (NSI) is expected to increase by an average of 1.7 percent per year and the annual peak demand is expected to grow by 1.2 percent per year over the 2008-2030 period. For St. Joseph Light and Power (SJLP) the growth rates are 1.4% and 1.0%.This forecast includes the impact of demand-side management (DSM) programs and dynamic voltage control (DVC) that have been adopted by GMO.

Table 1: 2009-2030 Load Forecast; Demand, & Energy

GMO 2009-2030 Load Forecast

Year	Gross Peak (MW)	DSM (MW)	DVC (MW)	PHEV (MW)	Net Peak (MW)	Gross NSI (Gwh)	DSM (Gwh)	DVC (Gwh)	PHEV (Gwh)	Net NSI (Gwh)	Gross Load Factor	Net Load Factor
1996	1,481				1,481	6,217.1				6,217.1	47.9%	47.9%
2001	1,705				1,705	7,382.4				7,382.4	49.4%	49.4%
2006	1,843				1,843	8,285.1				8,285.1	51.3%	51.3%
2007	1,923				1,923	8,570.1				8,570.1	50.9%	50.9%
2008	1,941				1,941	8,685.3				8,685.3	51.1%	51.1%
2009	1,922	7	-	-	1,915	8,653.9	11.5	-	-	8,642.4	51.4%	51.5%
2010	1,942	23	-	-	1,919	8,797.0	20.8	-	-	8,776.2	51.7%	52.2%
2015	2,059	150	-	0.6	1,909	9,612.6	279.9	-	2.2	9,334.8	53.3%	55.8%
2020	2,178	137	-	1.4	2,043	10,438.7	237.6	-	5.1	10,206.3	54.7%	57.0%
2025	2,321	140	-	2.8	2,184	11,286.7	237.8	-	10.2	11,059.1	55.5%	57.8%
2030	2,491	137	-	4.3	2,358	12,314.8	238.0	-	15.5	12,092.4	56.4%	58.5%
Annual Growth Rates:												
1996-2001	2.9%				2.9%	3.5%				3.5%	0.6%	0.6%
2001-2006	1.6%				1.6%	2.3%				2.3%	0.8%	0.8%
2006-2010	1.3%				1.0%	1.5%				1.5%	0.2%	0.4%
2010-2020	1.2%				0.6%	1.7%				1.5%	0.6%	0.9%
2020-2030	1.4%				1.4%	1.7%				1.7%	0.3%	0.3%
2008-2030	1.1%				0.9%	1.6%				1.5%	0.5%	0.6%

* *Note: 1996 through 2008 peaks and NSI are weather-normalized.*
***DSM impacts were provided by Energy Solutions and include only currently adopted programs.*

1.1 METHODOLOGY

GMOuses detailed end-use information along with statistical techniques to construct its load forecast. End-use information is obtained from KCP&L/GMO’s semiannual appliance saturation surveys and from results published by the US Department of Energy (DOE) for the West North Central Midwest region. This information is used to construct end-use level forecasts of electricity sales based on economic forecasts of key drivers specific to the Kansas City metro area. Load is forecasted separately for each tariff group in each utility.

The forecasts of economic drivers were obtained through a contract with Moody's Economy.com and include the number of households, population, personal income, gross metro product (GMP), manufacturing GMP, total employment, manufacturing employment, and the consumer price index (CPI). These drivers were provided for three scenarios that were used to construct base, high and low scenarios for GMO's load forecasts.

The end-use forecasts were calibrated to monthly billing statistics. Heating, cooling and base loads from the end-use models were each calibrated to optimize the ability of these forecasts to explain the monthly billing data. These calibrated models are then used to forecast monthly electric energy sales. Using load research data collected from a sample of GMO's customers, this end-use forecast is allocated to each hour of the forecast period and peak demands are determined from these results.

1.2 GMO2009-2030 LOAD FORECAST RESULTS

The current GMOload forecast was prepared in the 1st quarter of 2009. Projections of weather normalized peak load and net system input are shown in Table 2.

Table 2: 2009-2030 Annual Demand & Energy Load Forecast

GMO 2009-2030 Load Forecast

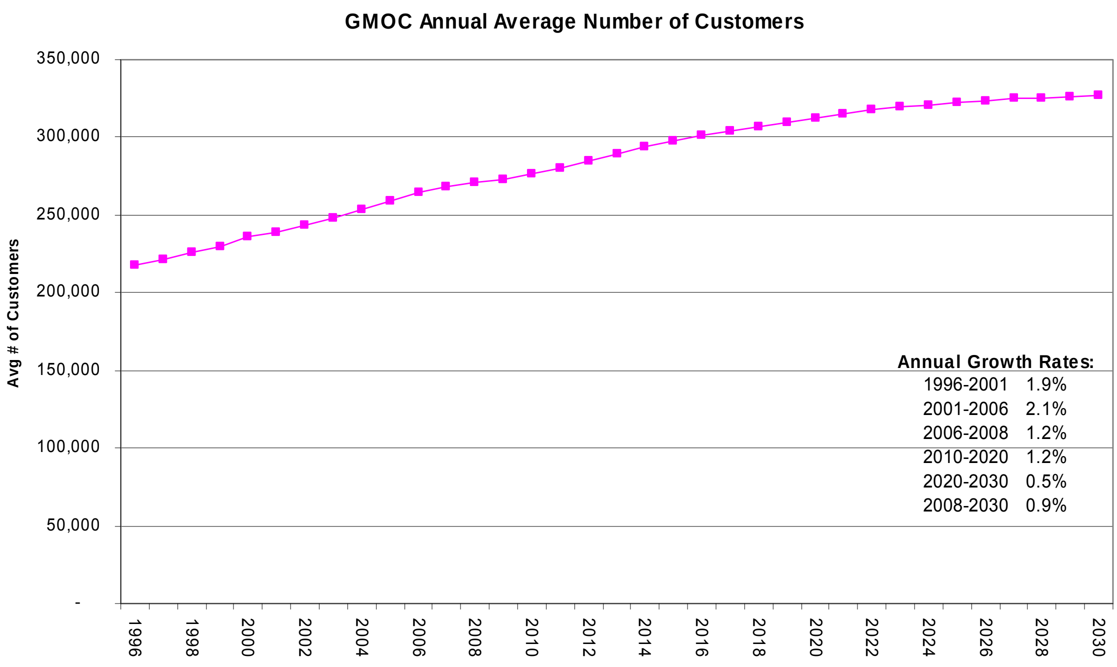
Year	Gross Peak (MW)	DSM (MW)	DVC (MW)	PHEV (MW)	Net Peak (MW)	Gross NSI (Gwh)	DSM (Gwh)	DVC (Gwh)	PHEV (Gwh)	Net NSI (Gwh)	Gross Load Factor	Net Load Factor
1996	1,481				1,481	6,217.1				6,217.1	47.9%	47.9%
1997	1,515				1,515	6,394.1				6,394.1	48.2%	48.2%
1998	1,633				1,633	6,739.4				6,739.4	47.1%	47.1%
1999	1,649				1,649	6,948.3				6,948.3	48.1%	48.1%
2000	1,715				1,715	7,281.1				7,281.1	48.5%	48.5%
2001	1,705				1,705	7,382.4				7,382.4	49.4%	49.4%
2002	1,677				1,677	7,481.7				7,481.7	50.9%	50.9%
2003	1,717				1,717	7,639.4				7,639.4	50.8%	50.8%
2004	1,825				1,825	7,890.0				7,890.0	49.4%	49.4%
2005	1,815				1,815	8,059.8				8,059.8	50.7%	50.7%
2006	1,843				1,843	8,285.1				8,285.1	51.3%	51.3%
2007	1,923				1,923	8,570.1				8,570.1	50.9%	50.9%
2008	1,941				1,941	8,685.3				8,685.3	51.1%	51.1%
2009	1,922	7	-		1,915	8,653.9	11.5	-	-	8,642.4	51.4%	51.5%
2010	1,942	23	-	-	1,919	8,797.0	20.8	-	-	8,776.2	51.7%	52.2%
2011	1,965	54	-	0.2	1,911	8,977.9	66.8	-	0.8	8,911.9	52.2%	53.2%
2012	1,990	83	-	0.3	1,908	9,167.3	118.8	-	1.0	9,049.6	52.6%	54.2%
2013	2,017	111	-	0.4	1,906	9,311.2	178.5	-	1.3	9,134.0	52.7%	54.7%
2014	2,037	131	-	0.5	1,907	9,461.4	228.0	-	1.7	9,235.1	53.0%	55.3%
2015	2,059	150	-	0.6	1,909	9,612.6	279.9	-	2.2	9,334.8	53.3%	55.8%
2016	2,084	144	-	0.7	1,941	9,807.8	259.5	-	2.7	9,551.0	53.7%	56.2%
2017	2,107	140	-	0.9	1,967	9,939.4	237.5	-	3.2	9,705.2	53.9%	56.3%
2018	2,129	137	-	1.0	1,993	10,087.6	237.5	-	3.8	9,853.9	54.1%	56.4%
2019	2,152	137	-	1.2	2,017	10,241.9	237.5	-	4.4	10,008.8	54.3%	56.7%
2020	2,178	137	-	1.4	2,043	10,438.7	237.6	-	5.1	10,206.3	54.7%	57.0%
2021	2,205	137	-	1.6	2,070	10,576.2	237.6	-	5.9	10,344.5	54.8%	57.1%
2022	2,230	137	-	1.9	2,095	10,737.1	237.7	-	6.8	10,506.3	55.0%	57.2%
2023	2,256	138	-	2.2	2,120	10,898.3	237.7	-	8.1	10,668.7	55.1%	57.4%
2024	2,287	139	-	2.5	2,150	11,112.3	237.7	-	9.1	10,883.7	55.5%	57.8%
2025	2,321	140	-	2.8	2,184	11,286.7	237.8	-	10.2	11,059.1	55.5%	57.8%
2026	2,357	141	-	3.1	2,219	11,498.9	237.8	-	11.2	11,272.3	55.7%	58.0%
2027	2,392	141	-	3.4	2,255	11,708.3	237.9	-	12.3	11,482.7	55.9%	58.1%
2028	2,425	139	-	3.7	2,289	11,940.1	237.9	-	13.4	11,715.6	56.2%	58.4%
2029	2,457	138	-	3.9	2,323	12,106.0	238.0	-	14.4	11,882.4	56.2%	58.4%
2030	2,491	137	-	4.3	2,358	12,314.8	238.0	-	15.5	12,092.4	56.4%	58.5%
Annual Growth Rates:												
1996-2001	2.9%				2.9%	3.5%				3.5%	0.6%	0.6%
2001-2006	1.6%				1.6%	2.3%				2.3%	0.8%	0.8%
2006-2010	1.3%				1.0%	1.5%				1.5%	0.2%	0.4%
2010-2020	1.2%				0.6%	1.7%				1.5%	0.6%	0.9%
2020-2030	1.4%				1.4%	1.7%				1.7%	0.3%	0.3%
2008-2030	1.1%				0.9%	1.6%				1.5%	0.5%	0.6%

1996-2008 Weather Normalized

1.2.1 CUSTOMERS

Between 2009 and 2030, the annual growth rate of the number of customers is projected to be 0.4% for SJLP and 1.0% for MPS. A separate model was created to forecast the number of customers in each customer class for SJLP and MPS. Details of the models are presented in the section of this report that addresses each customer class. Chart 1 plots the total number of customers and shows the growth rates for different time periods. The growth rate slowed in 2008 during the current recession and is expected to remain below trend for a few years. Moody's forecasts that the percent of Metro residents reaching retirement age will increase each year during our forecast horizon, and that these people will favor warmer climates and this will thus slow growth in both population and the number of households in the latter years of the forecast.

Chart 1: Annual Average Number of Total Customers



1.2.2 ENERGY & PEAK DEMAND

Chart 2 plots the forecast of annual electric energy production, which has a 1.3% annual growth rate over the 2009-2030 forecast horizon for SJLP and a 1.7% rate for MPS. Chart 3 plots the forecast of annual peak demand, which has a 0.8% annual growth over the 2009-2030 period for SJLP and a 1.0% rate for MPS. Currently adopted DSM programs eliminate growth in peak demand over the short run.

Chart 2: Annual Energy Forecast (NSI)

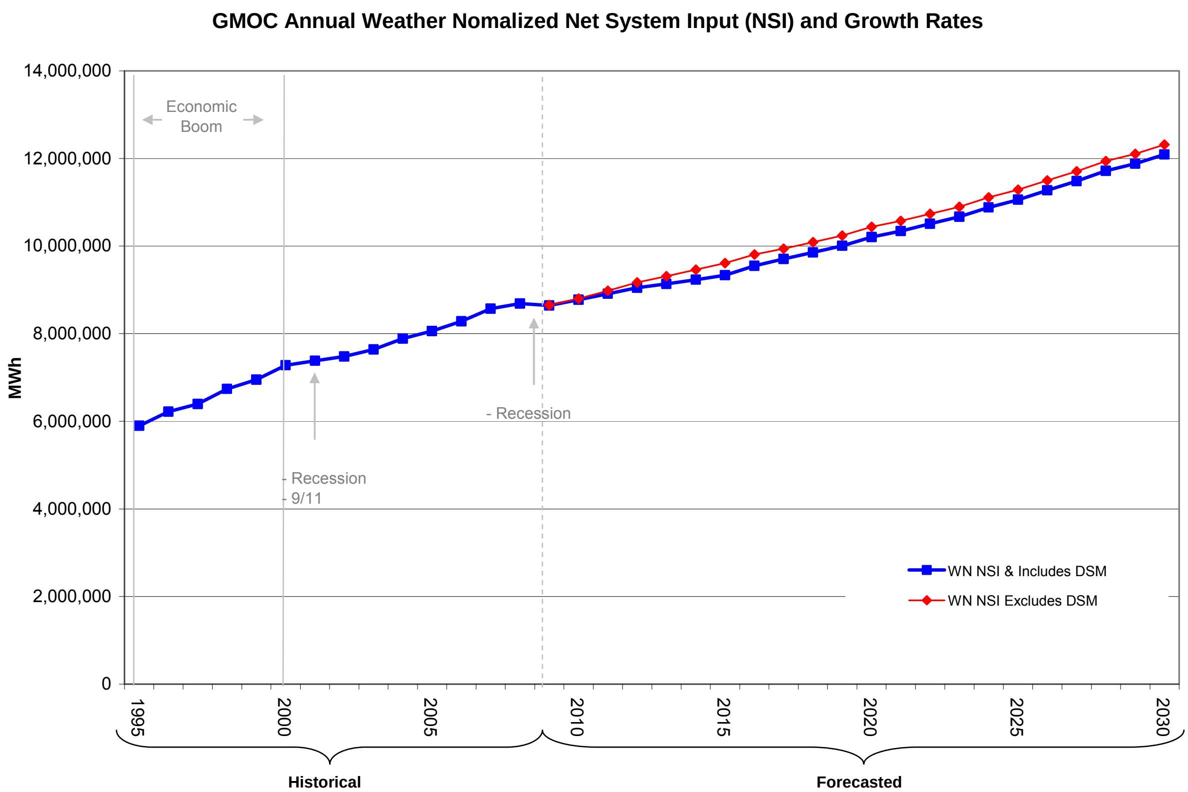
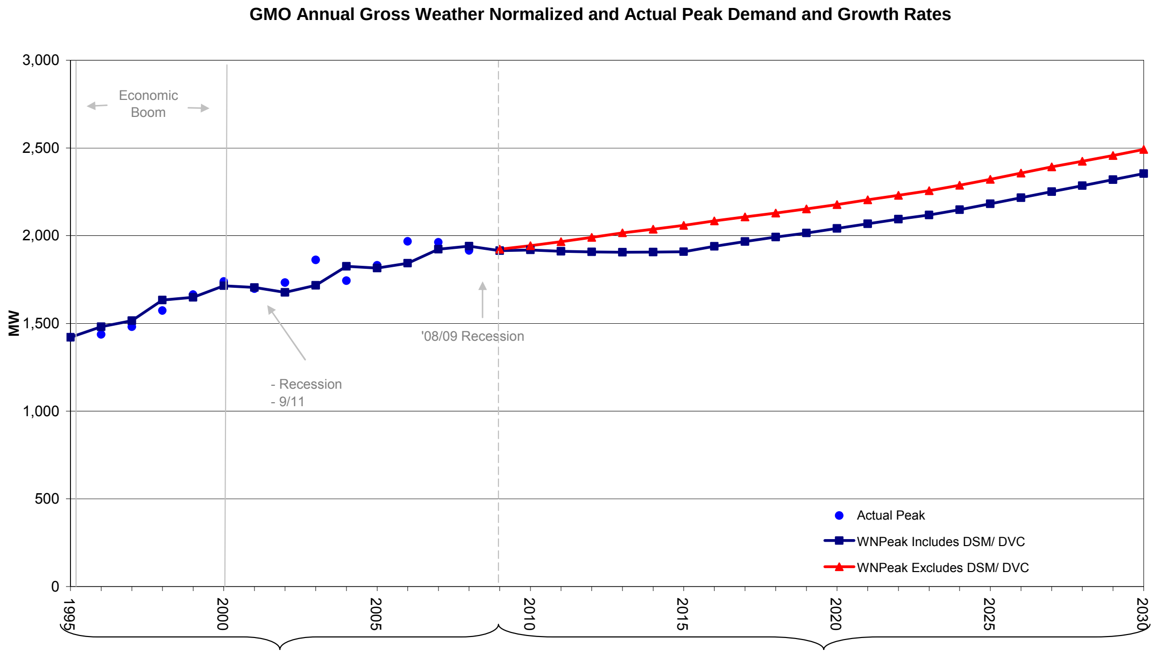


Chart 3: Annual Peak Demand Forecast



1.3 KEY FORECASTING DRIVERS/ ASSUMPTIONS

The major drivers and assumptions used in preparing GMO's 2009-2030 long-term forecast are the following:

- Economic Conditions – Under a contract, Moody's Economy.com provided an economic forecast for the Kansas City and St. Joseph, MO MSAs. The economic data used in GMO's forecasting models includes real personal income, the number of households, population, gross metro product (GMP), manufacturing GMP, non-manufacturing GMP, total employment, manufacturing employment, non-manufacturing employment, and the consumer price index (CPI). The outlook for the forecast period assumes slower growth than observed historically (see Appendix 3C). Moody's expects labor force participation rates in the U.S. will fall and that there will be very slow long-run growth in employment in the Midwest.[1]

[1] See Long-Term Outlook 072908b.ppt for their presentation on recent changes to their forecast.

- Electricity Prices - The historical price series are constructed from reported revenue per kWh data for each class. The historical price series is constructed by first adjusting average revenue per kWh by the CPI yielding a real $ per kWh series. The price series is then calculated by taking a 24-month moving average of the real $ per kWh series. By taking a 24-month moving average we de-couple observed seasonal sales and resulting seasonal prices. Further, a 24-month moving average assumes customers respond to changes in their bill over time – customers do not simply respond to the current or prior bill. For the forecast, we assume that prices will escalate at rates forecasted by the Midas model.

- Demographic Factors – Projections from Economy.com indicate that the population of the Kansas City metro area will increase 0.4% per year between 2008 and 2030, and by 0.2% per year in the St Joseph MSA.

- Weather and Number of Days per Billing Period – Monthly heating and cooling degree days are used to calibrate the end-use forecast to monthly billed sales. Degree days are computed with several base temperatures for each billing cycle and then averaged for each month over 21 billing cycles. Degree days were computed with temperatures measured at the Kansas City International Airport by the National Weather Service. In the forecast period, normal weather is computed by averaging degree days over the 30-year period,1978 to 2007.

  The daily maximum and minimum temperatures and the meter reading schedules are used to calculate revenue-month heating (HDD) and cooling (CDD) degree day variables. The average number of billing days per billing period is also calculated using the meter reading schedules.

- Appliance Saturations and Efficiency Levels – Appliance saturations are estimated from KCP&L/GMO's survey responses and EIA's study for the West North Central Region to create residential end-use indices. Commercial indices are constructed using EIA's efficiency and saturation series for the

West North Central Census region. The saturation of electric heating equipment is estimated as the percentage of customers on an electric heating rate. Both the residential and commercial indices are created for MPS and SJLP. Detailed explanations of the calculations and indexes are provided in each customer class sections of this report.

The utilization of more energy-efficient appliances and energy saving devices will offset some of the rise in energy usage created by future increases in the stocks of electricity consuming equipment. Efficiency increases will result from technology advancements, economic factors and legislated standards updating the national Energy Policy Act of 1992. These new efficiency standards slated for 2005-2007 include clothes washers, fluorescent lamp ballasts, and central air conditioners. See Appendix 3B more details.

- Efficiency and Demand Response – The impact of changes to the current level of efficiency and demand response (DSM) programs is incorporated into the load forecast. These programs include the following:

Affordability
- Low-Income Affordable New Homes Program
- Low-Income Weatherization and High Efficiency Program

Energy Efficiency
<u>Residential</u>
- Online Energy Information and Analysis Program Using NEXUS Residential Suite
- Home Performance with Energy Star® Program Training
- Change a Light – Save The World
- Cool Homes Program
- Energy Star® Homes – New Construction

<u>Commercial and Industrial</u>
- Online Energy Information and Analysis Program using NEXUS Commercial Suite
- C&I Energy Audit
- C&I Custom Rebate – Retrofit

- C&I Customer Rebate – New Construction
- Building Operator Certification Program
- Market Research

Demand Response

Residential and Small Commercial

- Air Conditioning Cycling

Commercial and Industrial

- Mpower (PLCC)

Dynamic Voltage Control (DVC)

Efficiency and demand response impacts are adjusted each year based on market penetration. An explanation of the impact of efficiency and demand response can be found in Section 6, Energy and Demand.

1.4 FORECAST UNCERTAINTY ANALYSIS

Forecast uncertainty is quantified through the use of alternative economic scenarios. Moody's Economy.com provided three economic scenarios named Low, Base and High that represent a 95% confidence range around the base case for economic growth. These economic scenarios were each used to forecast load growth and these forecasts represent a 95% confidence interval around load growth based on the uncertainty due to economic growth.

Table 3: Energy Uncertainty Analysis - Excluding DSM Impacts

NSI (GWh): Excluding DSM/ PHEV Impact		Low Range	Base	High Range
WN	2005		8,060	
WN	2006		8,285	
WN	2007		8,570	
WN	2008		8,685	
	2009	8,609	8,654	8,687
	2010	8,687	8,797	8,888
	2015	9,185	9,613	10,089
	2020	9,638	10,439	11,377
	2025	10,063	11,287	12,785
	2030	10,585	12,315	14,543
CAGR % Growth				
	05-'06		2.8%	
	06-'07		3.4%	
	07-'08		1.3%	
	08-'09	-0.9%	-0.4%	0.0%
	10-'15	1.1%	1.8%	2.6%
	15-'20	1.0%	1.7%	2.4%
	20-'25	0.9%	1.6%	2.4%
	25-'30	1.0%	1.8%	2.6%
	08-'30	0.9%	1.6%	2.4%

Chart 4: Energy Uncertainty Analysis - Excluding DSM Impacts

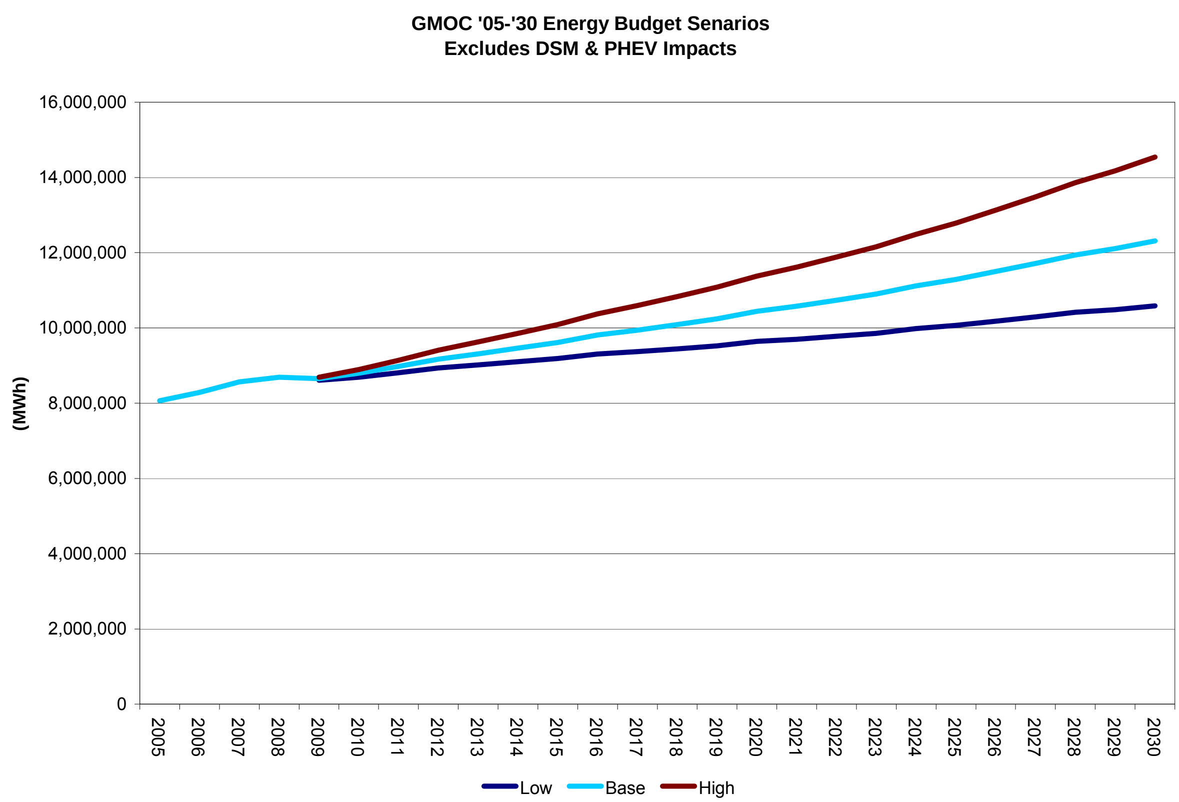


Table 4: Energy Uncertainty Analysis - Including DSM / DVC Impacts

NSI (GWh): Including DSM/ PHEV Impact		Low Range	Base	High Range	DSM Impact on NSI	PHEV Impact on Peak
WN	2005		8,060			
WN	2006		8,285			
WN	2007		8,570			
WN	2008		8,685			
	2009	8,598	8,642	8,675	(11)	0.0
	2010	8,666	8,776	8,868	(21)	0.0
	2015	8,909	9,337	9,813	(280)	2.2
	2020	9,411	10,211	11,149	(238)	5.1
	2025	9,846	11,069	12,568	(238)	10.2
	2030	10,378	12,108	14,336	(238)	15.5

CAGR % Growth	Low Range	Base	High Range
05-'06		2.8%	
06-'07		3.4%	
07-'08		1.3%	
08-'09	-1.0%	-0.5%	-0.1%
10-'15	0.6%	1.2%	2.0%
15-'20	1.1%	1.8%	2.6%
20-'25	0.9%	1.6%	2.4%
25-'30	1.1%	1.8%	2.7%
08-'30	0.8%	1.5%	2.3%

Chart 5: Energy Uncertainty Analysis - Including DSM Impacts

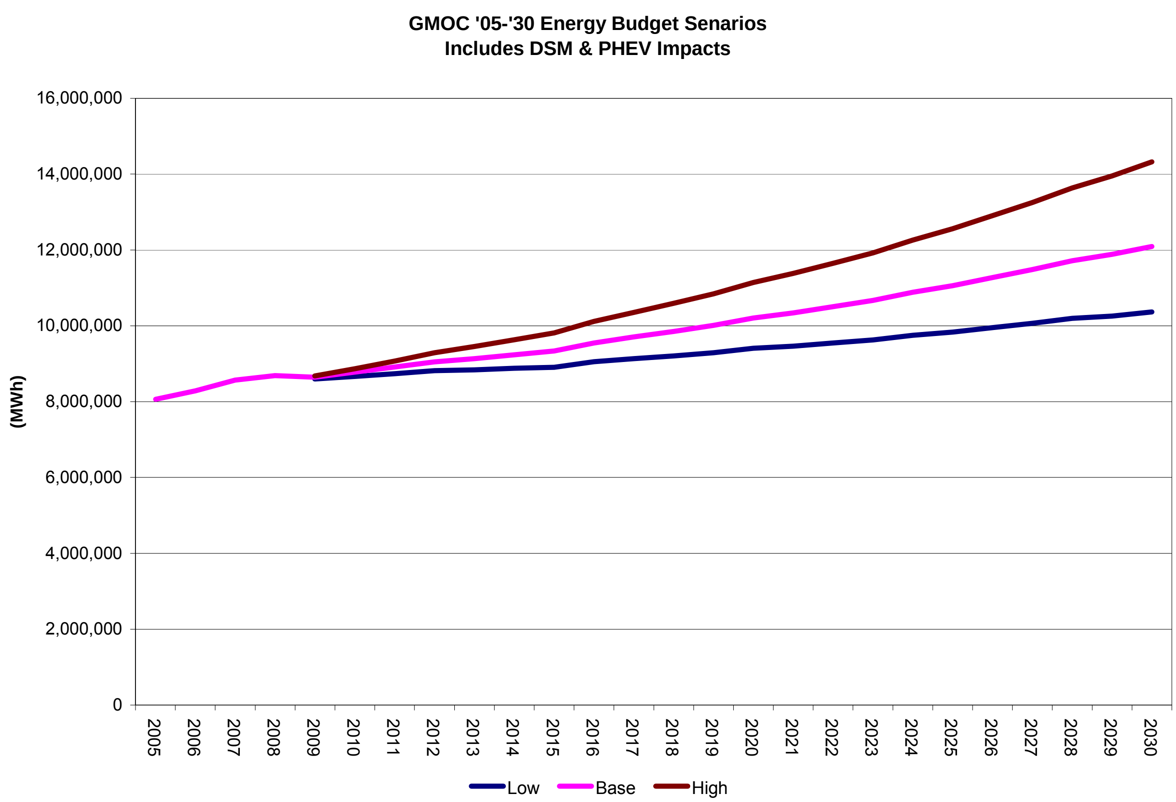


Table 5: Peak Uncertainty Analysis - Excluding DSM Impacts

Peak (MW): Excluding DSM/ PHEV Impact		Low Range	Base	High Range
WN	2005		1,815	
WN	2006		1,843	
WN	2007		1,923	
WN	2008		1,941	
	2009	1,910	1,922	1,936
	2010	1,917	1,942	1,968
	2015	1,970	2,059	2,162
	2020	2,014	2,178	2,373
	2025	2,071	2,321	2,629
	2030	2,136	2,491	2,942
CAGR % Growth				
	05-'06		1.5%	
	06-'07		4.3%	
	07-'08		0.9%	
	08-'09	-1.6%	-1.0%	-0.3%
	10-'15	0.5%	1.2%	1.9%
	15-'20	0.5%	1.1%	1.9%
	20-'25	0.6%	1.3%	2.1%
	25-'30	0.6%	1.4%	2.3%
	08-'30	0.4%	1.1%	1.9%

Chart 6: Peak Uncertainty Analysis - Excluding DSM Impacts

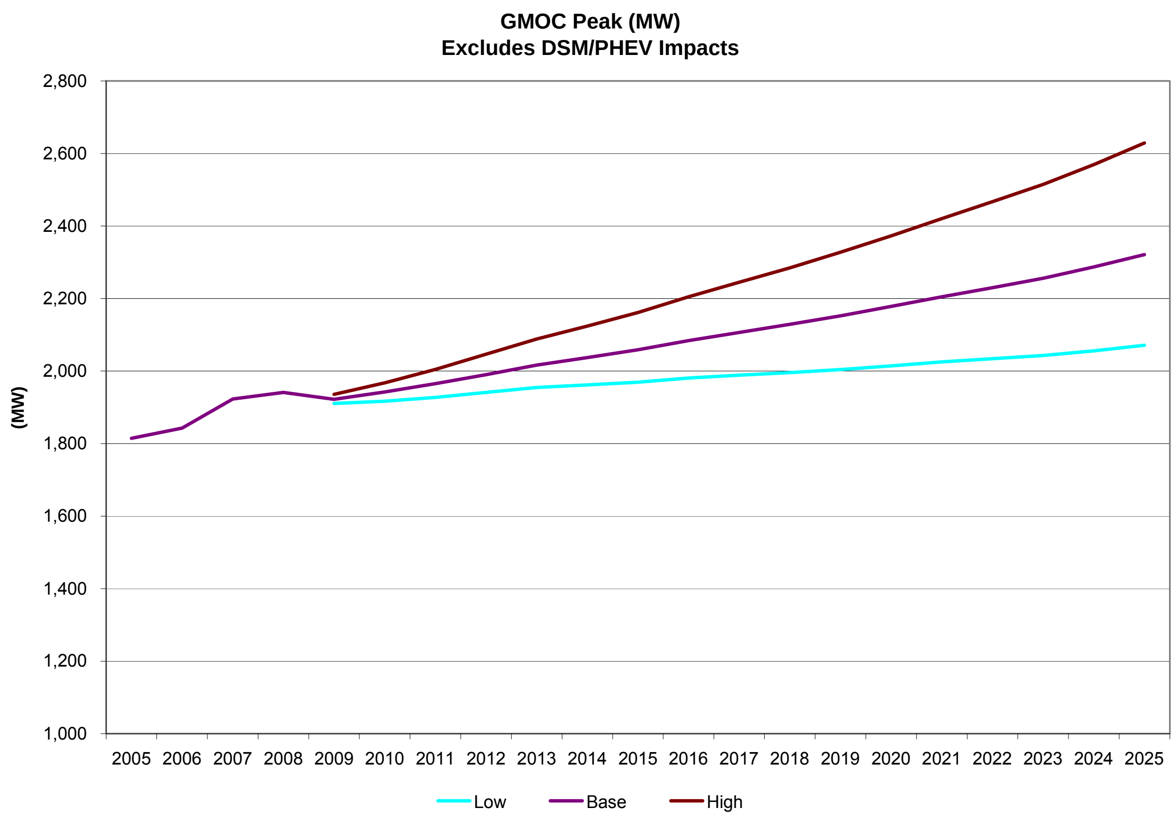
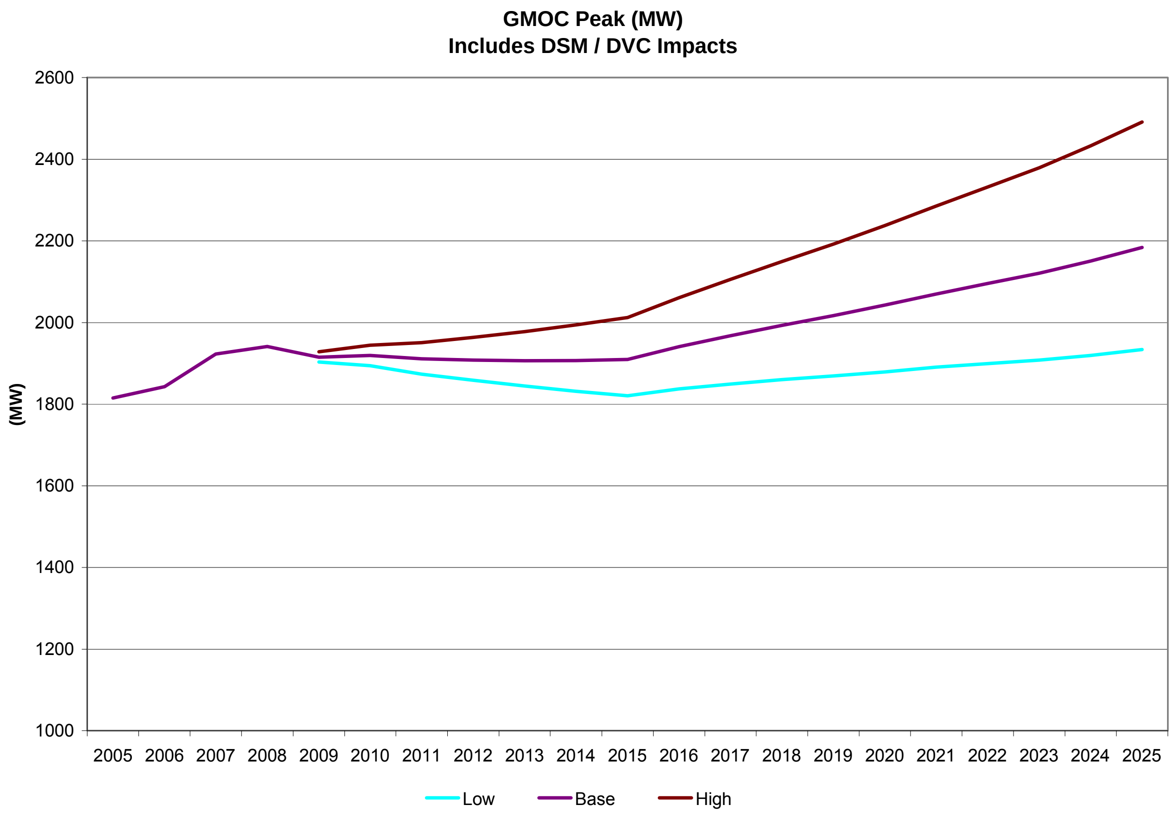


Table 6: Peak Uncertainty Analysis - Including DSM Impacts

Peak (MW): Including DSM/ PHEV Impact		Low Range	Base	High Range	DSM Impact on Peak	PHEV Impact on Peak
WN	2005		1,815			
WN	2006		1,843			
WN	2007		1,923			
WN	2008		1,941			
	2009	1,903	1,915	1,928	(7)	0.0
	2010	1,894	1,919	1,944	(23)	0.0
	2015	1,820	1,909	2,012	(150)	0.6
	2020	1,879	2,043	2,238	(137)	1.4
	2025	1,934	2,184	2,491	(140)	2.8
	2030	2,003	2,358	2,809	(137)	4.3

CAGR % Growth	Low Range	Base	High Range
05-'06		1.5%	
06-'07		4.3%	
07-'08		0.9%	
08-'09	-2.0%	-1.3%	-0.7%
10-'15	-0.8%	-0.1%	0.7%
15-'20	0.6%	1.4%	2.1%
20-'25	0.6%	1.3%	2.2%
25-'30	0.7%	1.5%	2.4%
08-'30	0.1%	0.9%	1.7%

Chart 7: Peak Uncertainty Analysis - Including DSM Impacts



1.5 CLASS PROJECTIONS

Table 7 shows historical and forecasted sales for the customer classes as well as for total retail sales. A more detailed explanation of class demand and peak demand can be found in the Energy and Demand section of this report.

Table 7: Revenue Class Projections (Actual)

Historical and Forecasted GWh Usage							
Year	Residential	Small General Service	Large General Service	Large Power	Lighitng	Sales for Resale	GMOC Sales
1996	2,387	719	911	1,439	55	191	5,702
2001	2,854	885	1,119	1,692	61	174	6,786
2006	3,386	910	1,245	2,073	68	31	7,713
2007	3,443	911	1,276	2,192	69	32	7,924
2008	3,506	914	1,297	2,269	69	31	8,087
2010	3,546	918	1,309	2,327	71	31	8,201
2015	3,803	1,005	1,493	2,556	76	31	8,964
2020	4,085	1,061	1,661	2,873	80	31	9,791
2025	4,403	1,114	1,858	3,203	82	31	10,692
2030	4,729	1,189	2,131	3,582	84	31	11,745

Annual Growth Rates							
1996-2001	3.6%	4.2%	4.2%	3.3%	2.1%	-1.8%	3.5%
2001-2006	3.5%	0.6%	2.2%	4.1%	2.1%	-29.1%	2.6%
2006-2008	1.8%	0.2%	2.0%	4.6%	0.9%	0.0%	2.4%
2007-2008	1.8%	0.3%	1.6%	3.5%	0.3%	-3.3%	2.1%
2008-2010	0.6%	0.2%	0.5%	1.3%	1.1%	0.0%	0.7%
2010-2015	1.4%	1.8%	2.7%	1.9%	1.4%	-0.1%	1.8%
2015-2020	1.4%	1.1%	2.2%	2.4%	0.9%	-0.1%	1.8%
2020-2025	1.5%	1.0%	2.3%	2.2%	0.6%	-0.1%	1.8%
2025-2030	1.4%	1.3%	2.8%	2.3%	0.4%	0.0%	1.9%
2008-2030	1.4%	1.2%	2.3%	2.1%	0.9%	-0.1%	1.7%

1996 – 2008 Weather Normalized

SECTION 2: RESIDENTIAL

2.1 SUMMARY

Energy sales to the residential class are projected to grow at an annual rate of 1.0% between 2008-2030 for SJLP and 1.5% for MPS. This represents a decrease from the historical growth rate of 2.1% for SJLP and 3.6% for MPS during 1996-2008.

The slower growth rate of residential sales in the forecast period compared to the historical period is caused by lower overall customer growth in MPS and by slower growth in average use per customer for both MPS and SJLP. Table 8 summarizes MPS and SJLP residential GWh sales.

Table 8: Residential GWh Sales

Weather Normalized Historical and Forecasted GWh Sales Residential			
Year	**MPS**	**SJ**	**GMO**
1996	1,784	603	2,387
2001	2,190	664	2,854
2006	2,628	758	3,386
2007	2,682	762	3,443
2008	2,732	774	3,506
2010	2,770	776	3,546
2015	3,007	796	3,803
2020	3,242	843	4,085
2025	3,497	906	4,403
2030	3,756	972	4,729

Annual Growth Rates			
1996-2001	4.2%	2.0%	3.6%
2001-2006	3.7%	2.7%	3.5%
2006-2008	2.0%	1.0%	1.8%
2007-2008	1.9%	1.6%	1.8%
2008-2010	0.7%	0.1%	0.6%
2010-2015	1.7%	0.5%	1.4%
2015-2020	1.5%	1.1%	1.4%
2020-2025	1.5%	1.5%	1.5%
2025-2030	1.4%	1.4%	1.4%
2008-2030	1.5%	1.0%	1.4%

2.2 METHODOLOGY

Residential electrical energy projections are prepared using Statistically Adjusted End-use (SAE) models that were developed by Itron as successors to EPRI's Residential End-Use Planning System (REEPS). The SAE models were developed by the same staff that formerly developed REEPS for EPRI. Separate SAE models were developed for residential customers of SJLP and MPS.

2.3 CUSTOMERS

Separate customer forecasting models were developed for SJLP and MPS. The number of households in the St. Joseph MSA was the primary driver for SJLP residential customers. For MPS, the primary driver was households in the Kansas City MSA. Table 9 shows the models and fit statistics. The number of households was chosen as the driver because residential customers are households.

Table 9: Residential Customer Model

Variable	MPS		SJLP	
	Coefficient	T-Stat	Coefficient	T-Stat
Constant	-13077.5	-2.8		
Households	36.7	2.9	26.6	1.2
Jan2008	-1459.8	-2.1	-1274.8	-7.2
Jul2000	-5445.4	-7.9		
Aug2000	9523.9	13.5		
Nov2000	-3439.80	-5.0		
Dec2000	6314.7	9.0		
Mar2005	4731.1	6.6		
Jan2005	-4290.0	-6.2		
Nov2008	-1504.4	-2.2		
Apr2000	1902.8	2.7		
LagDep(1)	0.93	36.8	0.98	53.5
AR(1)	-0.09	-1.1		
Estimation Period	1/1994-12/2008		6/1995-12/2008	
MAPE	0.21%		0.21%	
R^2	0.999		0.978	

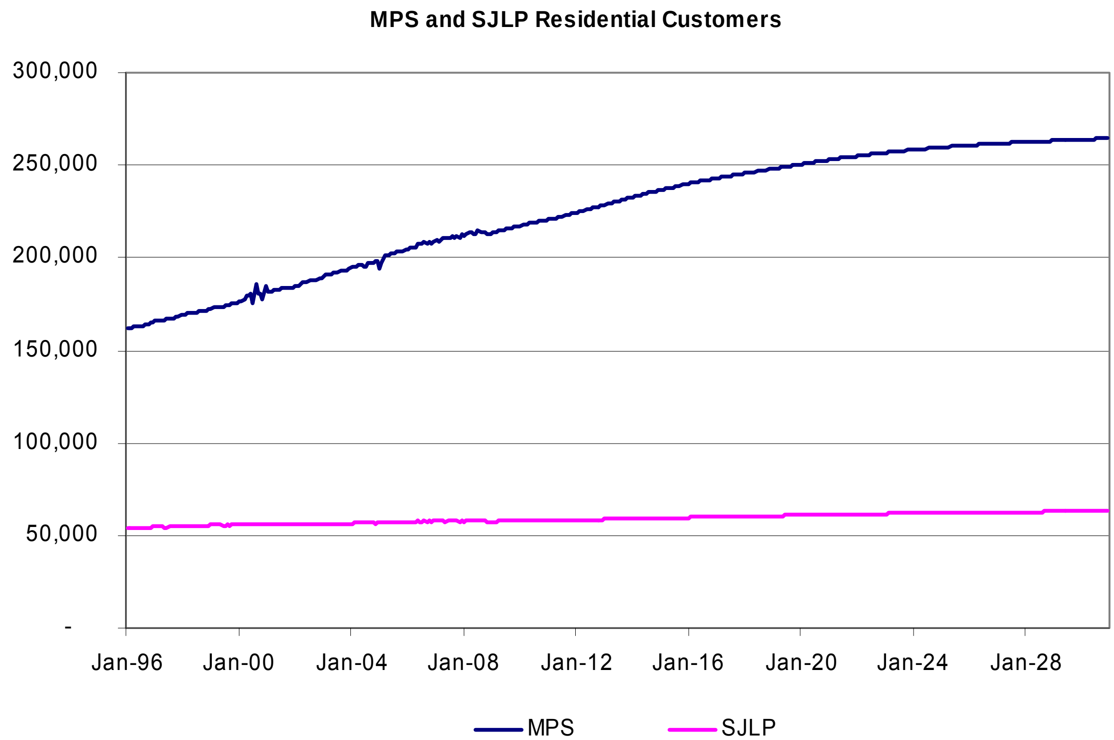
Table 10 shows historical and predicted average residential customers for each utility. Chart 8 shows historical and predicted values for the residential classes. The gradual decline in the growth rate of new customers is due to a similar decline in the population growth rate forecasted by Moody's Economy.com for the KC and SJ metro areas. They attribute this to slower population growth in the U.S., increasing out migration of retirees to warmer climates, declining immigration to the United States and a falling share of manufacturing in KC relative to the rest of the country.

Table 10: Annual Average Number of Residential Customers

Historical and Forecasted Annual Average Residential Customers			
Year	**MPS**	**SJ**	**GMO**
1996	163,257	54,234	217,491
2001	182,883	56,071	238,954
2006	207,074	57,468	264,542
2007	210,744	57,787	268,531
2008	213,264	57,656	270,921
2010	218,983	57,929	276,911
2015	238,336	59,508	297,844
2020	251,651	61,045	312,696
2025	260,182	62,304	322,486
2030	264,181	63,006	327,187

Annual Growth Rates			
1996-2001	2.3%	0.7%	1.9%
2001-2006	2.5%	0.5%	2.1%
2006-2008	1.5%	0.2%	1.2%
2007-2008	1.2%	-0.2%	0.9%
2008-2010	1.3%	0.2%	1.1%
2010-2015	1.7%	0.5%	1.5%
2015-2020	1.1%	0.5%	1.0%
2020-2025	0.7%	0.4%	0.6%
2025-2030	0.3%	0.2%	0.3%
2008-2030	1.0%	0.4%	0.9%

Chart 8: Total MPS and SJLP Residential Customers



2.4 RESIDENTIAL END-USE INDICES

Residential appliance saturation data was available for SJLP from 1992, 1995 and 2008. Surveys were conducted for MPS in 1998, and 2008. The 2008 survey was conducted for both GMO and KCP&L. 2000 questionnaires were mailed to each area, and 614 were returned for SJLP and 531 for MPS. The survey results for GMO are shown in Table 11 and Table 12.

Table 11: Residential Appliance Saturation Survey – SJLP

St. Joe	1992	1995	2008
Central A/C (CAC)	55%	61%	81%
Room A/C (RAC)	33%	31%	22%
Electric Water Heaters (EWHeat)	42%	37%	48%
Electric Ranges (Ecook)		67%	78%
Second Refrigerators (Ref2)		19%	28%
Freezers (Frz)		62%	76%
Dishwashers (Dish)		45%	61%
Clothes Washers (Cwash)		93%	95%
Electric Clothes Dryers (Edry)		80%	80%
TVs		180%	252%

Table 12: Residential Appliance Saturation Survey – MPS

MPS	1998	2008
Central A/C (CAC)	79%	93%
Room A/C (RAC)	12%	11%
Electric Water Heaters (EWHeat)	44%	31%
Electric Ranges (Ecook)	59%	85%
Second Refrigerators (Ref2)	26%	30%
Freezers (Frz)	60%	68%
Dishwashers (Dish)	57%	78%
Clothes Washers (Cwash)	99%	96%
Electric Clothes Dryers (Edry)	71%	81%
TVs	234%	265%

The EIA saturation forecasts were adjusted to fit the GMOappliance saturation survey results with the greatest weight placed on our 2008 survey results since the latest survey is more recent and was based on a much larger sample size. EIA estimates are from the recent Residential Energy Consumption Survey (RECS) for the West North Central Census region, which includes Missouri. The modified saturation trends along with the GMO survey results are shown in Charts 9 and 10. Appliance efficiency trends were based on EIA's historical and forecasted equipment efficiency data for West North Central Census region calibrated to UECs estimated for SJLP and MPS. The UECs were estimated in a conditional demand model based on billing records for 2008 matched to the survey responses. The saturation and efficiency trends are combined to generate the end-use indices.

Chart 9: Forecasted Saturation Trends - MPS

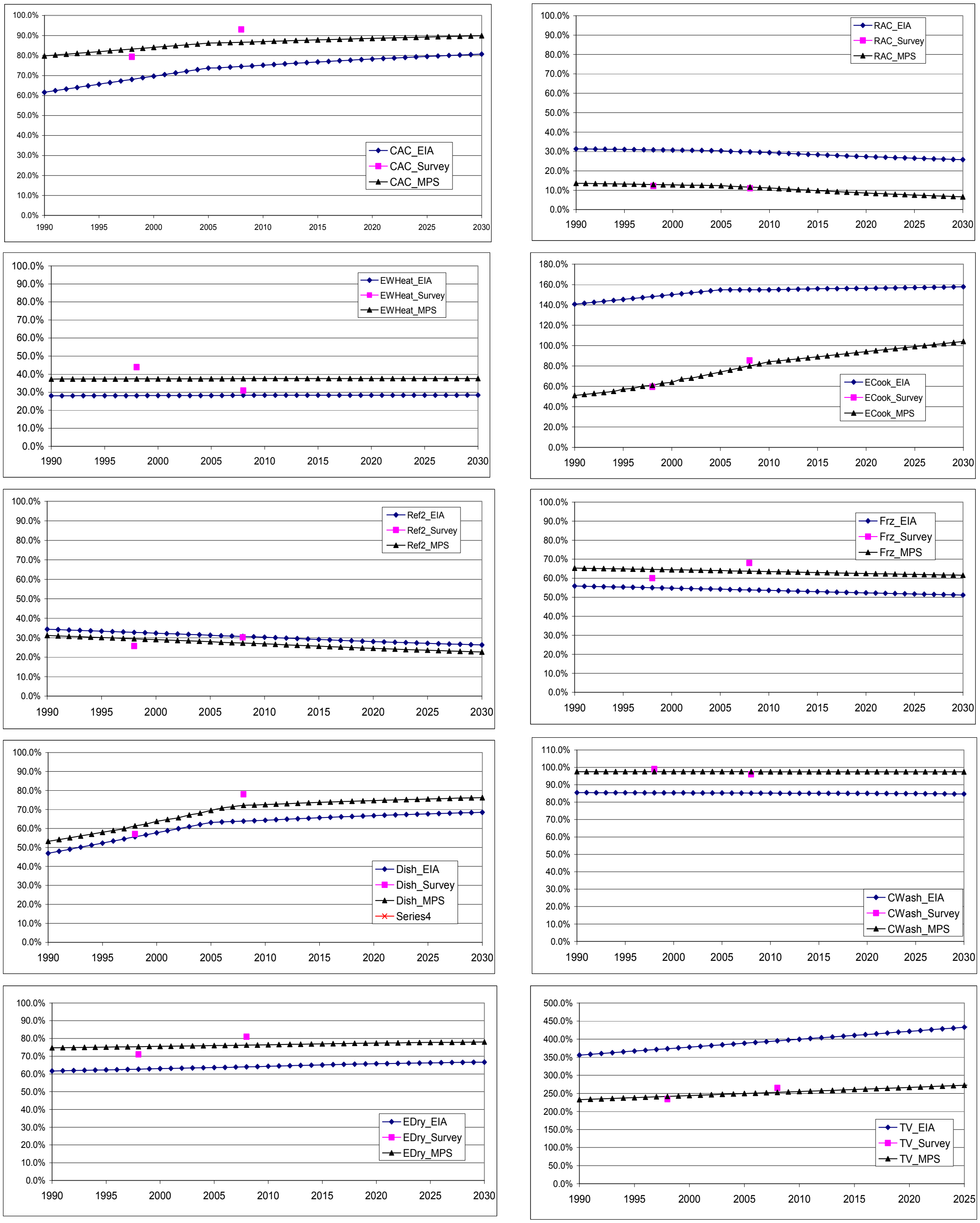
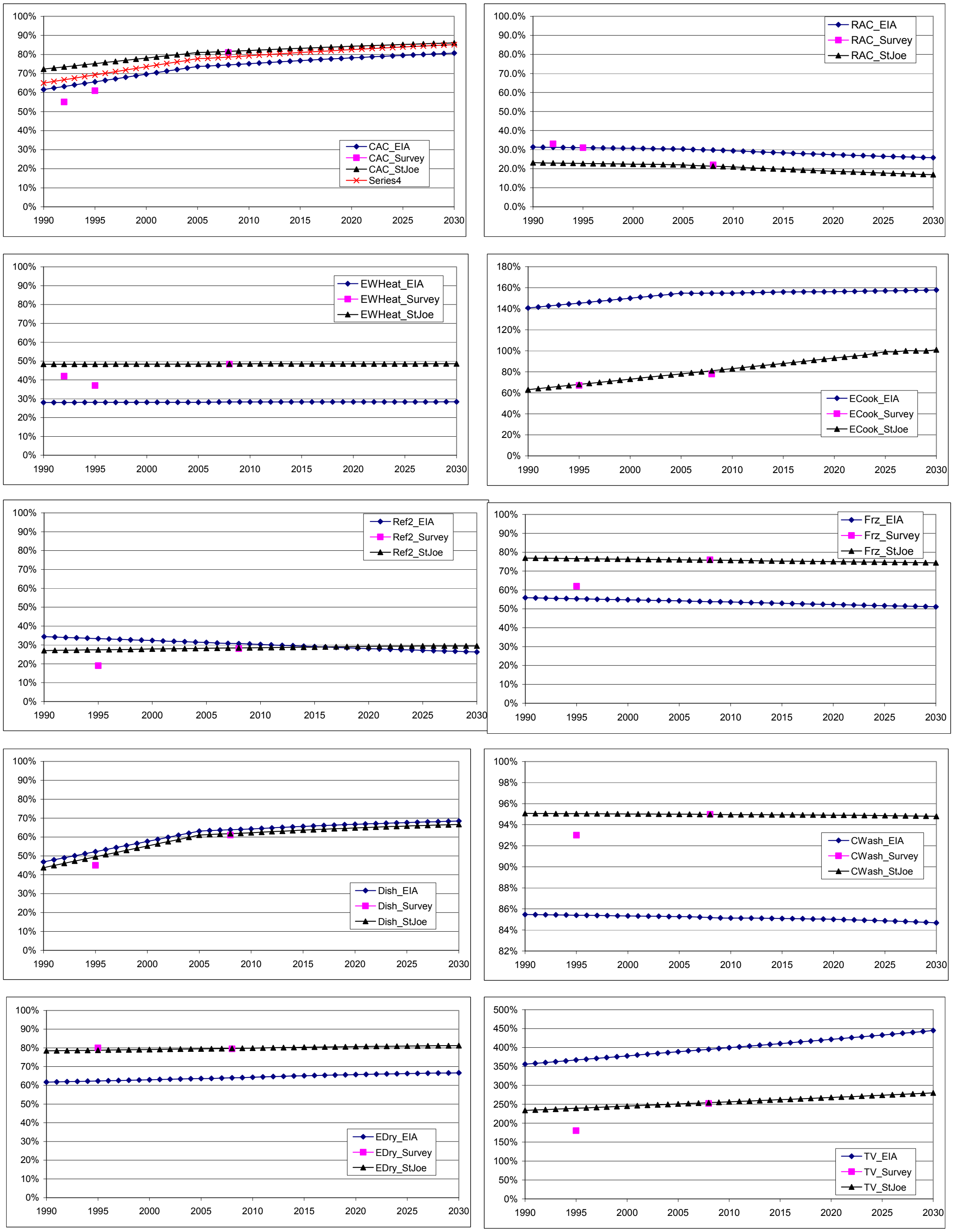


Chart 10: Forecast Saturation Trends – SJLP



2.5 RESIDENTIAL SAE MODEL SPECIFICATION

The SAE approach was used to develop models to forecast sales for the residential class. The SAE modeling framework defines energy use (kwh per customer) in the residential sector ($USE_{y,m}$) in year y and month m as the sum of energy used by heating equipment ($Heat_{y,m}$), cooling equipment ($Cool_{y,m}$) and other equipment ($Other_{y,m}$). Formally,

Equation 1

$$\mathrm{Use}_{y,m} = \mathrm{Heat}_{y,m} + \mathrm{Cool}_{y,m} + \mathrm{Other}_{y,m}$$

To increase the accuracy of this end-use forecast, the variables on the right-hand side of Equation 1 are calibrated to monthly billing data.

Equation 2

$$\mathrm{Use}_{y,m} = b_1\ \mathrm{xHeat}_{y,m} + b_2\ \mathrm{xCool}_{y,m} + b_3\ \mathrm{xOther}_{y,m} + \varepsilon_{y,m}$$

where $xHeat_{y,m}$, $xCool_{y,m}$, and $xOther_{y,m}$ are explanatory variables constructed from

end-use information, weather data, and market data. The constructed end-use variables are engineering-based estimates of end-use consumption. The variables are regressed on observed average usage. The estimated model can then be thought of as a statistically adjusted end-use model, where the estimated coefficients for the end-use variables are calibration factors.

2.5.1 HEATING END-USE VARIABLE

Electricity use for space heating depends on heating degree days, the percentage of space heaters using electricity, heating equipment operating efficiencies, dwelling thermal integrity and floor space, average household size, household income, and energy prices. The heating variable is represented as the product of an annual equipment index and a monthly usage multiplier. That is,

Equation 3

$$\mathrm{XHeat}_{\mathrm{y,m}} = \mathrm{HeatIndex}_{\mathrm{y}} \times \mathrm{HeatUse}_{\mathrm{y,m}}$$

where $XHeat_{y,m}$ is estimated heating energy use in year y and month m, $HeatIndex_y$ is the annual index of heating equipment, and $HeatUse_{y,m}$ is the monthly usage multiplier. Separate Heat Indices were estimated for both SJLP and MPS:

The $HeatIndex_y$ reflects changes in equipment saturation and efficiency trends relative to a base year, which was defined as 2005. The index is defined at the equipment level and then weighted to reflect end-use intensity in the base year. Given a set of fixed weights, the index will change over time with changes in equipment saturations (*Sat*), operating efficiencies (*Eff*), and building structural index (*StructuralIndex*). The ratio is equal to 1.0 in the base year, 2005. In other years, it will be greater than one if equipment saturation levels are above their 2005 level. This will be offset by higher efficiency levels, which will drive the index downward.

Historical and projected heating saturation trends are derived from EIA's Residential Energy Consumption Survey (RECS) for the West North Central region. Heating efficiencies are in terms of a *Heating Seasonal Performance Factor* and are developed by EIA. Formally, the heating index is defined as:

Equation 4

$$HeatIndex_y = StructuralIndex_y \times \sum_{Type} Weight^{Type} \times \frac{\left(Sat_y^{Type} \big/ Eff_y^{Type} \right)}{\left(Sat_{05}^{Type} \big/ Eff_{05}^{Type} \right)}$$

The *StructuralIndex* is constructed by combining the building shell efficiency index trends from Energy Information Agency (EIA) with surface area estimates, and then it is indexed to the 2005 value:

Equation 5

$$StructuralIndex_y = \frac{BuildingShellEfficiencyIndex_y \times SurfaceArea_y}{BuildingShellEfficiencyIndex_{05} \times SurfaceArea_{05}}$$

Surface area is derived to account for roof and wall area of a standard dwelling based on the regional average square footage data. The relationship between the square footage and surface area is constructed assuming an aspect ratio of 0.75 and an average of 25% two-story and 75% single-story. Given these assumptions, the approximate linear relationship for surface area is:

Equation 6

$$\mathrm{SurfaceArea_y} = 892 + 1.44 \times \mathrm{Footage_y}$$

The saturation and efficiency trends are provided at the equipment level for heating and cooling. An overall end-use intensity is derived by calculating equipment intensity in the base year and summing the equipment intensities. Equation 7 shows the equipment intensity calculation.

Equation 7

$$Weight^{Type} = \frac{Energy_{05}^{Type}}{HH_{05}} xHeatShare_{05}^{Type}$$

With these weights, the 2005 *HeatIndex* is equal to estimated annual heating intensity per household. This intensity estimate changes over time as saturation, efficiency, and the structural index change from their base year value. The weights are input into the calculation spreadsheet as base year i*ntensities* on the "*Efficiencies*" tab. A separate spreadsheet is constructed for each jurisdiction.

The utilization of the end-use stock is captured by the heating utilization variable *HeatUse*. Heating system usage levels are impacted by several factors, including weather, household size, income levels, and price.

Equation 8

$$HeatUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{05}}\right)^{E_P} \times \left(\frac{Income_{y,m}}{Income_{05}}\right)^{E_I} \times \left(\frac{HHSize_{y,m}}{HHSize_{05}}\right)^{E_{HH}} \times \left(\frac{HDD_{y,m}}{HDD_{05}}\right)$$

where $Price_{y,m}$ is the average residential real price of electricity in year y and month m, $Price_{05}$ is the average residential real price of electricity in 2005, E_P is the price elasticity, $Income_{y,m}$ is the average real income per household in a year y and month m, $Income_{05}$ is the real income per household in 2005, E_I is elasticity of income, $HHSize_{y,m}$ is the average household size in a year y and month m, $HHSize_{05}$ is the household size in 2005, E_{HH} is the elasticity of household size, $HDD_{y,m}$ is the revenue-month heating degree days in year y and month m, and HDD_{05} is the annual heating degree days for 2005.

By construction, the $HeatUse_{y,m}$ variable has an annual sum that is close to one in the base year, 2005. The *HDD* term serves to allocate annual values to months of the year. The remaining terms average to one in the base year. In other years, the values will reflect changes in the economic driver changes, as transformed through the end-use elasticity parameters. For example, the price elasticity for heating is -0.15, which indicates that if the real price of electricity increases 10% the *HeatUse* variable will decrease 1.5%.

2.5.2 COOLING END-USE VARIABLE

The cooling end-use variable is constructed in a manner similar to that for heating. Cooling requirements depend on cooling degree days, cooling equipment saturation levels, cooling equipment operating efficiencies, dwelling thermal integrity, dwelling size, household size, household income, and the real price of electricity. The cooling variable is represented as the product of an equipment-based index and monthly usage multiplier. That is,

Equation 9

$$\mathrm{XCool}_{y,m} = \mathrm{CoolIndex}_{y} \times \mathrm{CoolUse}_{y,m}$$

where $XCool_{y,m}$ is estimated cooling energy use in year y and month m, $CoolIndex_y$ is the annual index of cooling equipment, and $CoolUse_{y,m}$ is the monthly usage multiplier.

The *CoolIndex* represents an initial estimate of annual cooling intensity (in kWh). It is a weighted average across several cooling end-use technologies including central air conditioning, heat pumps, and room air conditioning. The index changes over time as in response to changes in equipment saturation, efficiency, floorspace, and thermal integrity. Formally, the equipment index is defined as:

Equation 10

$$CoolIndex_y = StructuralIndex_y \times \sum_{Type} Weight^{Type} \times \frac{\left(Sat_y^{Type} \middle/ Eff_y^{Type} \right)}{\left(Sat_{05}^{Type} \middle/ Eff_{05}^{Type} \right)}$$

The annual saturation estimates are derived from GMO's survey data and EIA's study for the West North Central region. The efficiency for space cooling heating pumps and central air-conditioning (A/C) units are given in terms of *Seasonal Energy Efficiency Ratio*, and for room A/C units efficiencies are given in terms of EER (energy efficiency ratio). Historical and projected efficiency trends are developed by the EIA.

In the above expression, 2005 is used as a base year for normalizing the index. The ratio on the right is equal to 1.0 in 2005. In other years, it will be greater than one if equipment saturation levels are above their 2005 level. This will be offset by higher efficiency levels, which will drive the index downward. The weights are defined as follows.

Equation 11

$$\text{Weight}^{\text{Type}} = \frac{\text{Energy}_{05}^{\text{Type}}}{\text{HH}_{05}} \times \text{CoolShare}_{05}^{\text{Type}}$$

As with heating, the sum of the end-use weights represents the annual cooling requirement in the base year. Separate indices are calculated for each jurisdiction. Variations from this value in other years will be proportional to saturation, efficiency, and structural index variations around their base values.

Cooling system usage levels are impacted by changes in weather, household size, income, and prices.

Equation 12

$$CoolUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{05}}\right)^{E_P} \times \left(\frac{Income_{y,m}}{Income_{05}}\right)^{E_I} \times \left(\frac{HHSize_{y,m}}{HHSize_{05}}\right)^{E_{HH}} \times \left(\frac{CDD_{y,m}}{CDD_{05}}\right)$$

where $CDD_{y,m}$ is the revenue month cooling degree days in year y and month m, and CDD_{01} is the annual cooling degree days for 2005.

By construction, the $CoolUse_{y,m}$ variable has an annual sum that is close to one in the base year, 2005. The *CDD* term serves to allocate annual values to months of the year. The remaining terms average to one in the base year. In other years, the values will reflect changes in the economic driver changes.

2.5.3 OTHER END-USES

Monthly estimates of non-weather sensitive sales can be derived in a similar fashion to space heating and cooling. Based on an end-use framework, other sales are driven by appliance saturation levels and efficiency levels, average household size, real income, real prices, and billing days. The explanatory variable for other uses is defined as follows:

Equation 13

$$\text{XOther}_{\text{y,m}} = \text{OtherEqpIndex}_{\text{y,m}} \times \text{OtherUse}_{\text{y,m}}$$

The first term on the right hand side of this expression ($OtherEqpIndex_{y,m}$) embodies information about appliance saturation and efficiency levels and monthly usage multipliers. The second term (*OtherUse*) captures the impact of changes in price, income, and number of billing-days on appliance utilization.

End-use indices are constructed in the residential indices spreadsheets. The end-use indices are combined into an aggregate stock index (*OtherEqpIndex*) in the forecast project files. *OtherEqpIndex* and *XOther* are constructed in the transformation tables "*RUStrucVars*".

The equipment index for water heaters (*EWHeat*) and appliances are given in Equation 14 and 15, respectively.

Equation 14

$$EWHeatIndex_{y,m} = Weight \times \frac{\left(Sat_y \big/ Eff_y \right)}{\left(Sat_{05} \big/ Eff_{05} \right)} \times MoMult_m$$

Equation 15

$$ApplianceIndex_{y,m} = Weight^{Type} \times \frac{\left(Sat_y^{Type} \Big/ \frac{1}{UEC_y^{Type}} \right)}{\left(Sat_{05}^{Type} \Big/ \frac{1}{UEC_{05}^{Type}} \right)} \times MoMult_m^{Type}$$

where *Weight* is the intensity for each appliance type, Sat_y represents the fraction of households who have an appliance type, Eff_y is the average operating efficiency, UEC_y is the unit energy consumption, and *MoMult* is the monthly usage multiplier for each appliance. The index for non-HVAC equipment is derived by summing the above equations:

Equation 16

$$\text{OtherEqpIndex}_{y,m} = \text{EWHeatIndex}_{y,m} + \text{ApplianceIndex}_{y,m}$$

The annual saturation levels for water heating units and appliances are derived from GMO's residential saturation survey data and EIA's study for the West North Central region. The efficiency for water heating units is given in terms of *Seasonal Energy Efficiency Ratio*, UECs are used as a proxy for efficiency change in the other appliances and are given in terms of kWh/year. UEC estimates are provided by EIA.

The weights reflect estimated end-use intensity in the base year. Estimates are based on EIA values for the West North Central census region. The end-use intensities are summed in constructing *OtherEqpIndex*. The end-use index reflects changes in saturation and efficiency and UEC levels for the main appliance categories. As with heating and cooling, the weights are defined as follows:

Equation 17

$$\text{Weight}^{\text{Type}} = \frac{\text{Energy}_{05}^{\text{Type}}}{\text{HH}_{05}} \times \text{Share}_{05}^{\text{Type}}$$

With these weights, the *OtherEqpIndex* value in 2005 will be equal to estimated annual water heating, appliance, and lighting intensity per household in that year. Changes in the index are driven by changes in saturation, efficiency assumptions.

Water heating and appliance usage levels are impacted on a monthly basis by several factors, including household size, income levels, prices, and billing days (*BDays*). The other use variable is computed as:

Equation 18

$$OtherUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{05}}\right)^{E_P} \times \left(\frac{Income_{y,m}}{Income_{05}}\right)^{E_I} \times \left(\frac{HSize_{y,m}}{HSize_{05}}\right)^{E_{HH}} \times \left(\frac{BDays_{y,m}}{NormalBDays}\right)$$

Multiplying the equipment index variable with the utilization variable then generates xOther.

2.6 ELASTICITIES USED IN THE RESIDENTIAL MODELS

The elasticities used in the residential models are the same as those used in the models for KCP&L and were chosen by consultants from Itron based on their expect opinions.

Table 13 Elasticities Used in the Residential Models

Parameter	Value	Definition
HSize_Ht	0.20	Household size elasticity for space heating
HIncm_Ht	0.20	Household income elasticity for space heating
Price_Ht	-0.15	Electricity price elasticity for space heating
HSize_Cl	0.20	Household size elasticity for space cooling
HIncm_Cl	0.20	Household income elasticity for space cooling
Price_Cl	-0.15	Electricity price elasticity for space cooling
HSize_Oth	0.20	Household size elasticity for non HVAC end-uses
HIncm_Oth	0.10	Household income elasticity for non HVAC end-uses
Price_Oth	-0.15	Electricity price elasticity for non HVAC end-uses

2.7 ESTIMATED RESIDENTIAL MODEL

Once the end-use variables are constructed, they are regressed on average monthly residential use per customer. Binary variables for specific months were added to the list of explanatory variables and error correction terms were used when statistically significant. The estimated model coefficients are all highly significant. Residential model R^2 are 0.978 for MPS and 0.954 for SJLP, with in sample MAPE of 3.1% and 4.0%. Tables 14 through 16 show the resulting model coefficients by jurisdiction.

Table 14: Average Use Residential Model Results

	MPS Residential	SJLP Residential
Estimation Period	1/2000-12/2008	1/1996-12/2008
MAPE	3.09%	3.98%
R^2	0.978	0.954

Table 15: Coefficients for MPS Average Residential Use

Variable	Coefficient	T-Stat
XHeat55	5.37	28.1
XCool65	2.54	10.5
XCool70	-0.25	-1.3
XOther	0.79	53.4
Jun06	-114.86	-2.8
Jan05	233.43	5.6
Jun94	0.0	0.0
AR(1)	0.14	1.3

Table 16: Coefficients for SJLP Average Residential Use

Variable	Coefficient	T-Stat
XHeat55	5.92	33.3
XCool65	1.34	4.4
XCool70	0.53	2.1
XOther	0.84	32.7
Jan05	229.53	4.3
Dec00	-195.05	-3.7
year<2007	-45.51	-2.7
AR(1)	0.10	1.2

Charts 11 and 12 show resulting actual and predicted values for the residential class by jurisdiction. Over time, heating use for MPS was initially less than cooling use, but over time heating use exceeds cooling use. For SJLP, heating use in the winter currently exceeds cooling use in the summer.

Chart 11: MPS Residential Urban Average Use Model Results

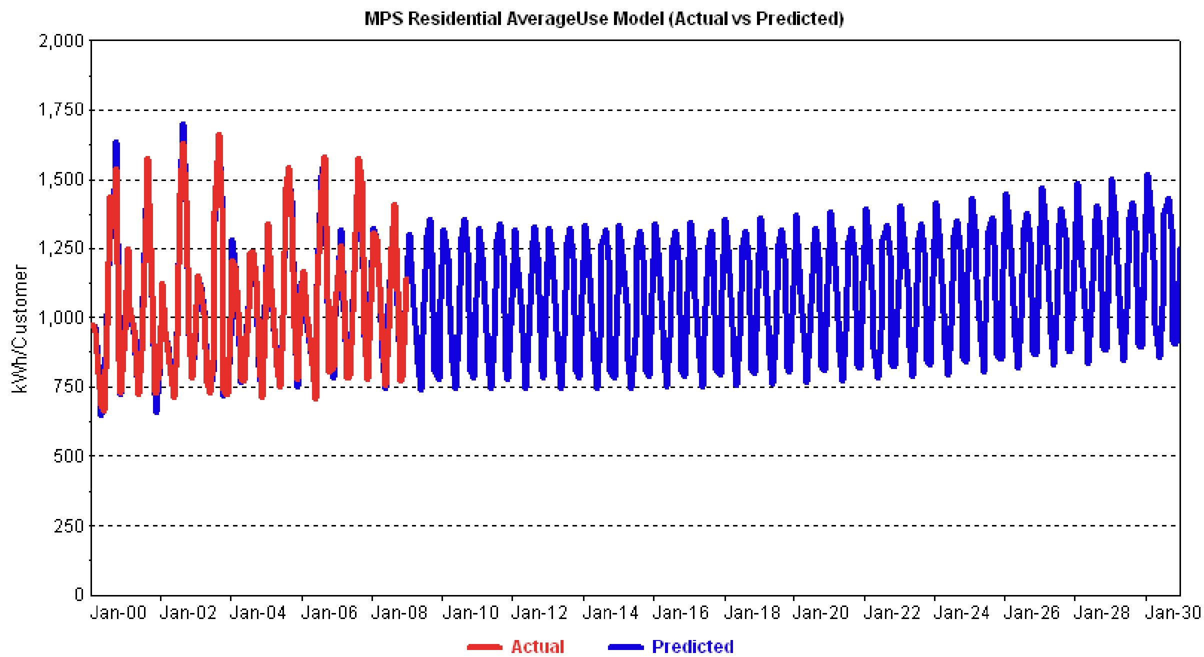
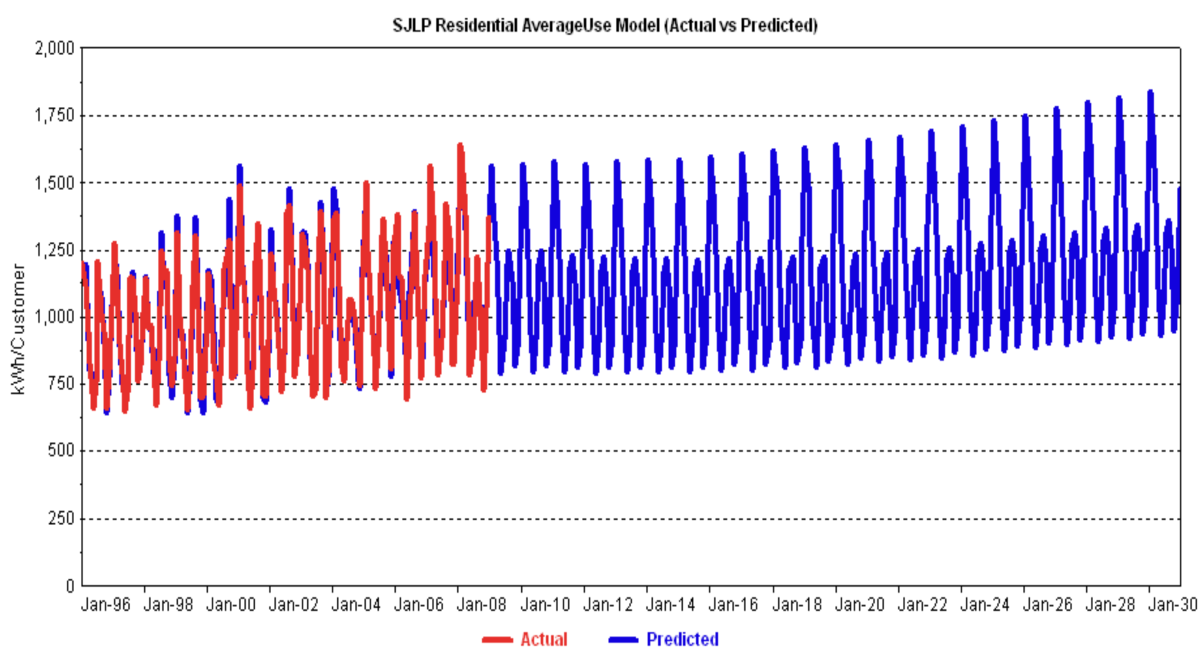


Chart 12: SJLP Residential Urban Average Use Model Results



2.8 AVERAGE USE BASE CASE FORECAST

Table 17 shows the annual average use forecast and historical actual average use for the MPS and SJLP residential classes. The forecast shows a slowdown in the growth of average use. This is primarily due to a slowdown in the growth of population and households in the Kansas City Metropolitan area since new customers tend to have larger homes and are more likely to heat with electricity and thus have higher usage than existing customers.

Table 17: MPS and SJLP Average Use

Weather Normalized Historical and Forecasted AverageUse Residential			
Year	MPS	SJ	GMO
1996	10,925	11,118	10,973
2001	11,974	11,848	11,944
2006	12,692	13,189	12,800
2007	12,725	13,181	12,823
2008	12,811	13,420	12,941
2010	12,648	13,396	12,804
2015	12,615	13,379	12,768
2020	12,883	13,805	13,063
2025	13,442	14,538	13,653
2030	14,219	15,429	14,452

Annual Growth Rates			
1996-2001	1.8%	1.3%	1.7%
2001-2006	1.2%	2.2%	1.4%
2006-2008	0.5%	0.9%	0.6%
2007-2008	0.7%	1.8%	0.9%
2008-2010	-0.6%	-0.1%	-0.5%
2010-2015	-0.1%	0.0%	-0.1%
2015-2020	0.4%	0.6%	0.5%
2020-2025	0.9%	1.0%	0.9%
2025-2030	1.1%	1.2%	1.1%
2008-2030	0.5%	0.6%	0.5%

2.9 DAILY LOAD PROFILES

Annual end-use class sales for residential customers are combined with hourly end-use and class load profiles. The residential class daytype profiles are based on 2007 hourly residential load research data with simulated shapes for 2008-2030. Refer to

Section 6, Energy and Demand for information about residential class and end-use daily load profiles and the use of these profiles in forecasting energy and demand.

SECTION 3: GENERAL SERVICE

3.1 SUMMARY

Small General Service (SGS) class billed electricity consumption is expected to increase 1.2% percent per year between 2008 and 2030. During this period, the MPS SGS class is expected to grow at 1.2% and the SJLP SGS class is expected to grow 1.2% per year on average. Table 18 summarizes the SGS energy forecast by jurisdiction. MPS SGS had a period of robust growth from 1996 to 2001, but then it ended mainly because the growth shifted to the larger customer classes. Larger chain stores are currently growing more rapidly than small chain and independent stores. SJLP shows a similar but smaller change in the trend.

Table 18: Small General Service Actual Billed GWh Sales

Historical and Forecasted Billed GWh Sales Small General Service			
Year	**MPS**	**SJ**	**GMO**
1996	630.1	89.2	719.3
2001	790.6	94.6	885.2
2006	808.8	101.1	910.0
2007	809.5	101.8	911.3
2008	812.1	102.2	914.3
2010	814.4	103.3	917.7
2015	898.0	107.2	1,005.3
2020	945.7	115.2	1,060.9
2025	990.2	123.8	1,114.0
2030	1,057.3	131.6	1,188.9

Annual Growth Rates			
1996-2001	4.6%	1.2%	4.2%
2001-2006	0.5%	1.3%	0.6%
2006-2008	0.2%	0.5%	0.2%
2007-2008	0.3%	0.4%	0.3%
2008-2010	0.1%	0.6%	0.2%
2010-2015	2.0%	0.7%	1.8%
2015-2020	1.0%	1.4%	1.1%
2020-2025	0.9%	1.4%	1.0%
2025-2030	1.3%	1.2%	1.3%
2008-2030	1.2%	1.2%	1.2%

Large General Service (LGS) class billed electricity consumption is expected to increase at a compounded annual rate of 2.3% percent between 2008 and 2030. MPS LGS class is expected to grow at 2.7% per year and the SJLP LGS class is expected to grow at 1.1%. Table 19 summarizes the LGS energy forecast by jurisdiction.

Table 19 Large General Service Actual Billed GWh Sales

Historical and Forecasted Billed GWh Sales Large General Service			
Year	**MPS**	**SJ**	**GMO**
1996	597	314	911
2001	754	366	1,119
2006	858	388	1,245
2007	884	392	1,276
2008	906	390	1,297
2010	917	392	1,309
2015	1,089	403	1,493
2020	1,235	426	1,661
2025	1,400	458	1,858
2030	1,636	495	2,131

Annual Growth Rates			
1996-2001	4.8%	3.1%	4.2%
2001-2006	2.6%	1.2%	2.2%
2006-2008	2.8%	0.4%	2.0%
2007-2008	2.6%	-0.5%	1.6%
2008-2010	0.6%	0.3%	0.5%
2010-2015	3.5%	0.5%	2.7%
2015-2020	2.5%	1.1%	2.2%
2020-2025	2.5%	1.5%	2.3%
2025-2030	3.2%	1.6%	2.8%
2008-2030	2.7%	1.1%	2.3%

3.2 METHODOLOGY

The SAE approach was used to develop general service models to forecast energy for the small general service and large general service classes of MPS and SJLP. The models were developed by Itron as successors to EPRI's COMMEND models by the same staff that formerly supported the COMMEND models for EPRI.

3.3 CUSTOMERS

Separate customer forecasting models are estimated for each tariff class by jurisdiction. Simple monthly regression models are estimated that relate an economic driver for GMO's service territory to historical monthly customer data. The driver used for MPS SGS was non-manufacturing employment and was households for SJLP. Small commercial customers generally exist to serve households, and thus track their growth. A different driver was used for MPS because employment better explained the number of customers. In the models for LGS customers, total employment was used. LGS customers are a mix of commercial and industrial business types.

No driver was adequate in explaining the shift from small to large businesses, however, and this is why two of the drivers were not significant. Tables 20 through 23 show the model results by jurisdiction and tariff class.

Table 20: MPS SGS Customers Model Results

	MPS Small General Service
Estimation Period	1/1994-12/2008
MAPE	0.88%
R^2	0.978

MPS Small General Service		
Variable	Coefficient	T-Stat
Constant	-566.3	-0.8
Feb02	-1328.0	-3.7
Apr00	2089.8	5.4
Jan05	364.8	1.0
Mar00	-1331.8	-3.5
Aug98	-1455.5	-3.8
Jul98	1163.6	3.0
Emp_NonMan	1.8	1.4
LagDep(1)	1.0	52.0
AR(1)	-0.4	-5.5

Table 21: SJLP SGS Customers Model Results

	SJLP Small General Service
Estimation Period	7/1995-12/2008
MAPE	0.35%
R^2	0.957

SJLP Small General Service		
Variable	Coefficient	T-Stat
Constant	-63.2	-0.6
RU_Cust	0.0	3.7
LagDep(1)	0.9	25.3
Feb02	-127.0	-4.4
Jul08	-100.0	-3.5
Aug04	-96.3	-3.3
Jul04	101.9	3.5

Table 22: MPS LGS Customers Model Results

	MPS Large General Service
Estimation Period	1/2002-12/2008
MAPE	1.10%
R^2	0.964

MPS Large General Service		
Variable	Coefficient	T-Stat
Constant	-486.2	-3.9
Apr05	11.9	0.7
LagDep(1)	0.8	16.6
May05	-3.4	-0.2
Apr00	0.0	0.0
Emp_Total	0.8	4.4
AR(1)	-0.2	-2.4

Table 23: SJLP LGS Customers Model Results

	SJLP Large General Service
Estimation Period	7/1995-12/2008
MAPE	0.44%
R^2	0.993

SJLP Large General Service		
Variable	Coefficient	T-Stat
Constant	12.8	1.8
Apr05	-35.9	-5.4
Feb06	28.8	4.3
Jan00	25.3	3.8
Emp_GMP	7.1	1.2
LagDep(1)	1.0	51.9
Jul08	-21.1	-3.1
Jan05	23.7	3.5

Tables 24 and 25 show historical and predicted average SGS and LGS customers by jurisdiction. Chart s 13 and 14 show historical and predicted values for the SGS and LGS class as a whole (GMO– SGS and GMO– LGS). Forecasted growth is very robust for a few years after the current recession.

Table 24: Small General Service Customers

Historical and Forecasted Annual Average Small General Service Customers			
Year	MPS	SJ	GMO
1996	22,349	5,830	28,179
2001	26,079	5,885	31,963
2006	28,538	6,087	34,624
2007	28,532	6,176	34,709
2008	28,401	6,119	34,520
2010	28,617	6,138	34,755
2015	31,329	6,318	37,647
2020	32,151	6,496	38,647
2025	32,649	6,646	39,295
2030	33,741	6,733	40,474

Annual Growth Rates			
1996-2001	3.1%	0.2%	2.6%
2001-2006	1.8%	0.7%	1.6%
2006-2008	-0.2%	0.3%	-0.2%
2007-2008	-0.5%	-0.9%	-0.5%
2008-2010	0.4%	0.2%	0.3%
2010-2015	1.8%	0.6%	1.6%
2015-2020	0.5%	0.6%	0.5%
2020-2025	0.3%	0.5%	0.3%
2025-2030	0.7%	0.3%	0.6%
2008-2030	0.8%	0.4%	0.7%

Table 25: Large General Service Customers

Historical and Forecasted Annual Average Large General Service Customers			
Year	MPS	SJ	GMO
1996	792	933	1,725
2001	972	1,071	2,044
2006	1,207	1,131	2,338
2007	1,269	1,180	2,449
2008	1,305	1,167	2,471
2010	1,295	1,167	2,462
2015	1,501	1,204	2,704
2020	1,620	1,267	2,886
2025	1,744	1,352	3,097
2030	1,934	1,450	3,384

Annual Growth Rates			
1996-2001	4.2%	2.8%	3.5%
2001-2006	4.4%	1.1%	2.7%
2006-2008	4.0%	1.5%	2.8%
2007-2008	2.8%	-1.1%	0.9%
2008-2010	-0.4%	0.0%	-0.2%
2010-2015	3.0%	0.6%	1.9%
2015-2020	1.5%	1.0%	1.3%
2020-2025	1.5%	1.3%	1.4%
2025-2030	2.1%	1.4%	1.8%
2008-2030	2.0%	1.0%	1.4%

Chart 13: Total GMOSmall General Service Customers (Historical & Forecasted)

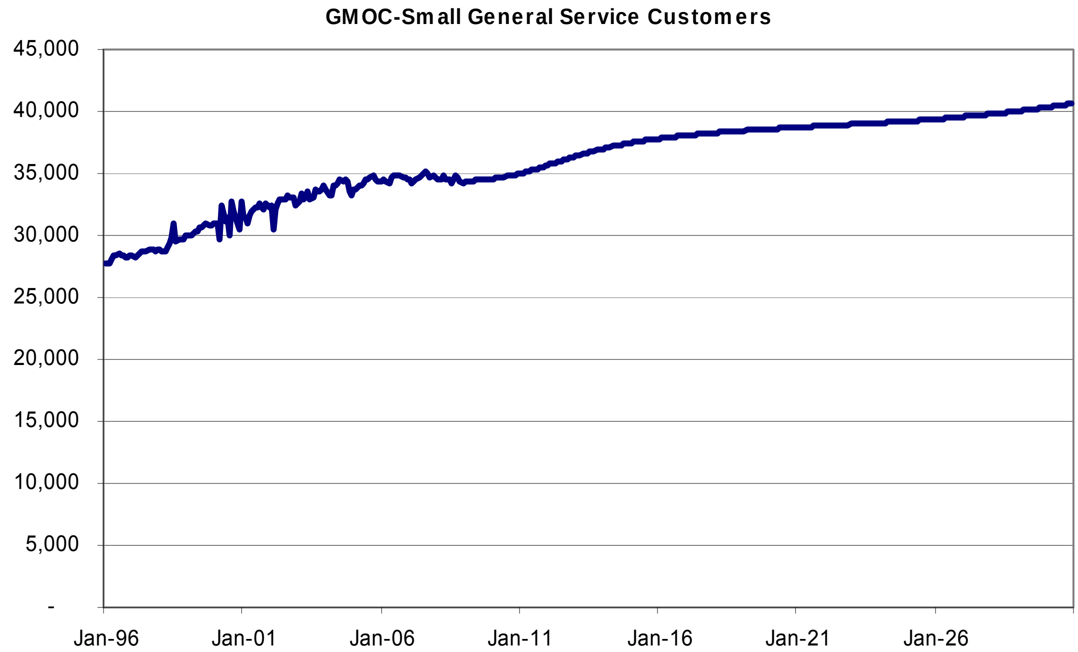
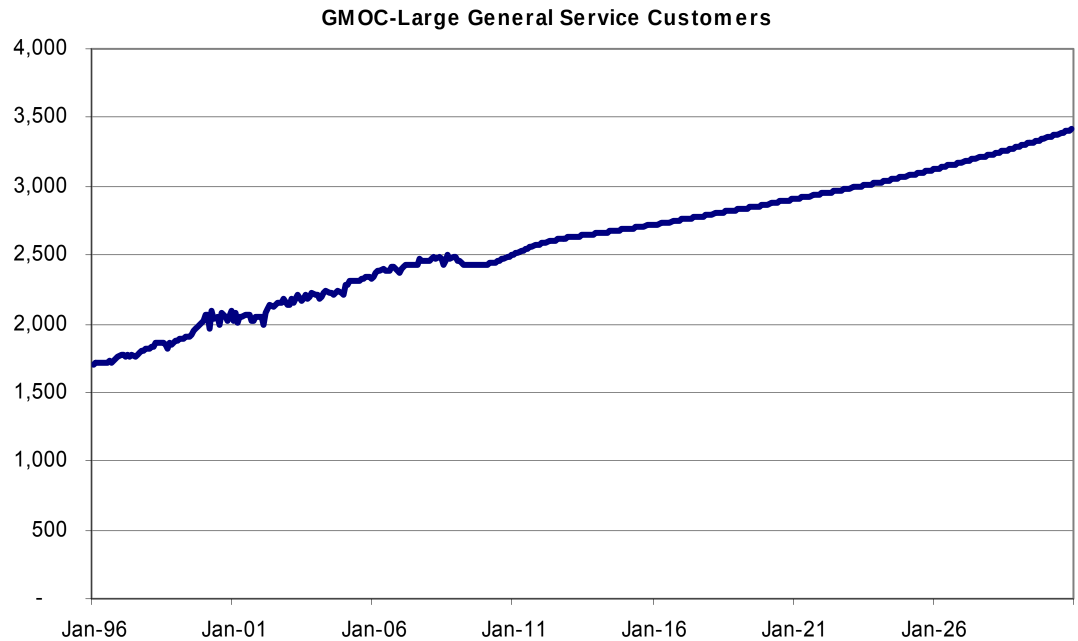


Chart 14: Total GMOLarge General Service Customers (Historical & Forecasted)



3.4 GENERAL SERVICE END-USE INDICES

The general service indices are constructed using EIA's efficiency and end-use saturation series for the West North Central Census region. EIA analyzes ten commercial building types and ten different energy end-uses as part of their forecasting process. Table 26 details the end-uses and building types analyzed.

Table 26: Building Types and End-Uses

Building Type	End-uses
Office	Electric Space Heating
Restaurant	Electric Air Conditioning
Grocery	Ventilation
Retail	Electric Water Heating
Warehouse	Electric Cooking
Education	Refrigeration
Health	Exterior lighting
Lodging	Interior Lighting
Miscellaneous	Office Equipment
Other	Miscellaneous Electric Appliances

3.5 GENERAL SERVICE SAE MODEL SPECIFICATION

The SAE modeling framework used for the general service class is similar to the residential SAE modeling in that general service energy use is defined as general service sector ($USE_{y,m}$) in year y and month m as the sum of energy used by heating equipment ($Heat_{y,m}$), cooling equipment ($Cool_{y,m}$) and other equipment ($Other_{y,m}$). Formally,

Equation 19

$$\mathrm{Use}_{y,m} = \mathrm{Heat}_{y,m} + \mathrm{Cool}_{y,m} + \mathrm{Other}_{y,m}$$

To increase the accuracy of this end-use forecast, the variables on the right-hand side of Equation 19 are calibrated to monthly billing data.

Equation 20

$$Use_{y,m} = b_1\ xHeat_{y,m} + b_2\ xCool_{y,m} + b_3\ xOther_{y,m} + \varepsilon_{y,m}$$

where $xHeat_{y,m}$, $xCool_{y,m}$, and $xOther_{y,m}$ are explanatory variables constructed from end-use information, weather data, and market data. The constructed end-use variables are engineering-based estimates of end-use consumption. The variables are regressed on observed average monthly usage. The estimated model can then be thought of as a statistically adjusted end-use model, where the estimated coefficients for the end-use variables are calibration factors. Examples of calculating xHeat, xCool, xOther, for small general service (SmlGen) and large general service (LgrGen) are shown in Table 27.

Table 27: Calculations for xHeat, xCool, and xOther

StrucVars.XHeat55_SmlGen	EconTrans.SmlGen_Prc_Ind ^ Elas.Price_SmlGen * EconTrans.GPNonMan_Ind ^ Elas.Output_SmlGen * WthrIndex.HDD55 * Convstock (Indices.Heating_Com)
StrucVars.XCool55_SmlGen	EconTrans.SmlGen_Prc_Ind ^ Elas.Price_SmlGen * EconTrans.GPNonMan_Ind ^ Elas.Output_SmlGen * WthrIndex.CDD55* Convstock (Indices.Cooling_Com)
StrucVars.XCool60_SmlGen	EconTrans.SmlGen_Prc_Ind ^ Elas.Price_SmlGen * EconTrans.GPNonMan_Ind ^ Elas.Output_SmlGen * WthrIndex.CDD60 * Convstock (Indices.Cooling_Com)
StrucVars.XOther_SmlGen	EconTrans.SmlGen_Prc_Ind ^ Elas.Price_SmlGen * EconTrans.GPNonMan_Ind ^ Elas.Output_SmlGen * WthrTrans.SmlGenBDays_Index* Convstock (Indices.NonHVAC_Com) * Value (MoMults.Multipliers, 2001, month)
StrucVars.XHeat55_LrgGen	EconTrans.LrgGen_Prc_Ind ^ Elas.Price_LrgGen * EconTrans.GPNonMan_Ind ^ Elas.Output_LrgGen * WthrIndex.HDD55 * Convstock (Indices.Heating_Com)
StrucVars.XCool55_LrgGen	EconTrans.LrgGen_Prc_Ind ^ Elas.Price_LrgGen * EconTrans.GPNonMan_Ind ^ Elas.Output_LrgGen * WthrIndex.CDD55* Convstock (Indices.Cooling_Com)
StrucVars.XOther_LrgGen	EconTrans.LrgGen_Prc_Ind ^ Elas.Price_LrgGen * EconTrans.GPNonMan_Ind ^ Elas.Output_LrgGen * WthrTrans.LrgGenBDays_Index* Convstock (Indices.NonHVAC_Com) * Value (MoMults.Multipliers, 2001, month)
EconTrans.GMP_Index EconTrans.GPNonMan_Ind EconTrans.GPMan_Ind	Economics.GMP / IndexValues.GMP Economics.GP_Non_Man / IndexValues.GP_Non_Man Economics.GP_Man / IndexValues.GP_Man

3.5.1 HEATING END-USE VARIABLE

As in the residential model, energy use by space heating systems depends on heating degree days, heating equipment share levels, heating equipment operating efficiencies, building characteristics, commercial output, and the real price of electricity. The heating variable is represented as the product of an annual equipment index and a monthly usage multiplier. That is,

Equation 21

$$XHeat_{y,m} = HeatIndex_{y} \times HeatUse_{y,m}$$

where $xHeat_{y,m}$ is estimated heating energy use in year y and month m, $HeatIndex_{y}$ is the annual index of heating equipment, and $HeatUse_{y,m}$ is the monthly usage multiplier. Separate Heat Indices are estimated for two general service models for each jurisdiction:

- Small General Service (SGS)
- Large General Service (LGS)

The *HeatIndex* is composed of electric space heating saturation levels normalized by operating efficiency levels. The index will change over time with changes in equipment saturations (*Sat*) and operating efficiencies (*Eff*). Formally, the equipment index is defined as:

Equation 22

$$HeatIndex_{y} = \left(\frac{kWh}{Sqft}\right)_{heating} \times \frac{\left(Sat_{y} / Eff_{y}\right)}{\left(Sat_{04} / Eff_{04}\right)}$$

The $HeatIndex_{y}$ reflects changes in equipment saturation and efficiency trends relative to a base year, 2004. The index is defined at the equipment level and then weighted to reflect the end-use intensity in the base year. Given a set of fixed weights, the index will change over time with changes in equipment saturations (*Sat*) and operating efficiencies (*Eff*). The ratio is equal to 1.0 in 2004. In other years, it will be greater than one if equipment saturation levels are above their 2004 level. This will be offset by higher efficiency levels, which will drive the index down. The average space heating intensity is energy sales for space heating per square feet of floor space.

Historical and projected heating equipment saturation trends are derived from EIA's Commercial Buildings Energy Consumption Survey (CBECS) for the North West Central region. Heating equipment efficiency trends are obtained from EIA's study for the North West Central region.

The utilization of the end-use stock is captured by the heating utilization variable *HeatUse*. Heating system usage levels are impacted on a monthly basis by several factors, including weather, commercial level economic activity, and prices.

Equation 23

$$HeatUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{04}}\right)^{E_P} \times \left(\frac{Output_{y,m}}{Output_{04}}\right)^{E_O} \times \left(\frac{HDD_{y,m}}{HDD_{04}}\right)$$

where $Price_{y,m}$ is the average commercial real price of electricity in year y and month m, $Price_{04}$ is the average commercial real price of electricity in 2004, E_P is the price elasticity, $Output_{y,m}$ is the economic output in year y and month m, $Output_{04}$ is the economic output in 2004, E_O is the output elasticity, $HDD_{y,m}$ is the revenue-month heating degree days, and HDD_{04} is the annual heating degree days for 2004.

By construction, the $HeatUse_{y,m}$ variable has an annual sum that is close to one in the base year, 2004. The *HDD* term serves to allocate annual values to months of the year. The remaining terms average to one in the base year. In other years, the values will reflect changes in the economic driver changes, as transformed through the end-use elasticity parameters.

3.5.2 COOLING END-USE VARIABLE

The explanatory variable for cooling loads is constructed in a similar manner as space heating. The amount of energy used by cooling systems depends on cooling degree days, cooling equipment saturations, cooling equipment operating efficiencies, building characteristics, commercial output, and energy prices. The cooling variable is represented as the product of an equipment-based index and monthly usage multiplier. That is,

Equation 24

$$\text{XCool}_{\text{y,m}} = \text{CoolIndex}_{\text{y}} \times \text{CoolUse}_{\text{y,m}}$$

where $xCool_{y,m}$ is estimated cooling energy use in year y and month m, $CoolIndex_y$ is an index of cooling equipment, and $CoolUse_{y,m}$ is the monthly usage multiplier. As with heating, the *CoolIndex* depends on equipment saturation levels normalized by operating efficiency levels. Formally, the cooling equipment index is defined as:

Equation 25

$$CoolIndex_y = \left(\frac{kWh}{Sqft}\right)_{cooling} \times \frac{\left(Sat_y / Eff_y\right)}{\left(Sat_{04} / Eff_{04}\right)}$$

Historical and projected cooling equipment saturation trends are derived from EIA's CBECS for the North West Central region. Cooling equipment efficiency trends are obtained from EIA's study for the North West Central region.

Data values in 2004 are used as a base year for normalizing the index, and the ratio on the right is equal to 1.0 in 2004. In other years, it will be greater than one if equipment saturation levels are above their 2004 level. This will be offset by higher efficiency levels, which will drive the index downward. The average space cooling intensity is computed as energy sales for space cooling per square feet of floor space.

Cooling system usage levels are impacted on a monthly basis by several factors, including weather, economic activity levels, and prices. Using elasticity parameters, the estimates for cooling equipment usage levels are computed as follows:

Equation 26

$$CoolUse_{y,m} = \left(\frac{\Pr ice_{y,m}}{\Pr ice_{04}}\right)^{E_P} \times \left(\frac{Output_{y,m}}{Output_{04}}\right)^{E_O} \times \left(\frac{CDD_{y,m}}{CDD_{04}}\right)$$

where $CDD_{y,m}$ is the revenue month cooling degree days in year y and month m, and CDD_{04} is the annual cooling degree days for 2004.

By construction, the $CoolUse_{y,m}$ variable has an annual sum that is close to one in the base year, 2004. The *CDD* term serves to allocate annual values to months of the year. The remaining terms average to one in the base year. In other years, the values will reflect changes in the economic driver changes.

3.5.3 OTHER END-USES

Monthly estimates of non-weather sensitive sales can be derived in a similar fashion to space heating and cooling. Based on end-use concepts, other sales are driven by equipment saturation levels, efficiency levels, commercial output, prices, and the number of days in the billing cycle. The explanatory variable for other uses is defined as follows:

Equation 27

$$\mathrm{XOther}_{y,m} = \mathrm{OtherIndex}_{y} \times \mathrm{OtherUse}_{y,m}$$

The first term on the right-hand side of this expression ($OtherIndex_y$) embodies information about equipment saturation levels and efficiency levels. The second term (*OtherUse*) captures the impact of changes in price, income, and number of billing-days on appliance utilization. The equipment index for other uses is defined as follows:

Equation 28

$$OtherIndex_y = \sum_{Type} Weight^{Type} \times \left(\frac{Sat_y^{Type} \big/ Eff_y^{Type}}{Sat_{04}^{Type} \big/ Eff_{04}^{Type}} \right)$$

where, *Weight* is the weight for each equipment type (measured in kWh/sqft), Sat_y represents the fraction of floor stock with an equipment type, and Eff_y is the average operating efficiency. This index combines information about trends in saturation levels and efficiency levels for the main equipment categories. The average equipment intensity is computed as energy sales for equipment per square feet of floor space. The annual saturation and efficiency levels for non-HVAC equipment are taken from the spreadsheet developed by EIA's study for the West North Central region.

Monthly variation is introduced by multiplying by usage factors and a monthly multiplier ($Mult_m$), and constructed as follows:

Equation 29

$$OtherUse_{y,m} = \left(\frac{\mathrm{Price}_{y,m}}{\mathrm{Price}_{01}}\right)^{E_P} \times \left(\frac{Output_{y,m}}{Output_{01}}\right)^{E_O} \times Mult_m$$

Where E_p and E_o are elasticity parameters. The *OtherUse* and *XOther* variables are constructed at the "*StrucVars*" transformation table in the project files.

3.6 ESTIMATED GENERAL SERVICE MODELS

The Small General Service (SGS) and Large General Service (LGS) tariff classes are estimated using an average use per customer models. Tables 28 and 29 show the coefficients and goodness of fit for the general service models.

Table 28: MPS General Service Model Results

	Small General Service	Large General Service
Estimation Period	1/2005-12/2008	1/2005-12/2008
MAPE	2.02%	2.73%
R^2	0.956	0.892

MPS Small General Service		
Variable	Coefficient	T-Stat
Const	642.482	2.6
XOther_SmlGen	0.550	4.7
XHeat55_SmlGen	4.091	10.9
XCool55_SmlGen	4.302	21.4
Calibrate	-31.096	-0.9
Jun08	-164.679	-2.5
Jan05	254.877	1.4
AR(1)	0.396	2.4

MPS Large General Service		
Variable	Coefficient	T-Stat
XOther_LrgGen	0.940	40.0
XHeat55_LrgGen	0.872	2.0
XCool55_LrgGen	3.322	15.2
Apr94	0.000	0.0
AR(1)	0.389	2.9

Table 29: SJLP General Service Model Results

	Small General Service	Large General Service
Estimation Period	6/1995-12/2008	6/1995-12/2008
MAPE	4.78%	2.72%
R^2	0.785	0.865

SJLP Small General Service		
Variable	Coefficient	T-Stat
XOther_SmlGen	0.805	42.9
XHeat55_SmlGen	5.777	16.7
XCool55_SmlGen	4.323	23.6
AR(1)	0.129	1.6

SJLP Large General Service		
Variable	Coefficient	T-Stat
Const	20985	14.7
XOther_LrgGen	0.089	1.5
XHeat55_LrgGen	2.679	13.4
XCool55_LrgGen	2.711	25.5
Jan04	-1172.192	-1.1
Aug04	2843.356	3.0
Jan	890.217	2.8
AR(1)	0.286	2.6

Charts 15 through 18 show resulting actual and predicted values for each of the general service classes. For LGS customer of MPS, there is a noticeable drop in use during the current recession. LGS has a significant number of manufacturing customers who have been particularly affected by the recession.

Chart 15: MPS Small General Service Average Use Model

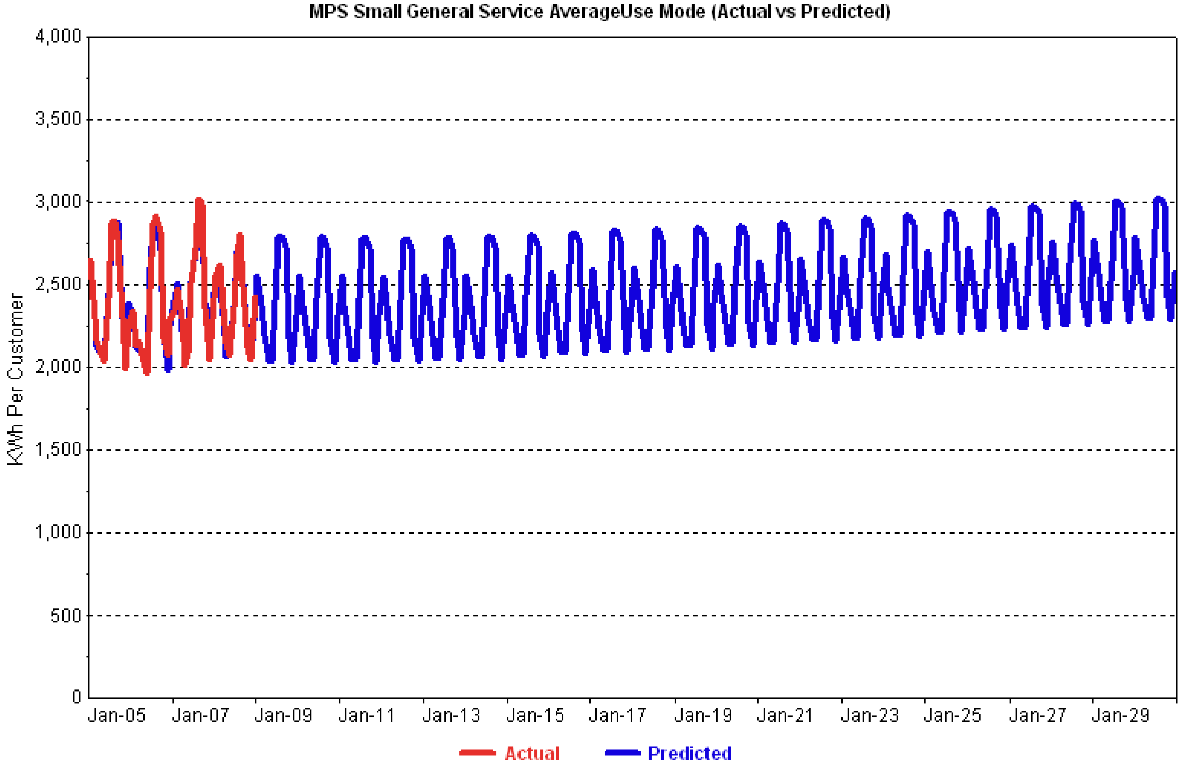


Chart 16: MPS Large General Service Average Use Model

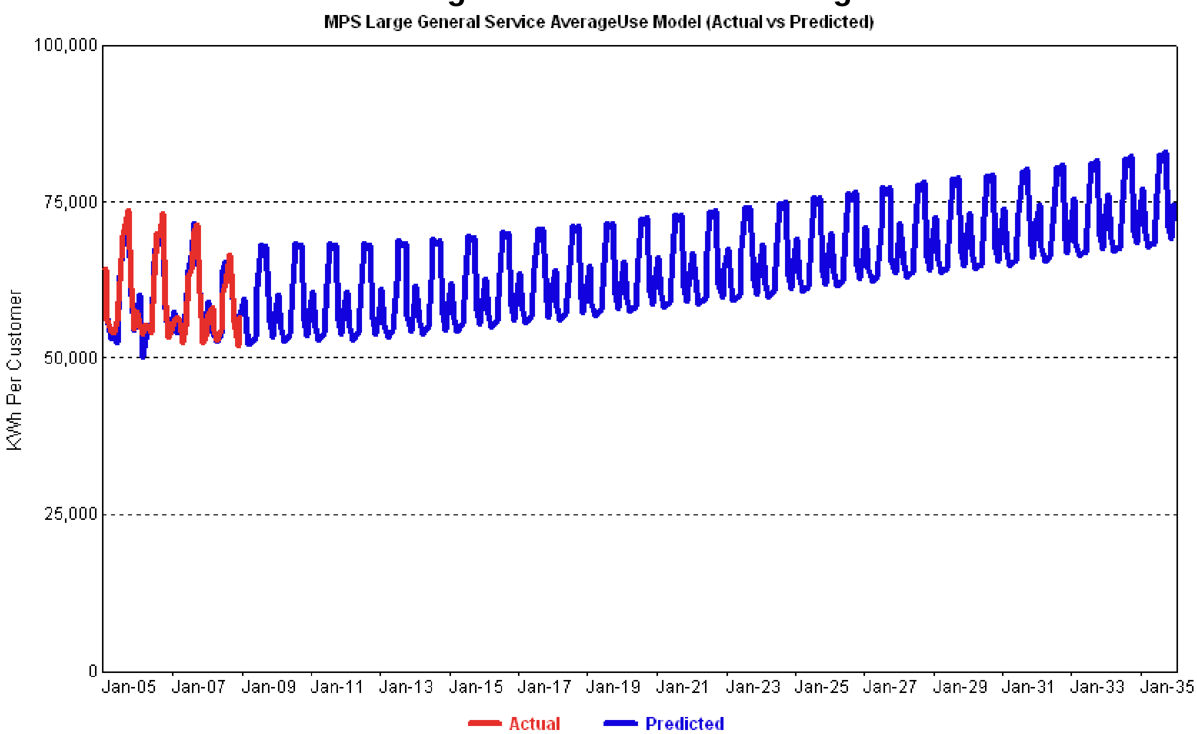


Chart 17: SJLP Small General Service Average Use Model

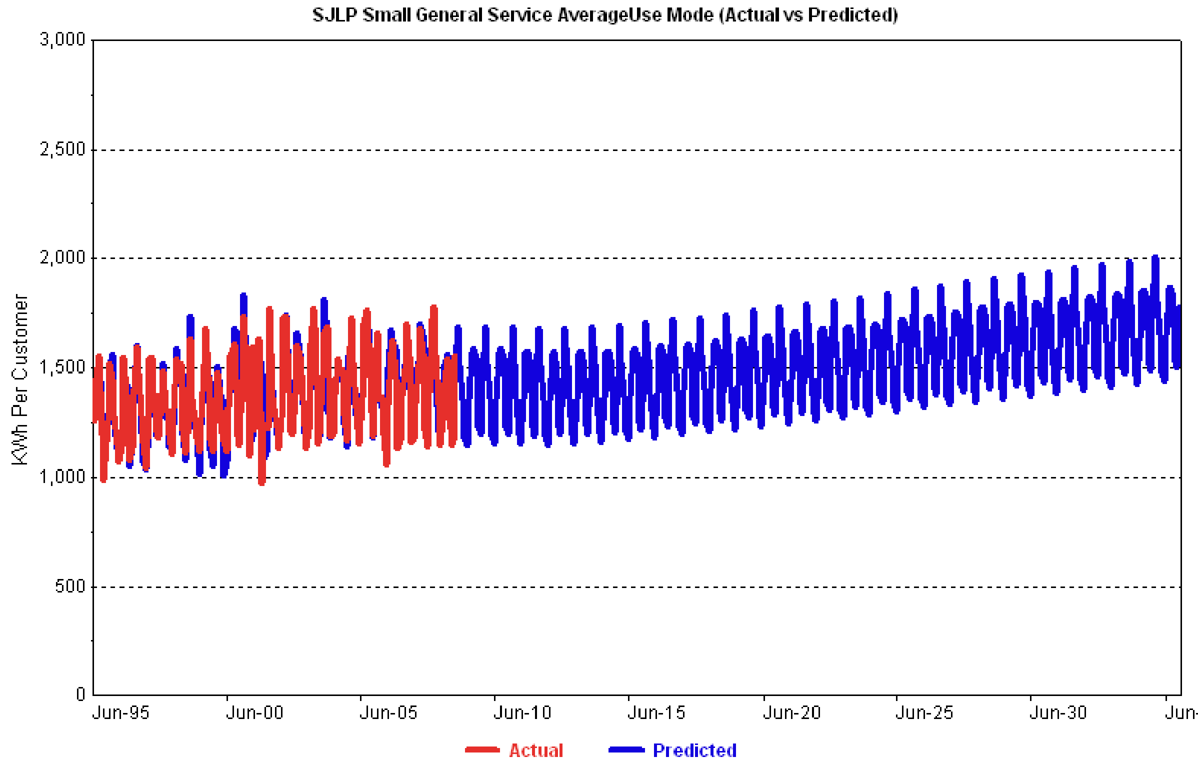
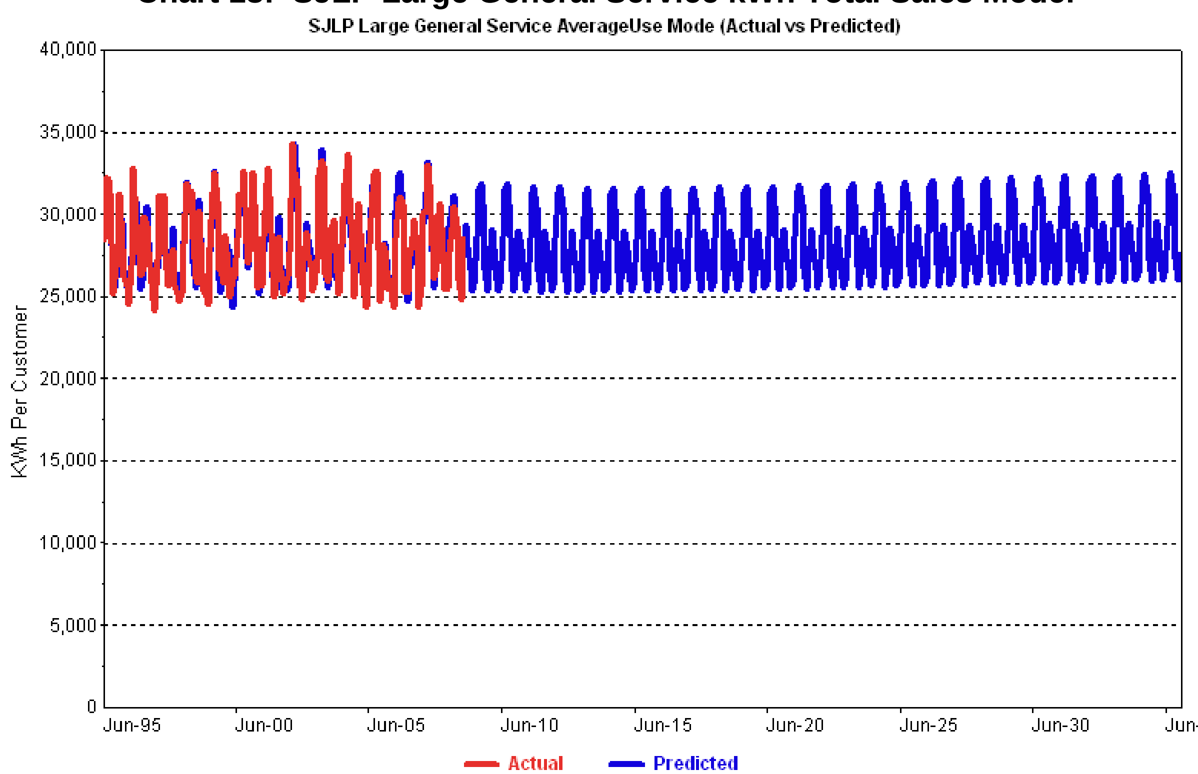


Chart 18: SJLP Large General Service kWh Total Sales Model



3.7 AVERAGE USE BASE CASE FORECAST

The General Service sales forecasts are generated as a product of the customer forecast and monthly average use. Summing over the monthly model results yields the annual sales forecast.

Charts 19 through 22 show the annual electric forecasts for MPS and SJLP by tariff group.

Chart 19: MPS Small General Service

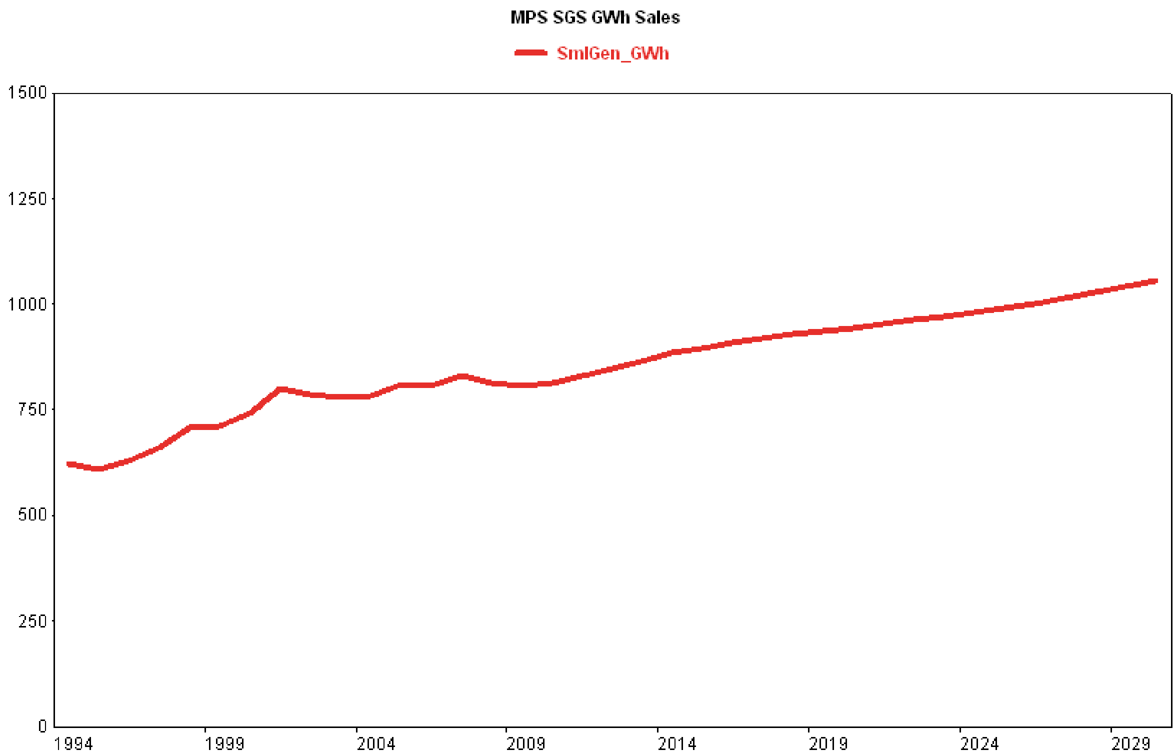


Chart 20: MPS Large General Service

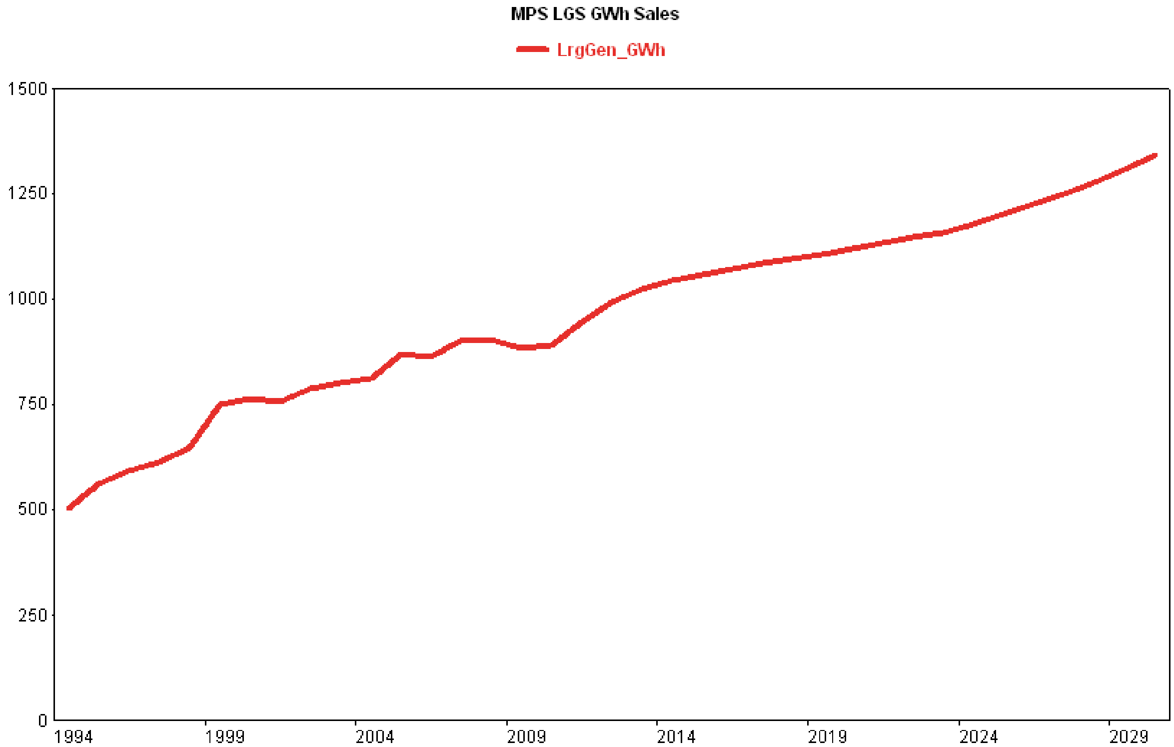


Chart 21: SJLP Small General Service

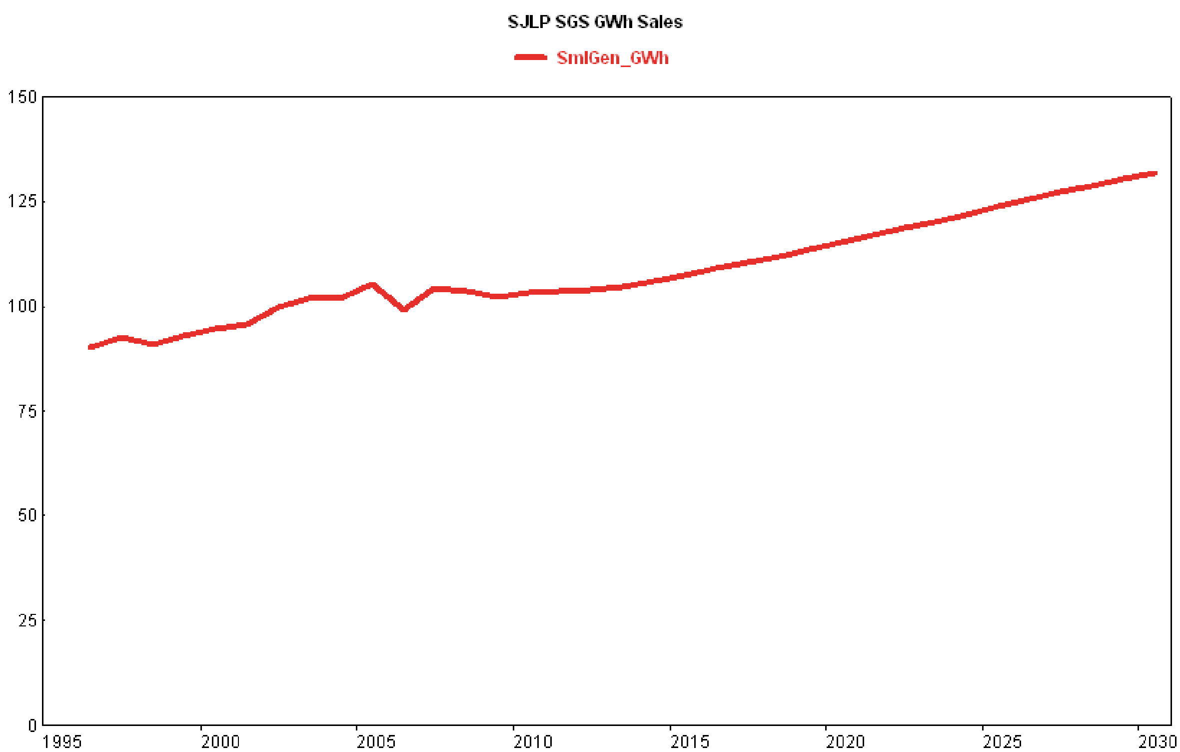
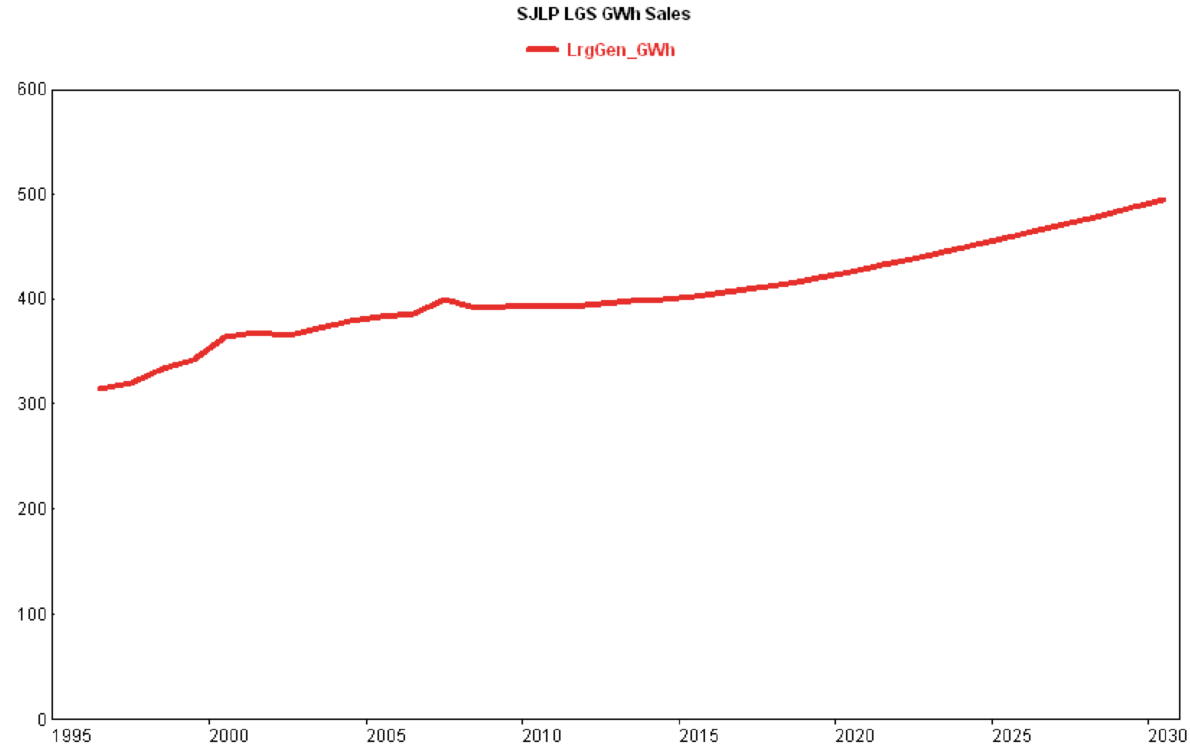


Chart 22: SJLP Large General Service



3.8 LOAD SHAPES

Monthly end-use sales forecasted for general service customers are combined with hourly end-use load profiles. The general service end-use profiles are based on load research data collected in 2007. Refer to Section 6, Energy and Demand for information about general service class and end-use daily load profiles and the use of these profiles in forecasting energy and demand.

SECTION 4: LARGE POWER

4.1 SUMMARY

GMOhas a relatively small large power sector, and most of these customers are in the category of light manufacturing. Thus their end-use profile is more like that of commercial customers, particularly warehouses and offices, than heavy manufacturing. For this reason, we adapted the SAE model for the commercial sector to GMO's large power customers.

The large power class billed electricity consumption is expected to increase at a 2.1% annual rate between 2008-2030. A higher rate of growth is expected on the MPS side of GMO's service territory. Table 30 summarizes the large power energy forecast.

Table 30: Large Power Historical and Forecasted Billed GWh Sales

Historical and Forecasted Billed GWh Sales Large Power			
Year	**MPS**	**SJ**	**GMO**
1996	939	500	1,439
2001	1,091	601	1,692
2006	1,332	741	2,073
2007	1,397	795	2,192
2008	1,416	853	2,269
2010	1,449	878	2,327
2015	1,609	947	2,556
2020	1,823	1,050	2,873
2025	2,052	1,151	3,203
2030	2,335	1,247	3,582

Annual Growth Rates			
1996-2001	3.0%	3.7%	3.3%
2001-2006	4.1%	4.3%	4.1%
2006-2008	3.1%	7.3%	4.6%
2007-2008	1.4%	7.3%	3.5%
2008-2010	1.2%	1.4%	1.3%
2010-2015	2.1%	1.5%	1.9%
2015-2020	2.5%	2.1%	2.4%
2020-2025	2.4%	1.8%	2.2%
2025-2030	2.6%	1.6%	2.3%
2008-2030	2.3%	1.7%	2.1%

4.2 METHODOLOGY

The SAE approach was used to develop models to forecast the sales of the large power classes for MPS and SJLP. The techniques used are similar to those used in the residential and general service classes.

4.3 CUSTOMER ANALYSIS

Separate customer forecast models were constructed for each jurisdiction. Simple monthly regression models were estimated that relate gross product in manufacturing, for the Kansas City or St. Joseph MSA to historical monthly customer data. Table 31 shows the model results by jurisdiction.

Table 31: Large Power Customer Model Results

	MPS Large Power	SJLP Large Power
Estimation Period	1/1990-5/2007	12/2000-5/2007
MAPE	2.10%	2.87%
R^2	0.970	0.888

SJLP Large Power Customers		
Variable	Coefficient	T-Stat
Gross Metro Product	20.286	58.8
Dec01	18.528	7.9
Apr01	-13.242	-5.5
Jan04	-10.617	-4.2
Dec03	12.048	4.7
Aug03	-7.646	-3.3
Jan08	-9.527	-3.7
Dec02	11.107	4.8
Sep07	7.794	3.3
Year≤2007	-10.195	-8.8
Dec07	8.148	3.2
AR(1)	0.421	5.3

MPS Large Power Customers		
Variable	Coefficient	T-Stat
Constant	-90.788	-13.0
Gross Metro Product	3.432	32.8
Apr05	-3.508	-1.0
Feb01	-21.716	-6.1
Apr00	15.600	4.4
AR(1)	0.554	8.6

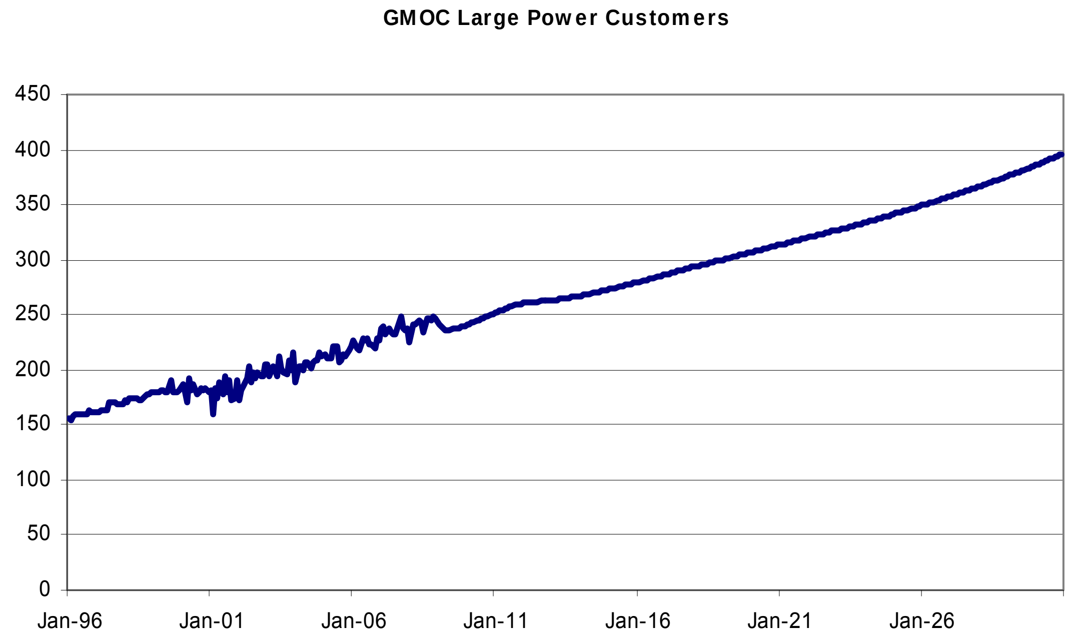
Table 32 shows historical and predicted large power customers by jurisdiction. Chart 23 shows historical and predicted values for the large power class as a whole (MPS and SJLP). On a system basis, customers growth will be 2.2% per year over the 2008-2030 forecast period.

Table 32: Annual Average Industrial Customers

Historical and Forecasted Annual Average Large Power Customers			
Year	**MPS**	**SJ**	**GMO**
1996	113	46	159
2001	125	55	181
2006	165	59	224
2007	171	66	237
2008	172	70	242
2010	175	71	246
2015	201	75	276
2020	227	83	310
2025	254	91	345
2030	290	101	391

Annual Growth Rates			
1996-2001	2.1%	3.7%	2.6%
2001-2006	5.6%	1.4%	4.4%
2006-2008	2.2%	8.6%	4.0%
2007-2008	0.6%	6.7%	2.3%
2008-2010	0.7%	0.7%	0.7%
2010-2015	2.8%	1.2%	2.4%
2015-2020	2.5%	2.0%	2.3%
2020-2025	2.2%	1.9%	2.2%
2025-2030	2.7%	2.0%	2.5%
2008-2030	2.4%	1.7%	2.2%

Chart 23: Large Power Customers



4.4 LARGE POWER END-USE INDICES

Large power end-use indicies are similar to general service indices in that it is constructed solely using EIA's efficiency and end-use saturation series for the West North Central Census region. EIA analyzes ten different energy end-uses as part of their forecasting process.

4.5 LARGE POWER OTHER SAE MODEL SPECIFICATIONS

The SAE modeling used for the Large Power class is similar to the general service SAE modeling in that energy use per customer is defined in year y and month m as the sum of energy used by cooling equipment ($Cool_{y,m}$) and other equipment ($Other_{y,m}$). Formally,

Equation 30

$$Use_{y,m} = Cool_{y,m} + Other_{y,m}$$

To increase the accuracy of this end-use forecast, the variables on the right-hand side of Equation 30 are calibrated to monthly billing data.

Equation 31

$$Use_{y,m} = b_1\ xCool_{y,m} + b_2\ xOther_{y,m} + \varepsilon_{y,m}$$

where *$XCool_{y,m}$*, and *$XOther_{y,m}$* are explanatory variables constructed from end-use information, weather data, and market data. The constructed end-use variables are engineering-based estimates of end-use consumption. The variables are regressed on observed average usage. The estimated model can then be thought of as a statistically adjusted end-use model, where the estimated coefficients for the end-use variables are adjustment factors. Examples for calculating XCool, and XOther for Large Power are shown in Table 33.

Table 33: Calculation of XCool, and XOther

XHeat55_LrgPwr	EconTrans.LrgPwr_Prc_Ind ^ Elas.Price_LrgPwr * EconTrans.GMP_Index ^ Elas.Output_LrgPwr * WthrIndex.HDD55 * Convstock (Indices.Heating_LrgPwr)
XCool55_LrgPwr	EconTrans.LrgPwr_Prc_Ind ^ Elas.Price_LrgPwr * EconTrans.GMP_Index ^ Elas.Output_LrgPwr * WthrIndex.CDD55 * Convstock (Indices.Cooling_LrgPwr)
XOther_LrgPwr	EconTrans.LrgPwr_Prc_Ind ^ Elas.Price_LrgPwr * EconTrans.GMP_Index ^ Elas.Output_LrgPwr * WthrTrans.LPBDays_Index * Convstock (Indices.NonHVAC_LrgPwr)
GMP_Index	Economics.GMP / IndexValues.GMP
GPNonMan_Ind	Economics.GP_Non_Man / IndexValues.GP_Non_Man
GPMan_Ind	Economics.GP_Man / IndexValues.GP_Man
LrgPwr_Prc_Ind	Price.LrgPwr / IndexValues.LrgPwr_Price

4.6 ESTIMATED LARGE POWER MODEL

Large Power (LP) models are estimated using total monthly billed sales rather than on kwh sales per customer. These models include binary indicator variables for certain months and error correction terms. Table 34 shows the results from the models.

Table 34: MPS and SJLP Large Power Model Results

	MPS Large Power	SJLP Large Power
Estimation Period	1/1994-12/2008	1/1996-12/2008
MAPE	4.09%	9.44%
R^2	0.920	0.664

SJLP Large Power Sales		
Variable	Coefficient	T-Stat
Const	-21512061.75	-4.6
XCool55_LrgPwr	401574.11	17.6
XOther_LrgPwr	29703.55	29.7
Nov01	40029380.78	7.7
Apr94	27540675.45	5.2
Feb01	-31312716.83	-6.0
Mar01	23145437.70	4.4
Aug07	21033066.97	3.9
Oct01	-18746699.19	-3.6
Calibration	-5920402.47	-3.5

MPS Large Power Sales		
Variable	Coefficient	T-Stat
Const	12911745.66	1.1
XCool55_LrgPwr	1235.21	3.8
XOther_LrgPwr	104.59	5.0
Jan04	-21732022.89	-3.6
oct07	19082959.39	3.4
Dec01	23824233.53	4.2
Jan08	-17579064.94	-2.9
Sep01	19664590.63	3.4
Jun05	15792685.26	2.8
Calibration	-18779272.15	-7.2
Jan	-1842607.30	-1.0
Jul	-3020669.04	-1.7
MA(1)	0.39	4.7

Charts 24 and 25 shows resulting actual and predicted values for each of the Large Power classes.

Chart 24: MPS Large Power

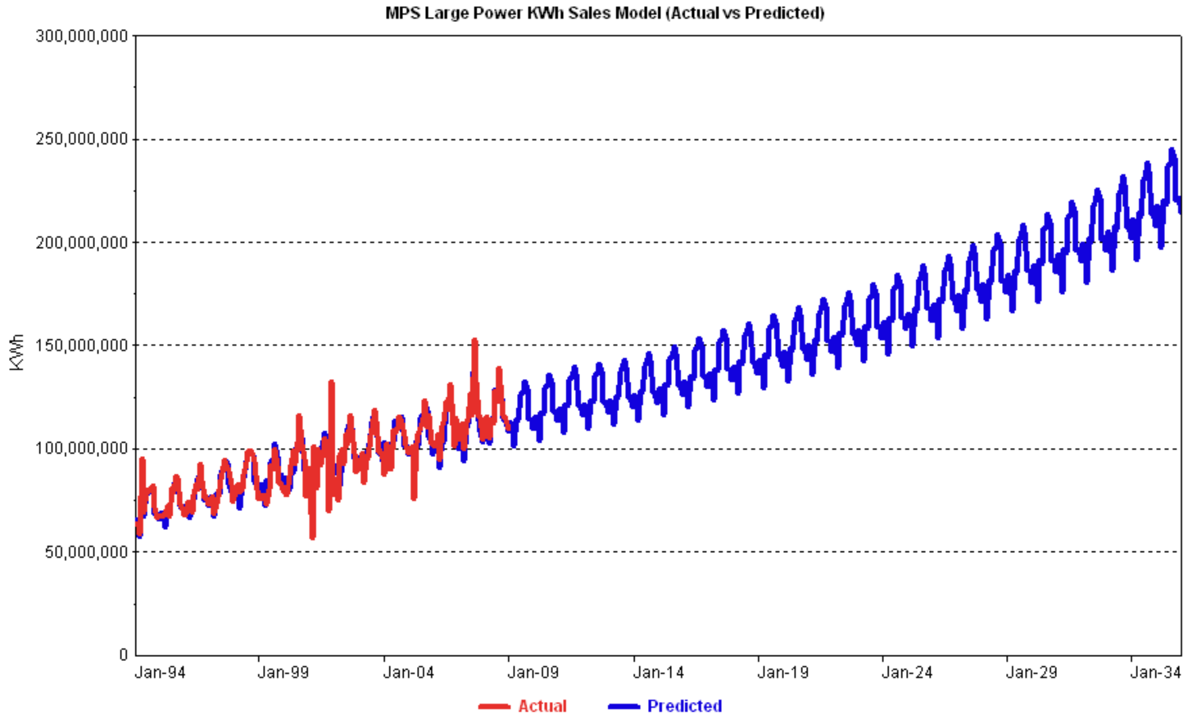
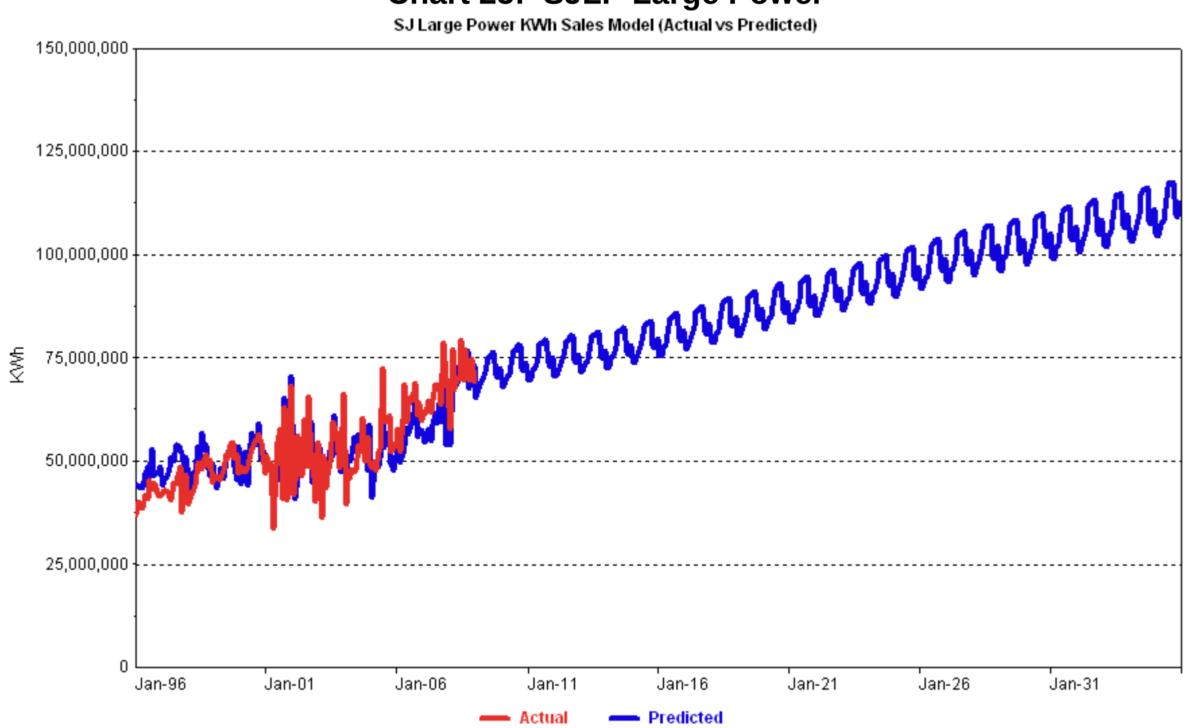


Chart 25: SJLP Large Power



4.7 BASE CASE FORECAST

Total Large Power sales forecast are generated as a product of the monthly sales. Charts 26 through 27 show the annual energy forecast for MPS and SJLP large power tariff classes.

Chart 26: MPS Large Power Base Annual Forecast

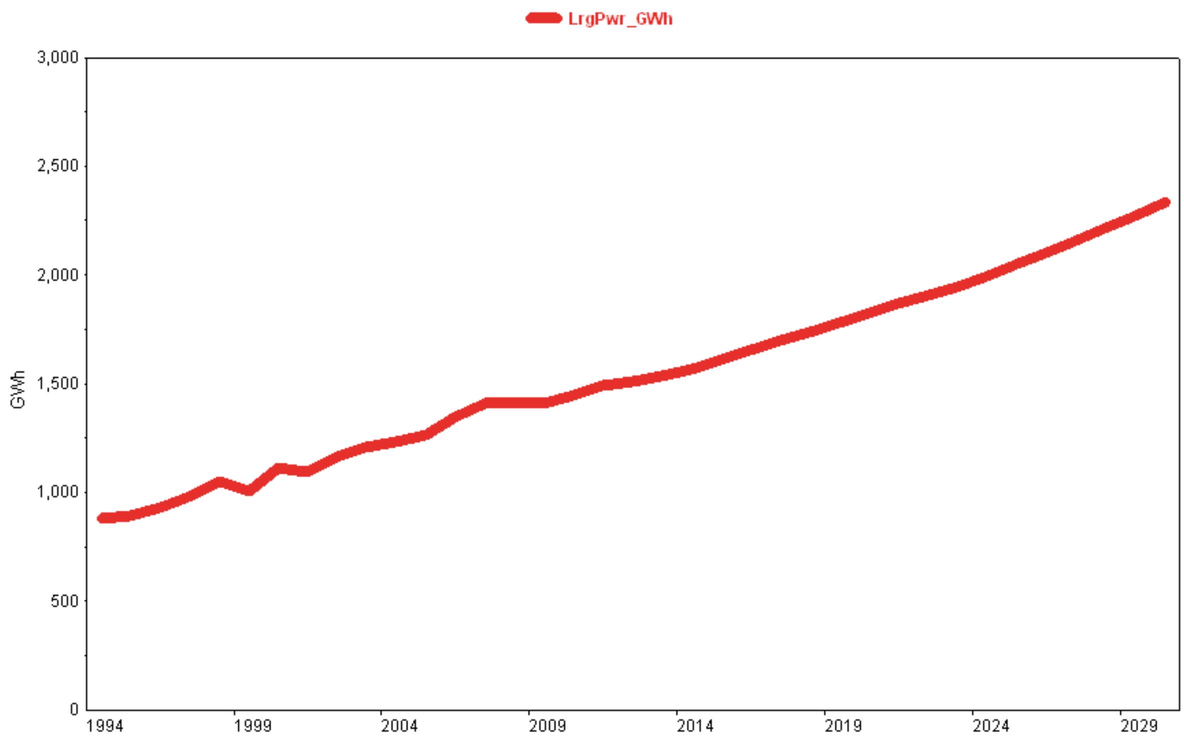
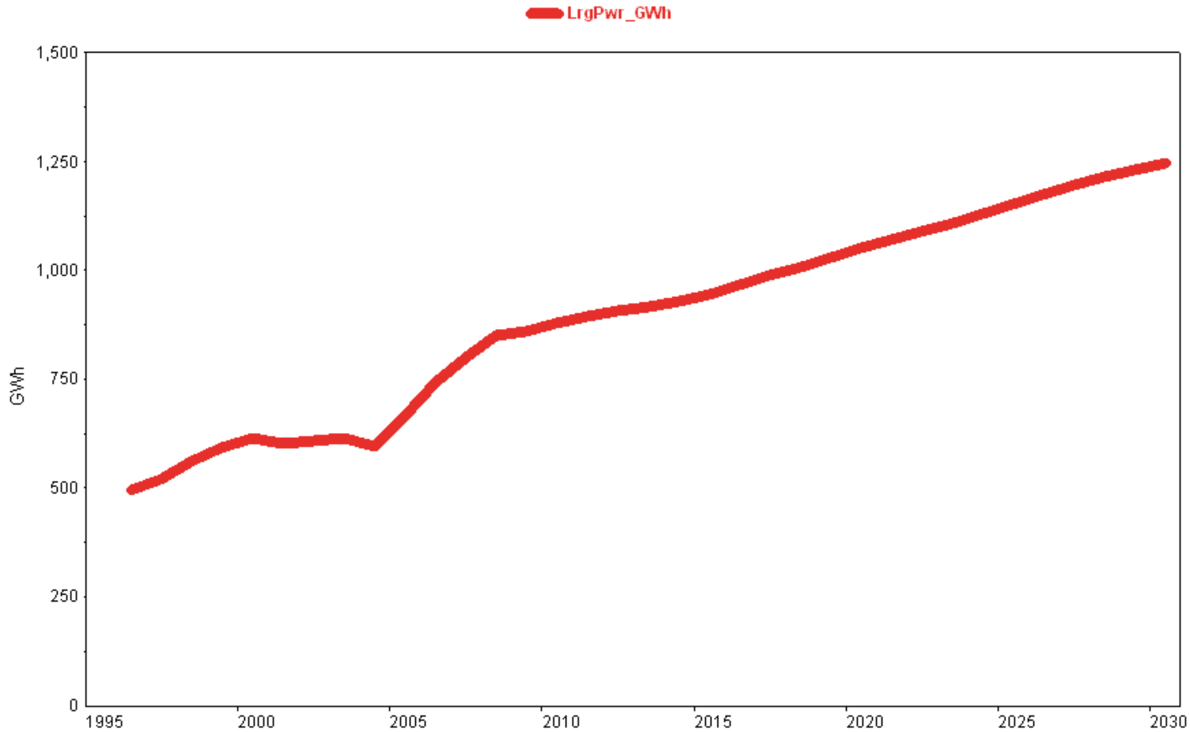


Chart 27: SJLP Large Power Base Annual Forecast



4.8 LOAD SHAPES

The large power end-use profiles are based on load research data. Refer to Section 6, Energy and Demand for information about large power class and end-use daily load profiles and the use of these profiles in forecasting energy and demand.

SECTION 5: OTHER RETAIL SALES

5.1 LIGHTING SUMMARY

Lighting customers are forecasted to be flat at 0.4 percent for MPS and 0.2 percent for SJLP over the 2008–2030 forecast. Simple trend models are used for forecasting both MPS and SJLP.

Sales for this group are expected to grow at 0.9% percent over the 2008-2030 forecast.

Table 35: Lighting Retail GWh Sales

Historical and Forecasted Billed GWh Sales Lighting			
Year	**MPS**	**SJ**	**GMO**
1996	36.7	18.6	55.3
2001	40.9	20.5	61.4
2006	46.1	22.0	68.1
2007	46.9	22.3	69.2
2008	47.3	22.1	69.4
2010	48.5	22.4	70.9
2015	52.7	23.5	76.2
2020	55.3	24.5	79.8
2025	56.9	25.5	82.4
2030	57.6	26.5	84.1

Annual Growth Rates			
1996-2001	2.2%	1.9%	2.1%
2001-2006	2.4%	1.9%	2.1%
2006-2008	1.3%	1.5%	2.1%
2007-2008	0.9%	-0.9%	0.3%
2008-2010	1.3%	0.7%	1.1%
2010-2015	1.7%	0.9%	1.4%
2015-2020	1.0%	0.8%	0.9%
2020-2025	0.6%	0.8%	0.6%
2025-2030	0.3%	0.8%	0.4%
2008-2030	0.9%	0.8%	0.9%

5.2 ESTIMATED LIGHTING MODELS

The forecast models are built from historical usage and driven by the number of households for MPS and a trend for SJLP. Table 36 shows the model coefficients for lighting.

Table 36: Model Coefficients for Lighting

MPS Lighting		
Variable	Coefficient	T-Stat
Const	-2,871,172.9	-12
Total_Household	8,180.2	13.6
Apr00	533,424.5	11.1
Jul00	-339,583.1	-6.9
Dec00	440,484.4	9
Aug00	319,702.2	5.6
LagDep(1)	0.1	1.6
AR(1)	0.4	5.2

SJLP Lighting		
Variable	Coefficient	T-Stat
Jul08	-548,104.9	-47.2
Apr97	131,260.2	11.6
Feb97	-120,465.9	-10.4
Jan	27,418.7	4.7
Feb	13,325.6	3.0
May	20,207.9	4.6
Jun	45,987.6	7.9
Jul	49,956.0	7.4
Aug	32,656.8	4.5
Sep	39,074.2	5.2
Oct	35,740.9	4.8
Nov	18,644.4	2.6
Dec	23,539.1	3.5
TrendVar	45.8	103.1
AR(1)	0.9	29.2

5.3 SALES FOR RESALE (SFR)

Individual class regression models were created for each region. The MPS Sales for Resale (SFR) class consists of one customer classification and in SJLP has none. SFR is expected to decline -0.1 percent during the 2008-2030 forecast period. Generally the drivers are weather, usage, price, and the number of households in the KC metro area. SFR customer growth is expected to remain constant during the forecast period, seven customers in MPS territory and none in SJLP. Table 37 shows the GWh sales for the Sales for Resale classifications.

MPS SFR customers are forecasted to be flat (0.0 percent) using a simple trend model.

Table 37: Sales for Resale GWh Sales

Historical and Forecasted Billed GWh Sales Sales for Resale			
Year	MPS	SJ	GMO
1996	190.5	-	190.5
2001	173.8	-	173.8
2006	31.2	-	31.2
2007	32.3	-	32.3
2008	31.2	-	31.2
2010	31.2	-	31.2
2015	31.0	-	31.0
2020	30.9	-	30.9
2025	30.8	-	30.8
2030	30.8	-	30.8

Annual Growth Rates			
1996-2001	-1.8%	0.0%	-1.8%
2001-2006	-29.1%	0.0%	-29.1%
2006-2008	0.0%	0.0%	0.0%
2007-2008	-3.3%	0.0%	-3.3%
2008-2010	0.0%	0.0%	0.0%
2010-2015	-0.1%	0.0%	-0.1%
2015-2020	-0.1%	0.0%	-0.1%
2020-2025	-0.1%	0.0%	-0.1%
2025-2030	0.0%	0.0%	0.0%
2008-2030	-0.1%	0.0%	-0.1%

The model coefficients for SFR are shown in Table 38.

Table 38: Sales for Resale Model Coefficients

MPS Sales For Resale		
Variable	Coefficient	T-Stat
CONST	2,320,421.0	0.695
HDD55	7,384,937.7	7.009
CDD65	7,482,204.2	8.221
Total_Households	-430.7	-0.099
AR(1)	0.3	1.368

SECTION 6: ENERGY AND DEMAND FORECAST

6.1 OVERVIEW

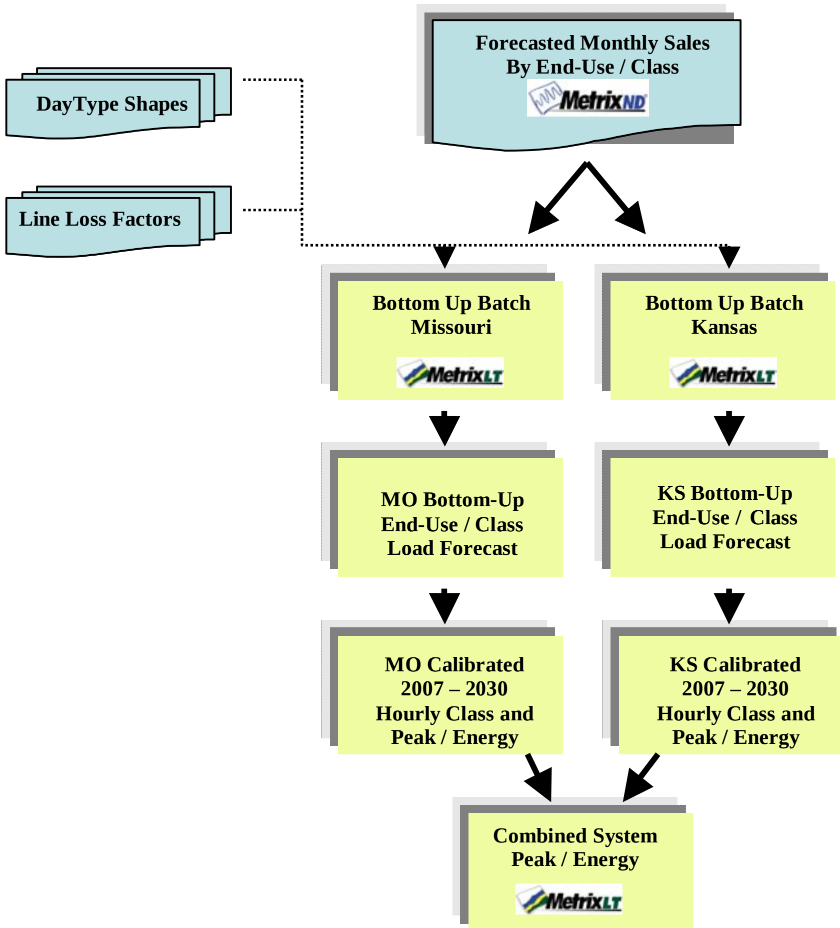
This section provides an overview of the models used to construct an hourly load and peak demand forecast, which was developed using *MetrixLT* software.

MetrixLT is designed to generate an hourly load peak forecast by combining end-use and class energy with hourly load profiles. This “bottom-up” approach entails integrating end-use sales forecasts with end-use and class hourly load forecasts, aggregating the class and revenue class load forecasts.

Monthly end-use sales for residential, small general service, large general service, and monthly sales forecast for large power, lighting, and sales for resale are combined with hourly end-use and class hourly day-type profiles, which were constructed from 2007 load research data.

An initial hourly load forecast is then generated by summing across the end-use and class hourly load forecasts and adjusting the resulting hourly load forecast for system losses. The system load model is then used to generate monthly class and system peak forecasts for 2008 to 2030. Figure 1 depicts the forecast process.

Figure 1: Flow Chart for the Hourly Load and Peak Forecast Process



6.2 FORECAST METHODOLOGY

The following steps are used to develop the energy and peak forecast:

Step 1: Construct residential, small general service, large general service and large power end-use profiles by region.

The residential, general service, and large power end-use profiles are generated using 2007 load research data and imported into *MetrixLT* as "daytype" profiles. GMOdeveloped daytype profiles for heating, cooling, and other use by class and jurisdiction. The daytype profiles represent typical usage patterns for a weekday, weekend, and peak day. A separate set of profiles was provided for each month. The result are 24-hourly end-use profiles. A lighting profile is constructed as a *daytype* model. The profiles are then imported into the *MetrixLT* project file as *Daytype Data*. Hourly daytype profiles generated for MPS residential, general service, and large power can be found in Appendix 3D. Examples of SJLP daytype profiles can be found in Appendix 3E.

6.2.1 HOURLY END-USE CLASS LOAD FORECASTS

Step 2: Develop MPS and SJLP hourly end-use class load forecasts

Hourly load profiles for MPS and SJLP are developed for residential, small general service, large general service, large power, lighting, and resale. Class profiles are generated through the forecast period based on a calendar and normal weather conditions.

Residential, Small General Service, Large General Service, & Large Power Hourly Load Forecasts. The residential, general service and large power end-use hourly load forecasts are generated by combining the monthly end-use sales forecasts with the end-use *Day-type* profiles. *MetrixLT* allocates the monthly end-use sales forecasts to each hour in the year based on the end-use profile. The end-use hourly load forecasts are then summed and adjusted for line losses to generate a hourly load forecast.

Lighting & Resale Hourly Load Forecasts. Combining the class sales forecasts with the class hourly load profiles generates hourly load forecasts for lighting and resale sectors. The monthly hourly load forecasts are allocated to each hour of the year based on the class profiles. Profiles are adjusted for line losses.

Charts 28 and 29 show the resulting seasonal MPS residential and small general service hourly end-use class load forecast.. Hourly end-end-use class load forecast for MPS can be found in Appendix 3F and SJLP in Appendix 3G.

Chart 28: MPS Residential End-Use Forecast

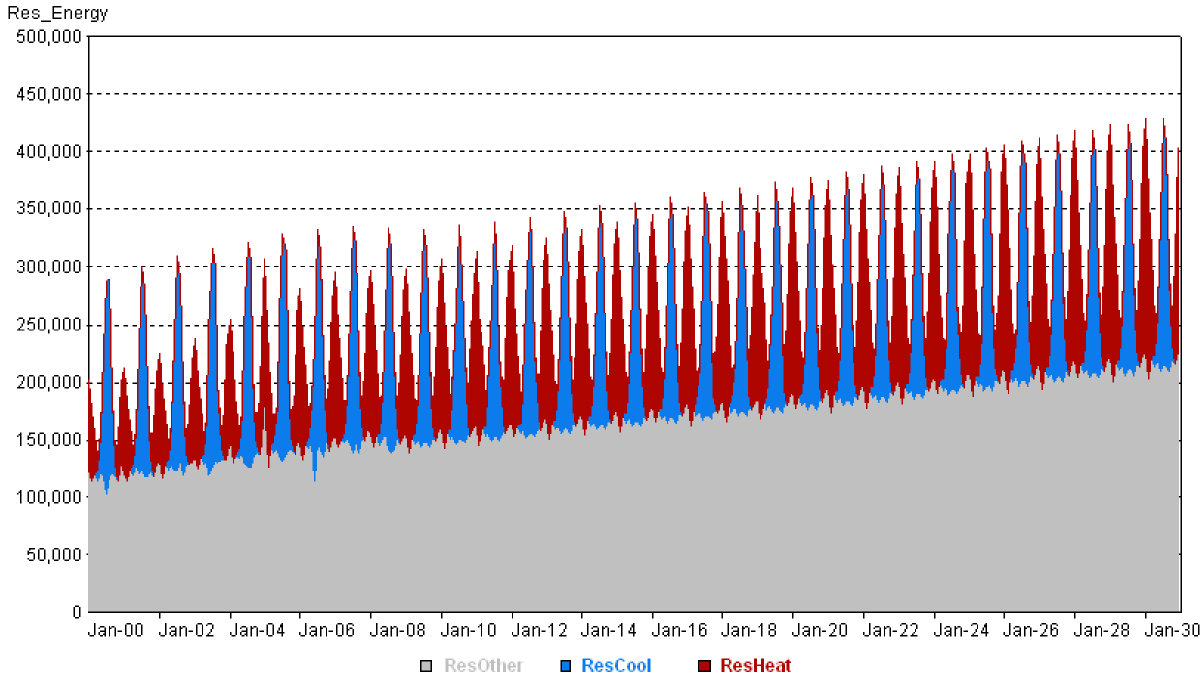
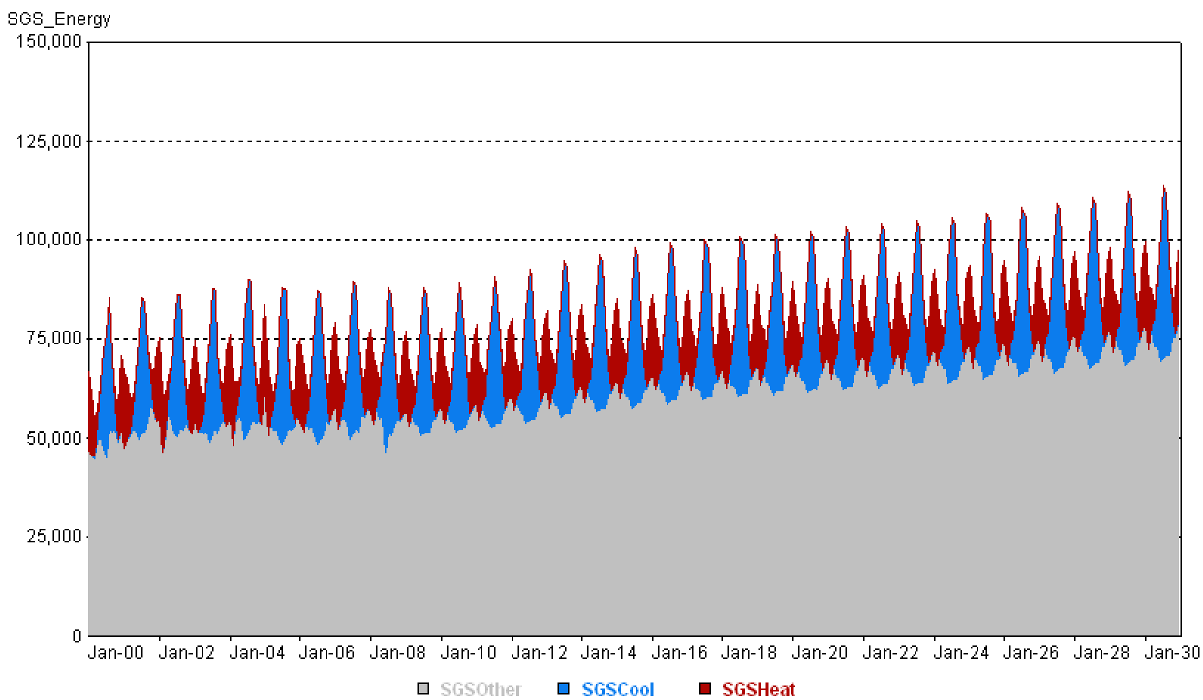


Chart 29: MPS Small General Service Load Profile



Step 3: Construct MPS and SJLP system hourly load forecast

The hourly load forecast is constructed by combining the end-use and class monthly sales forecast with the end-use and class hourly load profiles generated in Steps 1 and 2. The bottom-up forecast is built using a *Batch Transform* object.

Initial State Level Hourly Load Forecast. Separate state files are created in *MetrixLT* for both MPS and SJLP. The initial state level system hourly load forecasts are calculated by summing the class hourly load forecasts. Charts 30 and 31 shows the resulting MPS and SJLP system load.

Chart 30: MPS System Hourly Load

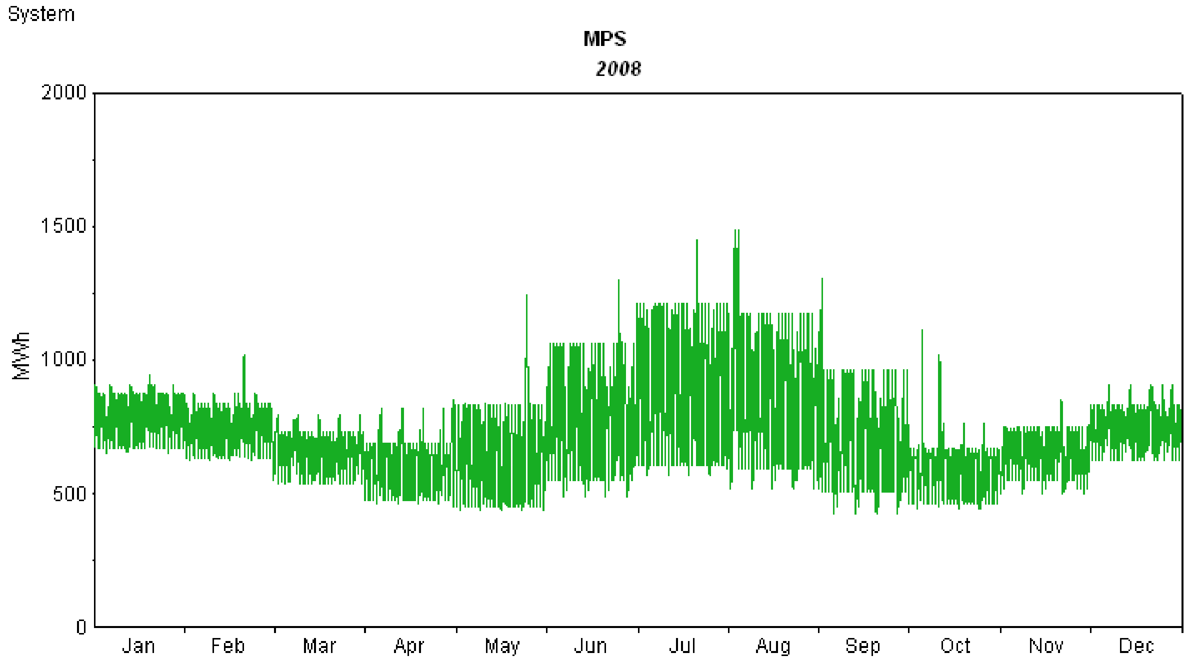
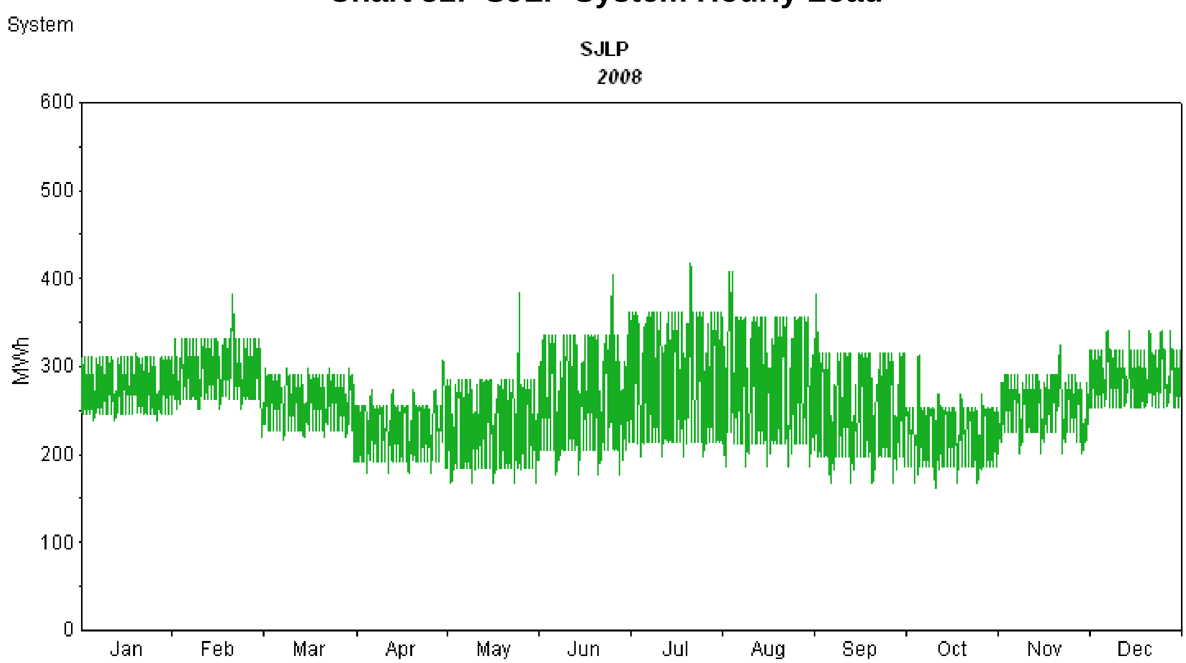


Chart 31: SJLP System Hourly Load



Step 4. Combine MPS and SJLP Bottom-Up Forecast to System Hourly Load

The MPS and SJLP "bottom-up" hourly load forecast is combined in *System MetrixLT* file*.* Each forecast is imported in to MetrixLT as an *Interval Data* table. Then combined in a *Batch Transform* table to create the hourly system load. Monthly and annual system forecasts are created through the use of a *Frequency Transform* table. Chart 32 shows the combined monthly system hourly load for GMOand Chart 33 shows the resulting monthly peak shape.

Chart 32: GMOSystem Hourly Load

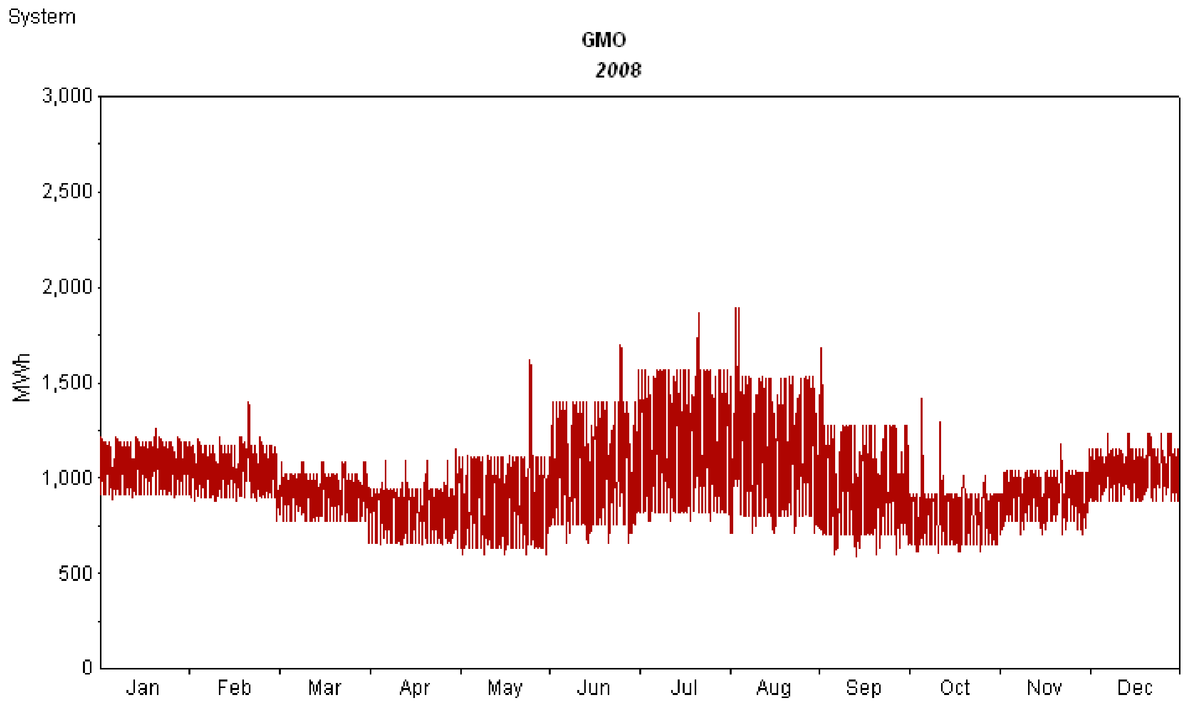
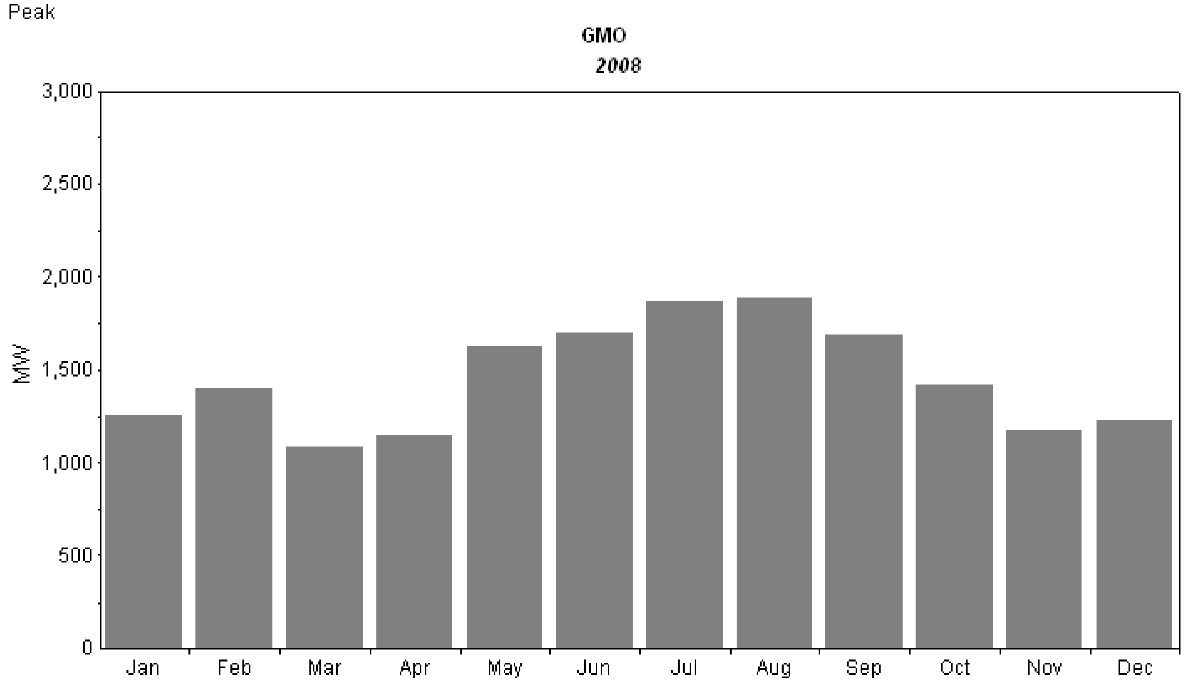


Chart 33: GMOSystem Peak



6.3 <u>RESULTS</u>

Charts 34 and 35 show forecasted monthly peaks and system energy through 2030. The figure shows actual system peaks and energy from January 2000 to December 2008 and peak and energy forecasts based on normal weather conditions less DSM from existing programs from January 2009 to December 2030. The system peak occurs in July with the system peak growing at an average annual growth rate of 1.2%. This compares with system energy growth rate forecast of 1.7%. DSM impacts for energy were accounted for after completing the hourly load and peak forecast process.

Chart 34: Monthly System Weather Normalized Peak Forecast (MW) Excludes DSM

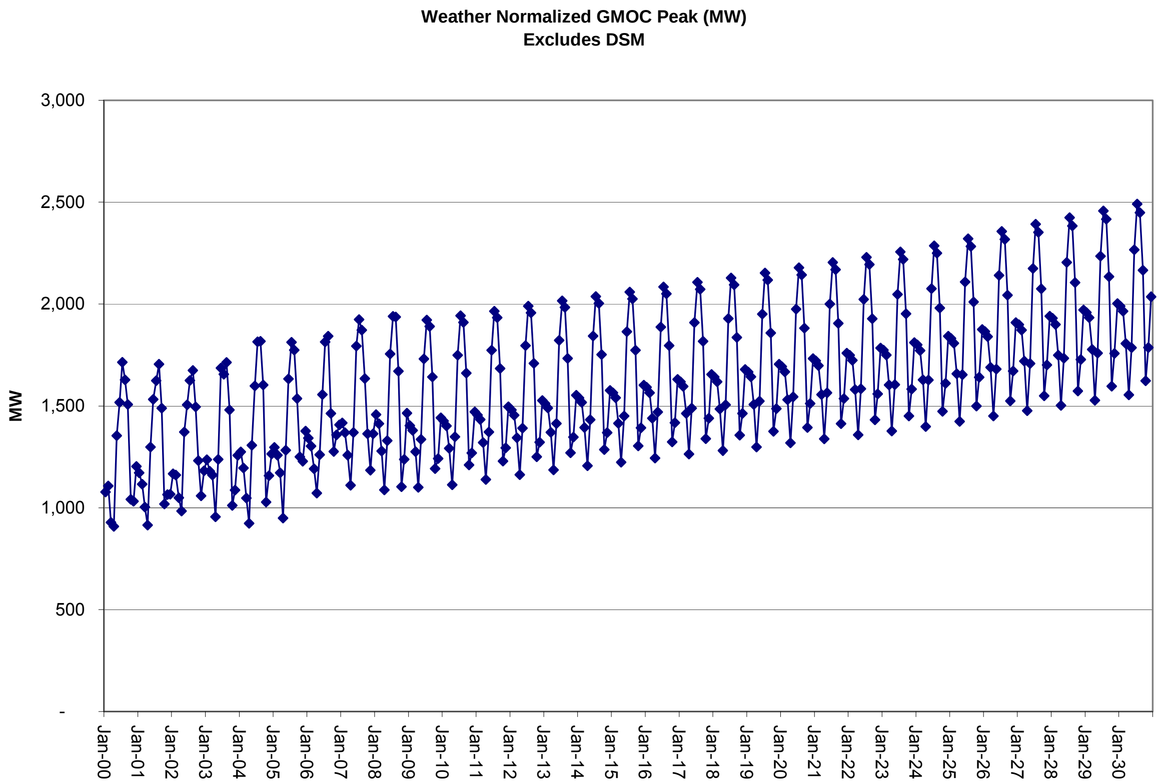
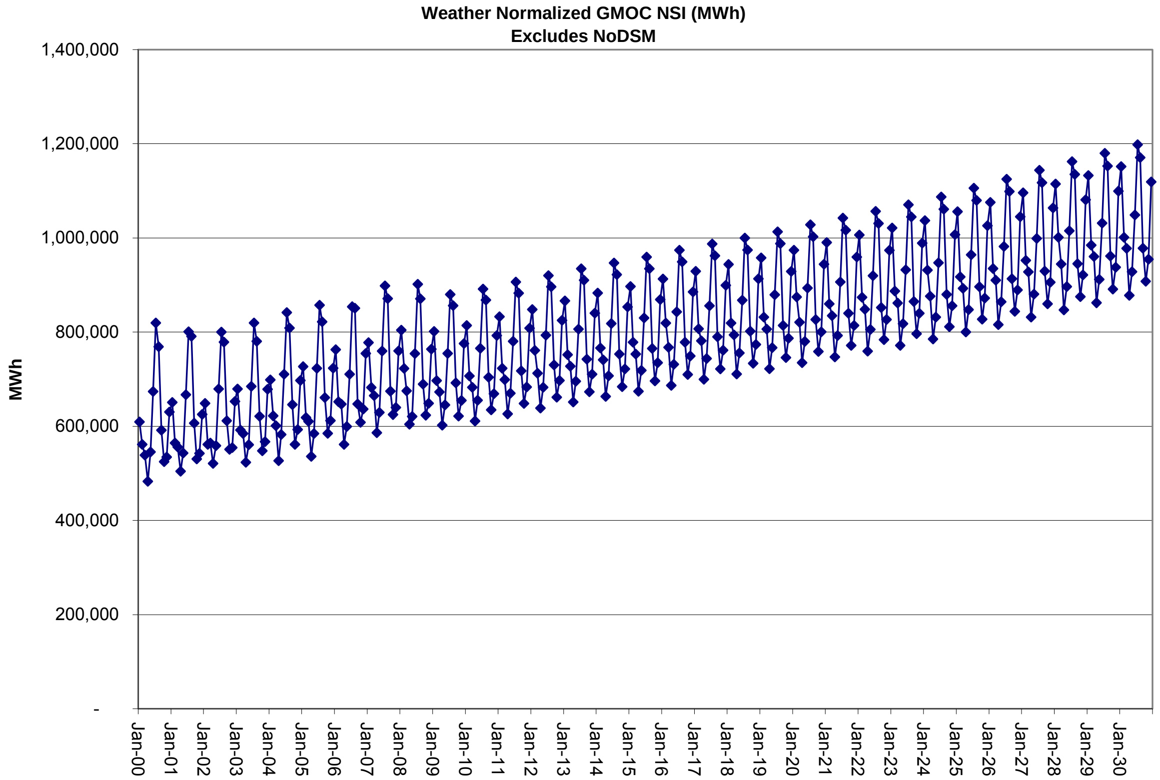


Chart 35: Monthly Weather Normalized NSI Forecast (MWH) Excludes DSM



SECTION 7: IRP RULES COMPLIANCE

Pursuant to Rule 22.030 (1) (A): GMOmaintains data bases with customer class detail. The data bases are stored in Metrix ND project files with the following file names:

MPS_Res.ndm
MPS_SmlGen.ndm
MPS_LrgGen.ndm
MPS_LrgPwr.ndm
MPS_Other.ndm
SJLP_Res.ndm
SJLP_SmlGen.ndm
SJLP_LrgGen.ndm
SJLP_LrgPwr.ndm
SJLP_Other.ndm

The data bases contain customer monthly kwh usage for each customer class starting in 1995.

Pursuant to Rule 22.030 (1) (A) 1: The data bases are maintained for each of the following customer classes:

Major Class	Subclasses
Residential	none
General Service	Small General Service (SGS) Large General Service (LGS)
Large Power (LP)	none
Lighting	none
Sales for Resale	none

Pursuant to Rule 22.030 (1) (A) 2: GMO does not use subclasses for the residential sector. GMO's billing statistics do not track customers by dwelling type. However, and end-use forecast is constructed with data from the US DOE and GMO's customer surveys that incorporates trends in energy use by dwelling type and this forecast is incorporated into the explanatory variables used in GMO's residential models for MPS and SJLP.

Subclasses for general service distinguish customers by size, small or large. GMO's models are fit to monthly billing statistics and these do not distinguish customers by building or product type. However, these models include explanatory variables, constructed with DOE data and forecasts, that are based on business type. The explanatory variables for the large power class were based on business rather than product type because most of the manufacturing in GMO's service area is light rather than heavy. Thus most of the energy use is considered to be end-use related rather than process related.

Pursuant to Rule 22.030 (1) (B) 1: For each customer class, the data bases listed in 1.A include monthly kwh, number of customers, revenue and weather-normalized kwh if weather sensitive. The data is maintained separately for MPS and SJLP.

Pursuant to Rule 22.030 (1) (B) 2: Actual and weather normalized demands at the time of the system peak are maintained for each major class in the following Metrix ND project files:

MPS_Res.ndm
MPS_SmlGen.ndm
MPS_LrgGen.ndm
MPS_LrgPwr.ndm
SJLP_Res.ndm
SJLP_SmlGen.ndm
SJLP_LrgGen.ndm
SJLP_LrgPwr.ndm

Pursuant to Rule 22.030 (1) (B) 3: Actual and weather normalized net system input is maintained in GMOSys.ndm.

Pursuant to Rule 22.030 (1) (C) 1: GMOforecasts energy use for the following units:

Subclass	Units
Residential:	Customer
Small General Service:	Customer
Large General Service:	Customer
Large Power:	None

For the general service and large power classes, GMOuses a two-step process in modeling kwh sales. The first step relies on an estimate of energy use per square foot.

For general service, GMOuses US Department of Energy (DOE) data to forecast energy use per square foot and then multiplies that by a calibration coefficient to compute energy use per customer and then uses this result to forecast sales per customer.

For large power, GMOuses US Department of Energy (DOE) data to forecast energy use per square foot and then multiplies that by a calibration coefficient to compute energy use and then uses this result to forecast total sales for the class.

This Statistically Adjusted End-use (SAE) approach was adopted because it incorporates end-use and efficiency trends that can be calibrated to monthly billing data.

Extensive documentation, including equations and computer code, for the DOE models can be found at:

http://tonto.eia.doe.gov/reports/reports_kindD.asp?type=model%20documentation

Pursuant to Rule 22.030 (1) (C) 2: GMOupdates the models described in this filing once a year. The Metrix ND model files were listed in section 22.030 (1) (A) above. First, actual heating and cooling degree days are uploaded into models along with recent billing data, including the number of customers and kwh sales. Then the models compute weather normalized monthly sales and the monthly weather impacts. This is done routinely during the summer of each year.

Pursuant to Rule 22.030 (1) (C) 2. A: The models used in the current GMOfiling include multiple cooling degree day variables, if statistically significant, to create a piecewise linear temperature response function.

Pursuant to Rule 22.030 (1) (C) 2. B: In each model that is weather sensitive, GMOforecasts the heating, cooling and non-weather sensitive components of sales for each year in the forecast period, 2009-2030. These are summed to forecast total sales. The forecast is computed in the regression models in each Metrix ND project file. The project files are

MPS_Res.ndm	SJLP_Res.ndm
MPS_SmlGen.ndm	SJLP_SmlGen.ndm
MPS_LrgGen.ndm	SJLP_LrgGen.ndm
MPS_LrgPwr.ndm	SJLP_LrgPwr.ndm
MPS_Other.ndm	SJLP_Other.ndm

Pursuant to Rule 22.030 (1) (C) 2. C: GMOfully documented its load forecasting methods[2] and results in its IRP filing.

Pursuant to Rule 22.030 (1) (D): The data base files listed in Section 1.A begin in 1996 and thus contain 13 years of data.

Pursuant to Rule 22.030 (1) (D) 1: The Commission granted GMO a waiver under "Order Granting KCP&L-GMO'S Request For Waivers", Case No. EE-2009-0237, dated March 11, 2009. This waiver allows the data for actual and weather normalized monthly class and system energy usage and actual hourly net system loads to start in January 1994 for MPS and January 1996 for SJLP. Actual and weather normalized sales are stored in Metrix ND project files with the following file names:

MPS_Res.ndm	SJLP_Res.ndm
MPS_SmlGen.ndm	SJLP_SmlGen.ndm
MPS_LrgGen.ndm	SJLP_LrgGen.ndm
MPS_LrgPwr.ndm	SJLP_LrgPwr.ndm
MPS_Other.ndm	SJLP_Other.ndm

Pursuant to Rule 22.030 (1) (D) 2: The Commission granted GMOa waiver under the Order that allowed for the start date for this rule to January 1990 for this filing.

The coincident peaks for each class and the system can be found in Excel files stored in two file folders, 8B_IRP and 8D_IRP.

[2] LOAD FORECAST DOCUMENTATION, 2009-2030 Load Forecast, Released: July 2009

The weather normalized hourly system loads can be found in system.ltm or GMOSys.ndm. These are also provided by jurisdiction in MPS_Fcst.ltm and SJ_Fcst1.ltm.

Pursuant to Rule 22.030 (2) (A): The driver variables and assumptions for these are described in GMO's documentation of the load forecast in the sections for each customer class.

Pursuant to Rule 22.030 (2) (B): Documentation of statistical models can be located as follows in GMO's report on the load forecast:

Residential	Section 2
General Service	Section 3
Large Power	Section 4
Lighting	Section 5.1
Sales for Resale	Section 5.3

Pursuant to Rule 22.030 (2) (C): GMOseparately modeled the number of units (customers) for each subclass.

Pursuant to Rule 22.030 (3) (A) 1: In the residential sector, end-use saturations were measured for electric furnaces, heat pumps, central air conditioners, room air conditioners, electric water heaters, cook tops, ovens, ranges, refrigerators, freezers, dishwashers, clothes washers, electric dryers, and TVs. Information was collected with through a customers survey conducted in the summer of 2008 and in some previous years as is discussed in our report. Saturations were determined for each jurisdiction. The survey responses from 2008 were matched to electricity bills for 2008 and a conditional demand study was used to estimate the unit energy consumption (UEC) for each appliance type.

For the General Service and Large Power classes, information collected by EIA/DOE was used for our customers as was described in our report. EIA conducts the Commercial Buildings Energy Consumption Survey (CBECS) for the North West Central region. CBECS is currently conducted on a quadrennial basis. The EIA also estimates energy use per square foot for each enduse. The enduses included in our modeling are electric space heating, air conditioning, ventilation, electric water heating, cooking, refrigeration, outdoor lighting, indoor lighting, office equipment and miscellaneous for all other enduses.

Pursuant to Rule 22.030 (3) (A) 2: GMOused end-use information gathered from its residential appliance saturation surveys and by the US DOE.

Pursuant to Rule 22.030 (3) (A) 3: GMOused end-use information gathered from its residential appliance saturation surveys and by the US DOE..

Pursuant to Rule 22.030 (3) (A) 4: A miscellaneous enduse was used to represent all other enduses.

Pursuant to Rule 22.030 (3) (B) 1: GMOacquires end-use information from two sources: first, from its biannual residential appliance surveys and secondly, from yearly updates from the DOE. DOE updates include historical and forecasted data for appliance stocks, efficiencies, utilization and standards.

Pursuant to Rule 22.030 (3) (B) 2: Per Waiver Request 3 granted to GMO, individual enduses were aggregated into heating, cooling and other categories prior to calibrating monthly energies and demands using the SAE methodology described in our report.

Pursuant to Rule 22.030 (4): GMOdeveloped load profiles for each customer class in each region, for heating cooling and other end-uses by month and day type. Day types include weekday, weekend and peak day. These profiles were used to allocate forecasted monthly energy use to each hour in the month. GMO's use of load profiles can be found on the following pages of this document:

Residential	Section 2.8, 6.2.1
Small General Service	Section 3.8, 6.2.1
Large General Service	Section 3.8, 6.2.1
Large Power	Section 4.8, 6.2.1
Other	Section 6.2.1

Pursuant to Rule 22.030 (4) (A): The Commission granted our Waiver Request 4 for this rule to specify the enduses for this rule as heating, cooling and other. Statistical regression analysis of tariff level load research data was used to weather normalize load profiles and to separate the loads into heating, cooling and other enduses. Climate data was used in the regression to measure the heating and cooling loads. For each class, the results were then used to compute peak day, average weekday and average weekend load profiles for each month.

Pursuant to Rule 22.030 (4) (B): The hourly end-use load profiles are applied to the energy forecast to develop system hourly loads, which is calibrated to the weather normalized system peak. This calibration factor is then applied to the hourly load forecasts by tariff group and enduse, which include heating, cooling and other.

Pursuant to Rule 22.030 (5): GMO's load forecast was constructed to meet this rule.

Pursuant to Rule 22.030 (5) (A): GMOforecasts monthly peak and energy for MPS and SJLP separately.

Pursuant to Rule 22.030 (5) (B) 1: The methodology to forecast number of units can be found on the following sections of GMO's report:

Residential customers	Section 2.3
Small General Service customers	Section 3.3
Large General Service customers	Section 3.3
Large Power customers	Section 4.3
Lighting customers	Section 5.1
Sales for Resale customers	Section 5.3

Pursuant to Rule 22.030 (5) (B) 1. A: The forecast of driver variables was obtained from Economy.com and is documented in Appendix 3C.

Pursuant to Rule 22.030 (5) (B) 1. B: The forecast of the driver variables is compared to historical trends in Appendix 3C.

Pursuant to Rule 22.030 (5) (B) 2. A: Natural gas and electric prices are used to forecast the saturations of space heating and water heating end-uses. Electric prices, household size and personal income are used to forecast usage.

GMO's use per unit forecast is documented in the following sections of GMO's report:

Residential kwh sales per customer	Section 2.6, 2.8
Small General Service kwh sales per customer	Section 3.6, 3.7
Large General Service kwh sales per customer	Section 3.6, 3.7
Large Power kwh sales per customer	Section 4.6

Pursuant to Rule 22.030 (5) (B) 2. B: The Commission granted GMOit Waiver Request 6 for this rule to specify the enduses as heating, cooling and other. For these end-uses, GMOforecasting monthly use and hourly loads and monthly and seasonal peak demands.

Pursuant to Rule 22.030 (5) (B) 2. C: The methodology that GMOused to forecast energy-using capital goods and how its was used to forecast energy sales and peak demands is described in the following sections:

Residential	Sections 2.4, 2.5
Small General Service	Sections 3.4, 3.5
Large General Service	Sections 3.4, 3.5
Large Power	Sections 4.4, 4.5

Pursuant to Rule 22.030 (5) (B) 2. D: Major class forecast use per unit can be found in Appendix 3H. Any significant differences between the forecasts and long term and trends are discussed on each chart.

Pursuant to Rule 22.030 (5) (C): The net system load profiles for each year of the planning horizon can be found in Appendix 3N.

Pursuant to Rule 22.030 (6): The report for the sensitivity analysis can be found in Appendix 3J. The working files are located in the folder called GMOLongTerm\analysis.

Pursuant to Rule 22.030 (7): GMOproduced a high and low forecast scenario in addition to the base case forecast scenario. These scenarios are each based on a different economic scenario that we obtained from GMO’s vendor, Economy.com. The high and low economic scenarios define a 95% confidence band around the base or most likely scenario. GMO assigns an 80% probability for the base case scenario, and 10% probabilities for the high and low scenarios. These scenarios are discussed in Section 1.4 of GMO’s documentation.

Pursuant to Rule 22.030 (8) (A): See: Appendix 3H.pdf

Pursuant to Rule 22.030 (8) (A) 1: See: Appendix 3H.pdf

Pursuant to Rule 22.030 (8) (A) 2: See: Appendix 3H.pdf

Pursuant to Rule 22.030 (8) (A) 2. A: See: Appendix 3H.pdf

Pursuant to Rule 22.030 (8) (A) 2. A: See: Appendix 3H.pdf

Pursuant to Rule 22.030 (8) (B): See: Appendix 3I.pdf

Pursuant to Rule 22.030 (8) (B) 1: See: Appendix 3I.pdf

Pursuant to Rule 22.030 (8) (B) 2: The commission granted GMOa waiver under the Order, Attachment A, Item 9, for this rule to specify the end-uses as heating, cooling and other. See: Appendix 3I.pdf

Pursuant to Rule 22.030 (8) (C): See: Appendix 3J.pdf

Pursuant to Rule 22.030 (8) (D): See: Appendix 3K.pdf

Pursuant to Rule 22.030 (8) (D) 1: See: Appendix 3K.pdf

Pursuant to Rule 22.030 (8) (D) 2: See: Appendix 3K.pdf

Pursuant to Rule 22.030 (8) (D) 3: See: Appendix 3K.pdf

Pursuant to Rule 22.030 (8) (D) 4: See: Appendix 3K.pdf

Pursuant to Rule 22.030 (8) (E): See: Appendix 3L.pdf

Pursuant to Rule 22.030 (8) (E) 1: The commission granted GMOa waiver under the Order, Attachment A, Item 10, for this rule to specify the end-uses as heating, cooling and other. See: Appendix 3L.pdf

Pursuant to Rule 22.030 (8) (E) 2: See: Appendix 3L.pdf

Pursuant to Rule 22.030 (8) (F): See: Appendix 3M.pdf

Pursuant to Rule 22.030 (8) (F) 1: See: Appendix 3M.pdf

Pursuant to Rule 22.030 (8) (F) 2: See: Appendix 3M.pdf

Pursuant to Rule 22.030 (8) (G): Each Appendix pertaining to Section 4 Rule 8 contains both tabular data and plots.

Pursuant to Rule 22.030 (8) (H) Section 1: through Section 7: of this document provide descriptions and methods used to develop the load forecast. Section 7: provides information on how these methods comply with the rules.