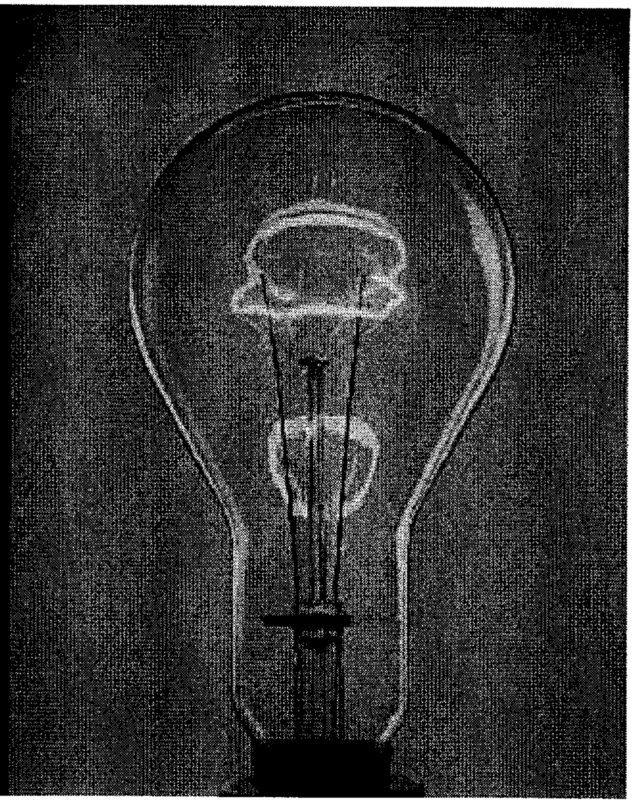
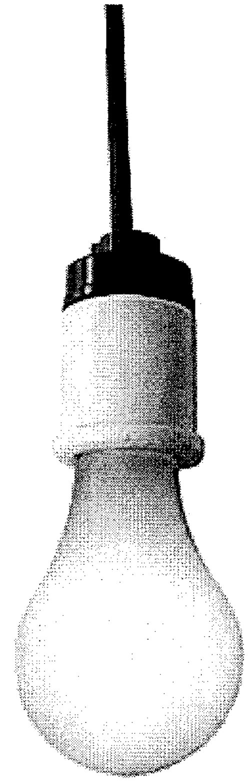
Attachment 1

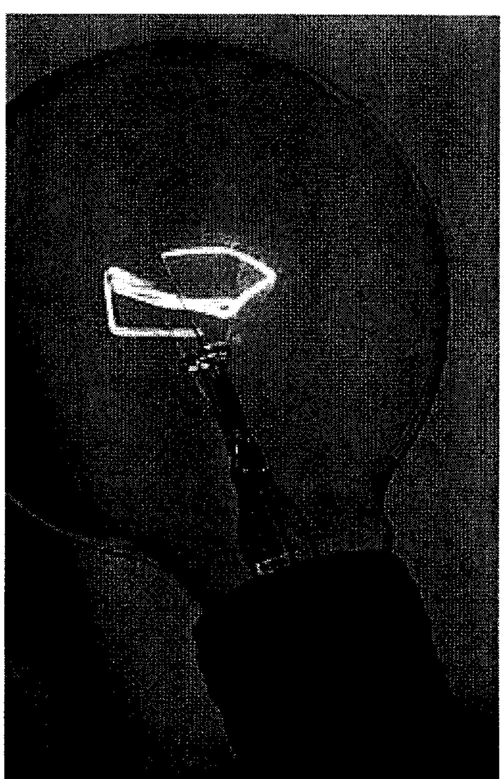
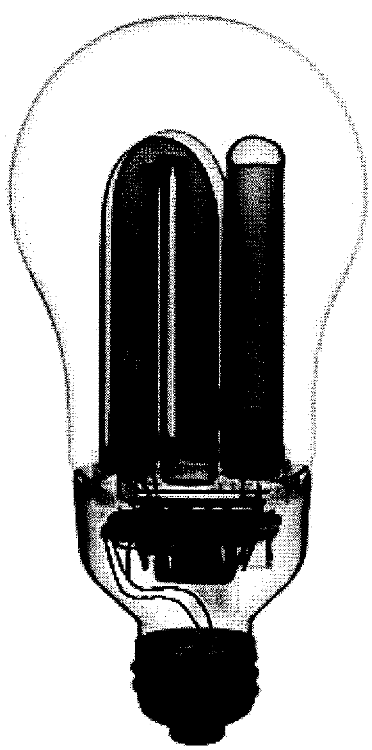
Load Analysis and Forecasting (4 CSR 240-22.030)

LOAD FORECAST DOCUMENTATION

2006-2025 Load Forecast

Released: July 2006

Kansas City Power & Light®

ENERGIZING LIFE

RESEARCH & FORECASTING

2006-2025 Load Forecast Documentation

Kansas City Power & Light®

ENERGIZING LIFE

Table of Contents

SECTION 1: EXECUTIVE SUMMARY

Table 1 summarizes Kansas City Power & Light Company's 2006-2025 load forecast. System energy is expected to increase by an average of 1.5 percent per year and the annual peak demand is expected to grow by 1.3 percent per year over the 2006-2025 period. This forecast includes the impact of demand-side management programs that have been adopted by KCPL.

Table 1 2005-2025 Load Forecast; Demand, & Energy

Year	Gross Peak Demand (MW)	DSM Impacts (MW)	Net Peak Demand (MW)	Gross NSI (Gwh)	DSM Impacts (Gwh)	Net NSI (Gwh)	Gross Load Factor	Net Load Factor
1990	2,723		2,723	11,320.5		11,320.5	47.5%	47.5%
1995	2,910		2,910	12,920.5		12,920.5	50.7%	50.7%
2000	3,290		3,290	15,052.4		15,052.4	52.2%	52.2%
2005	3,572		3,572	15,735.4		15,735.4	50.3%	50.3%
2006	3,650	55	3,595	16,165.5	2.8	16,162.8	50.6%	51.3%
2010	3,920	164	3,756	17,492.7	65.5	17,427.2	50.9%	53.0%
2015	4,202	164	4,038	19,067.9	65.5	19,002.4	51.8%	53.7%
2020	4,481	164	4,317	20,434.8	65.5	20,369.3	52.1%	53.9%
2025	4,746	164	4,583	21,597.4	65.5	21,531.9	51.9%	53.6%
Annual Growth Rates:								
1990-2000	1.9%		1.9%	2.9%		2.9%	1.0%	1.0%
2000-2005	1.7%		1.7%	0.9%		0.9%	-0.8%	-0.8%
2000-2010	1.8%		1.3%	1.5%		1.5%	-0.2%	0.1%
2006-2015	1.6%		1.3%	1.9%		1.8%	0.3%	0.5%
2015-2025	1.2%		1.3%	1.3%		1.3%	0.0%	0.0%
2006-2025	1.4%		1.3%	1.5%		1.5%	0.1%	0.2%

** Note: The 1990 through 2005 peak and NSI are weather-normalized.*

***DSM Impacts provided by Energy Solutions*

SECTION 2: SUMMARY OF RESULTS

Methodology

KCP&L uses detailed end-use information along with statistical techniques to construct its load forecast. End-use information is obtained from our 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 residential, commercial and industrial sector electricity sales, based on economic forecasts of key drivers specific to the Kansas City metro area.

The forecasts of economic drivers were obtained through a contract with 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). The drivers were provided for three scenarios, which we used to construct a base, high and low scenarios for our load forecasts.

The end-use forecasts were calibrated to monthly billing statistics between 1990 and July 2005. 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 statistics. The calibrated models are used to forecast monthly electric energy sales. Using load research data collected from a sample of our customers, this forecast is allocated to each hour of the forecast period and peak demands are determined from these results.

This methodology was modified for large industrial customers served at a primary voltage. A simple econometric model was used to forecast their sales. Since KCP&L lost a very large industrial customer, GST Steel, in 2001, the sales and loads of this customer were subtracted from our monthly billing statistics to improve model statistics and to smooth out trends in historical data. For a few very large industrial customers, direct contact was used to obtain input regarding the customer's own assessment of future electricity requirements. This customer-specific information is then incorporated into KCP&L's load projections.

To recognize load forecast uncertainty and the need to consider a planning range, KCP&L has adopted a load forecast bandwidth, represented by High and Low scenarios. This bandwidth reflects the facts that load forecast uncertainty increases as the forecast horizon lengthens.

KCP&L'06-'25 Load Forecast Results

The current KCP&L load forecast was prepared in the 2nd and 3rd quarters of 2005. Projections of peak load and net system input are shown in Table 2.

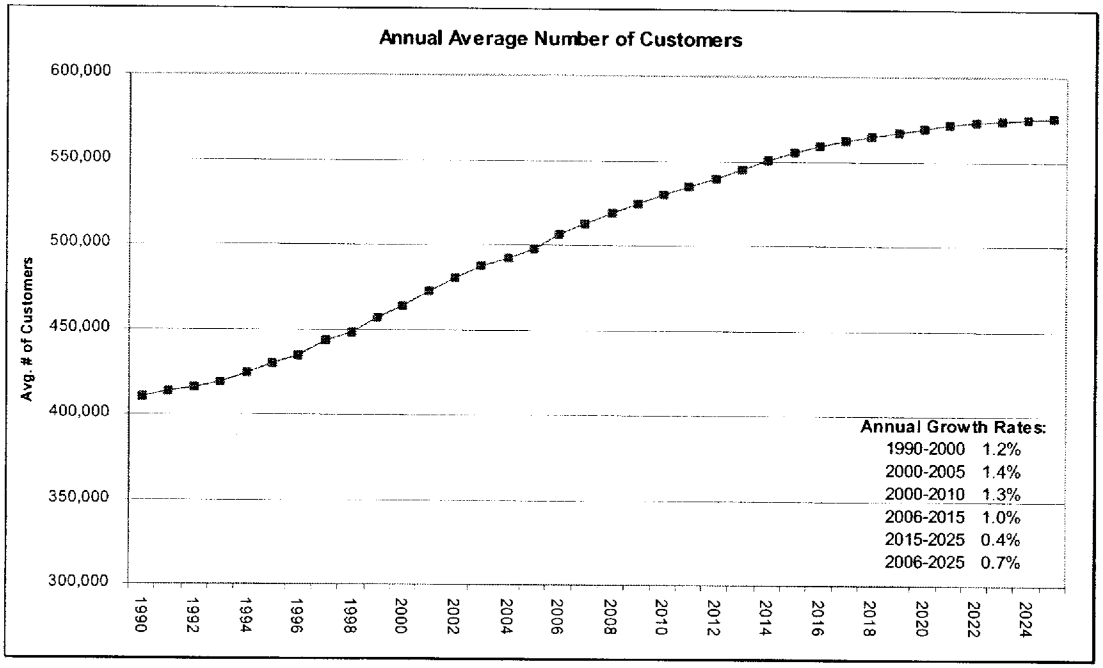
Table 2 2006-2025 Annual Demand & Energy Load Forecast

	2006-2025 Demand and Energy Load Forecast					
	Gross Demand (MW)	DSM Impacts (MW)	Net Demand (MW)	Gross Energy (MWh)	DSM Impacts (MWh)	Net Energy (MWh)
2006	3,650	55	3,595	16,165,545	2,778	16,162,767
2007	3,715	73	3,642	16,522,691	14,965	16,507,726
2008	3,782	106	3,676	16,857,587	31,159	16,826,428
2009	3,850	156	3,694	17,183,350	48,756	17,134,593
2010	3,920	164	3,756	17,492,682	65,499	17,427,183
2011	3,972	164	3,808	17,799,609	65,499	17,734,111
2012	4,020	164	3,856	18,111,490	65,499	18,045,991
2013	4,085	164	3,922	18,439,177	65,499	18,373,678
2014	4,142	164	3,979	18,758,985	65,499	18,693,487
2015	4,202	164	4,038	19,067,935	65,499	19,002,436
2016	4,255	164	4,091	19,359,426	65,499	19,293,928
2017	4,322	164	4,159	19,644,993	65,499	19,579,495
2018	4,379	164	4,215	19,916,981	65,499	19,851,482
2019	4,436	164	4,272	20,182,778	65,499	20,117,279
2020	4,481	164	4,317	20,434,847	65,499	20,369,349
2021	4,542	164	4,378	20,684,053	65,499	20,618,554
2022	4,593	164	4,429	20,922,973	65,499	20,857,474
2023	4,644	164	4,480	21,155,650	65,499	21,090,152
2024	4,685	164	4,521	21,375,607	65,499	21,310,108
2025	4,746	164	4,583	21,597,410	65,499	21,531,911

Customers

Between 2006 and 2025, the annual compound growth rate of total number of customers is projected to be 0.7%. A separate model is used for forecast the number of customers in each revenue class in Kansas and Missouri. Details of the models are presented in the section of this report that describes each class.

Chart 1: Annual Average Number of Total Customers



Energy & Peak Demand

Chart 2 plots the forecast of annual electric energy sales with a 1.5% compound annual growth over the 2006-2025 forecast horizon. Chart 3 plots the forecast of annual peak demand and shows a 1.2% compound annual growth over the 2006-2025 period.

Chart 2: Annual Energy Forecast (NSI)

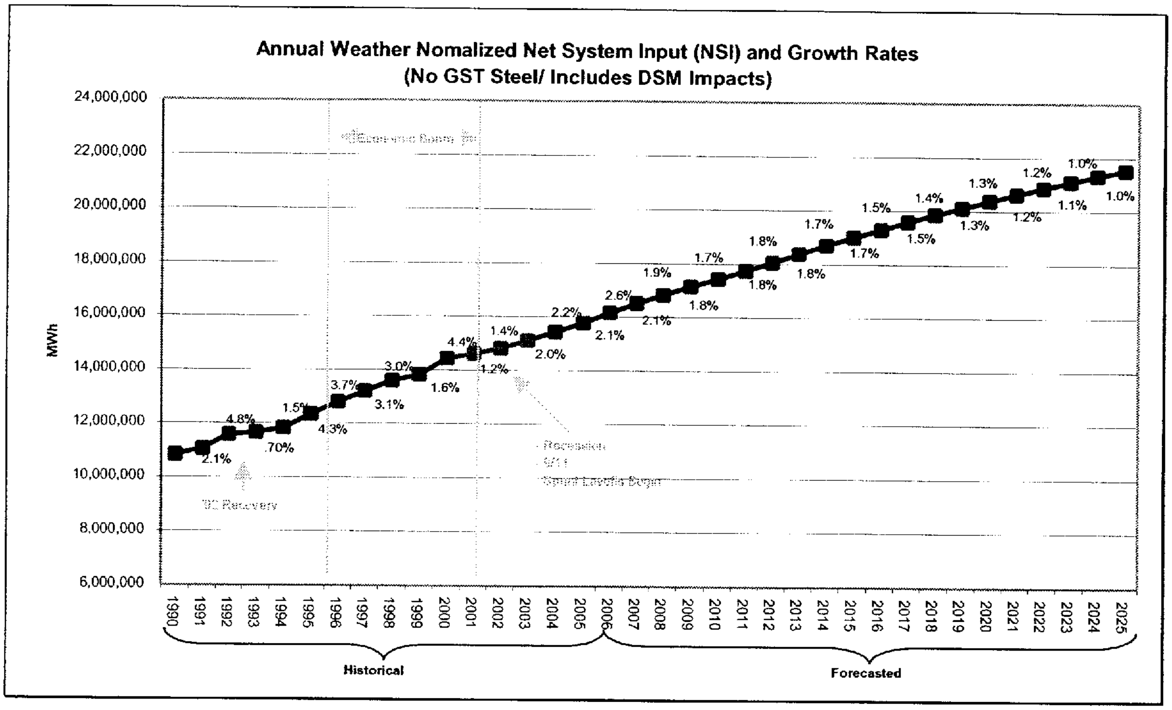
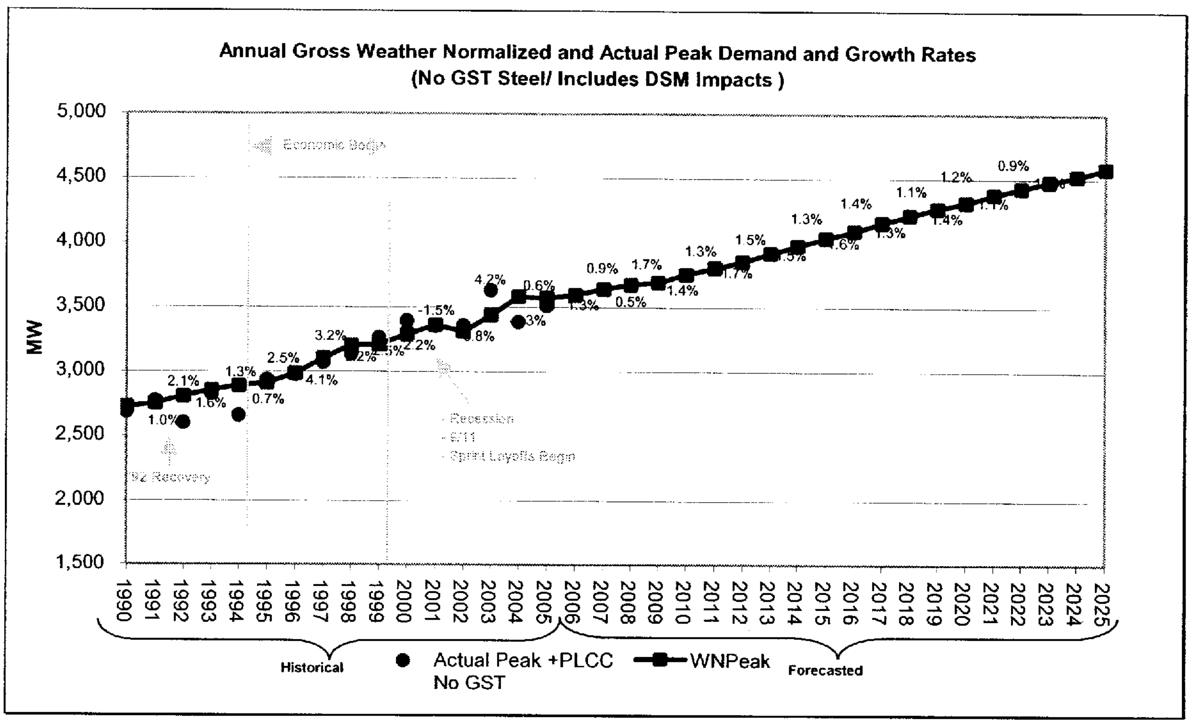


Chart 3: Annual Peak Demand Forecast



Key Forecasting Drivers/ Assumptions

The major drivers and assumptions used in preparing KCP&L's 2006-2025 long-term forecast are as follows:

- Economic Conditions – Under a contract, Economy.com provided an economic forecast for the Kansas City MSA and Service Territory Counties. The economic data used in our forecasting models included 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 CPI. The outlook for the forecast period (2006-2025) assumes slower growth than observed historically, but continuing to recover from the recession period. (GMP 2.7%, Income 2.2%, Households .83%, Population 0.62%, and Employment 0.88%) See Appendix C.

- Electricity Prices - The price series are constructed from reported revenue per kWh data for each rate from January 1990 to June 2005. The historical price series is constructed by first adjusting average revenue per kWh by the CPI index yielding a real $ per kWh series. The price series is then calculated by taking a 12-month moving average of the real $ per kWh series. By taking a 12-month moving average we de-couple observed sales and resulting revenues. Further, a 12-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 nominal prices will remain unchanged during the period of '05-'06 and grow at the rate of inflation for the period of '07-'25.

- Demographic Factors – Projections from Economy.com indicate that the population of the Kansas City metro area will increase by about 83,940 persons between 2006 and 2025. Population declines in the Jackson County portion of the service territory will be more than offset by population increases in Johnson County and the Northland area. The overall population increase, coupled with a projected decline in average household size from 2.54 to 2.42 persons per household in the next 20 years, implies a 0.7% increase, or approximately 69,294 residential customers during 2006-2025.

- Weather and Billing Days Data – Monthly heating and cooling degree days are used to calibrate the end-use forecast to monthly billed sales. Degree days are computed with a base temperature of 65 degrees by billing cycle and averaged for each month over the 21 billing cycles. The temperature is measured at the Kansas City International Airport by the National Weather Service. In the forecast period, normal weather is assumed by averaging degree days over the period 1975 to 2004.

- The daily maximum and minimum temperatures and the meter read schedule available from 1992 through 2005 are used to calculate revenue month heating (HDD) and cooling (CDD) degree day variables. The average number of billing days is also calculated using the meter read schedule.

- Appliance Saturations and Efficiency Levels – The annual saturation estimates are derived from KCP&L's survey data and EIA's study for West North Central Region to create the Residential End-Use Indices. Commercial indices are constructed solely using EIA's efficiency and saturation series for the West North Central Census. Both the Residential and Commercial indices are created for Missouri and Kansas. Detailed explanations of the calculations and indexes are provided in each class section 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 occur from both 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 B more details.

- Efficiency and Demand Side Management – The impact of changes to the current level of demand-side management (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

Residential

- 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

Commercial and Industrial

- 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 Side Management

Residential and Small Commercial

- Air Conditioning Cycling

Commercial and Industrial

- The Alliance, An Energy Partnership Program
    - Mpower (PLCC)
    - Distributed Generation

- Commercial Lighting Curtailment

Efficiency and DSM impacts are adjusted each year based on market penetration. An explanation of the impact of efficiency and DSM programs can be found in the Energy and Demand Development section.

Forecast Uncertainty Analysis

The uncertainty associated with the forecasts of customers, energy, and demand is quantified through the analysis of alternative projections resulting form the variation of key determinants of electricity demand. Alternative projections are shown in Tables 3 through 6 and Charts 4 through 7. Two general categories of uncertainty in the forecast driving variables were analyzed: (1) economic and demographic quantities such as Gross Metro Product, employment, population, and the number of households, (2) market factors effecting customer growth. While the forecast bandwidth does not consider all elements of forecast uncertainty, it does encompass the probable variation from significant factors that play a role in the determination of energy and peak growth. High and low growth assumptions for the economic variables were obtained from Economy.com.

Table 3 Energy Uncertainty Analysis - Excluding DSM Impacts

NSI (GWh): Excluding DSM Impact		Low Range	Base	High Range
WN	2004		15,435	
WN	2005		15,735	
	2006	16,065	16,166	16,260
	2010	17,308	17,493	17,659
	2015	18,719	19,068	19,344
	2020	19,772	20,435	20,847
	2025	20,483	21,597	22,200
CAGR % Growth				
	04-'05		1.9%	
	04-'06		1.9%	
	05-'06	2.1%	2.7%	3.3%
	06-'10	1.9%	2.0%	2.1%
	06-'15	1.7%	1.9%	1.9%
	15-'25	0.9%	1.3%	1.4%
	06-'25	1.3%	1.5%	1.7%

Chart 4 : Energy Uncertainty Analysis - Excluding DSM Impacts

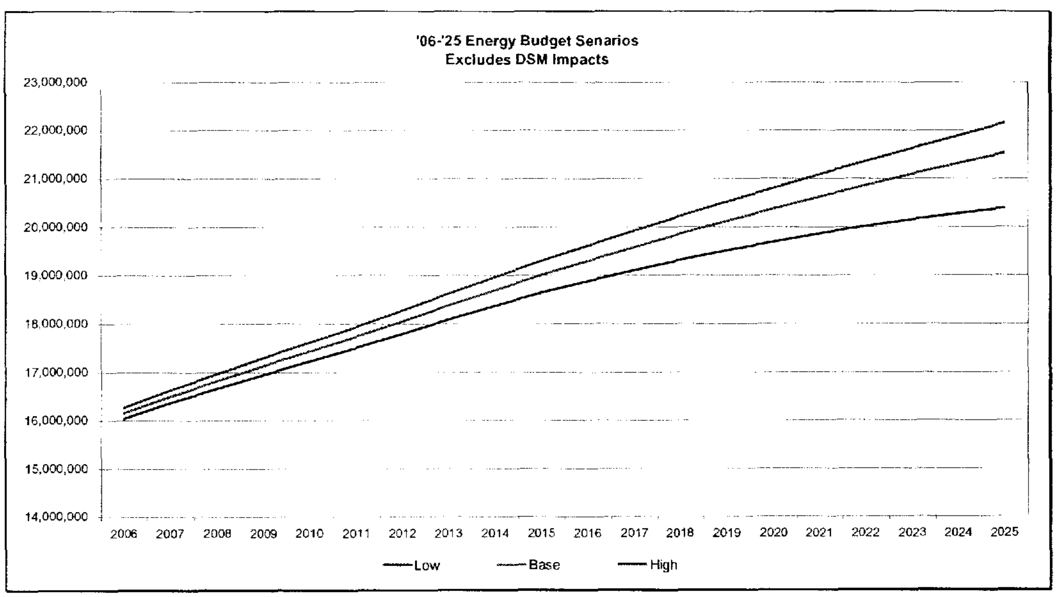


Table 4 Energy Uncertainty Analysis - Including DSM Impacts

NSI (GWh): Including DSM Impact		Low Range	Base	High Range	DSM Impact on NSI
WN	2004		15,435		
WN	2005		15,735		
	2006	16,045	16,163	16,274	(3)
	2010	17,225	17,427	17,611	(65)
	2015	18,636	19,002	19,297	(65)
	2020	19,688	20,369	20,800	(65)
	2025	20,399	21,532	22,153	(65)
CAGR % Growth					
	04-'05		1.9%		
	04-'06		1.9%		
	05-'06	2.0%	2.7%	3.4%	
	06-'10	1.8%	1.9%	2.0%	
	06-'15	1.7%	1.8%	1.9%	
	15-'25	0.9%	1.3%	1.4%	
	06-'25	1.3%	1.5%	1.6%	

Chart 5: Energy Uncertainty Analysis - Including DSM Impacts

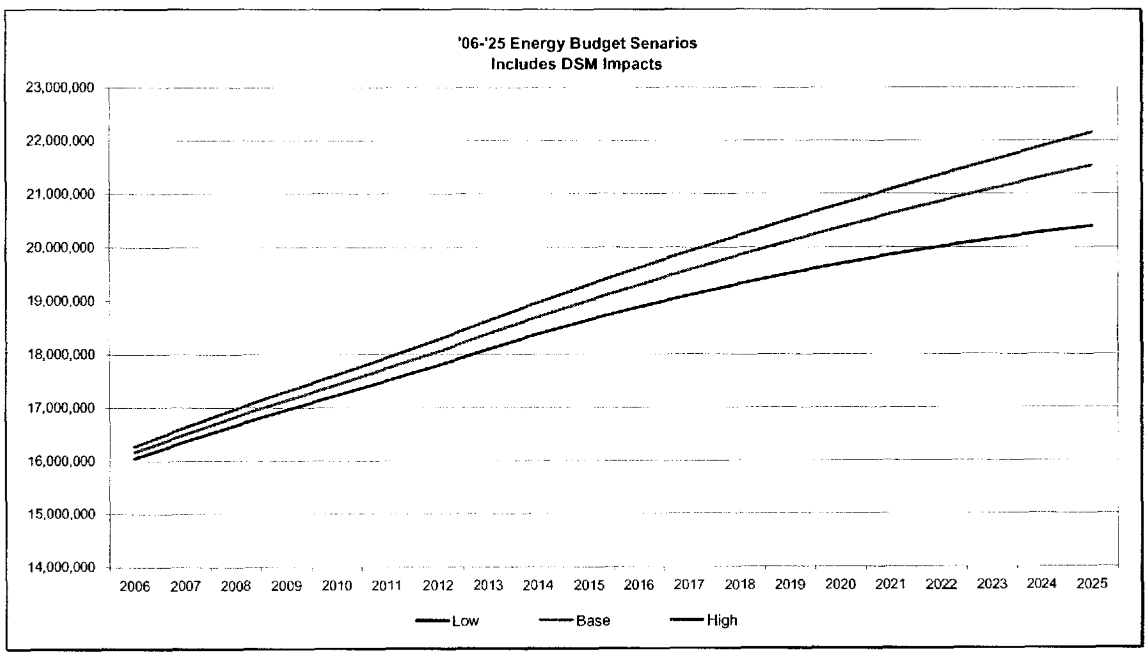


Table 5 Peak Uncertainty Analysis - Excluding DSM Impacts

Peak (MW): Excluding DSM Impact		Low Range	Base	High Range
WN	2004		3,532	
WN	2005		3,572	
	2006	3,624	3,650	3,671
	2010	3,872	3,920	3,961
	2015	4,117	4,202	4,273
	2020	4,330	4,481	4,592
	2025	4,504	4,746	4,908
CAGR % Growth				
	04-'05		1.1%	
	04-'06		1.1%	
	05-'06	1.5%	2.2%	2.8%
	06-'10	1.7%	1.8%	1.9%
	06-'15	1.4%	1.6%	1.7%
	15-'25	0.9%	1.2%	1.4%
	06-'25	1.2%	1.4%	1.5%

Chart 6 : Peak Uncertainty Analysis - Excluding DSM Impacts

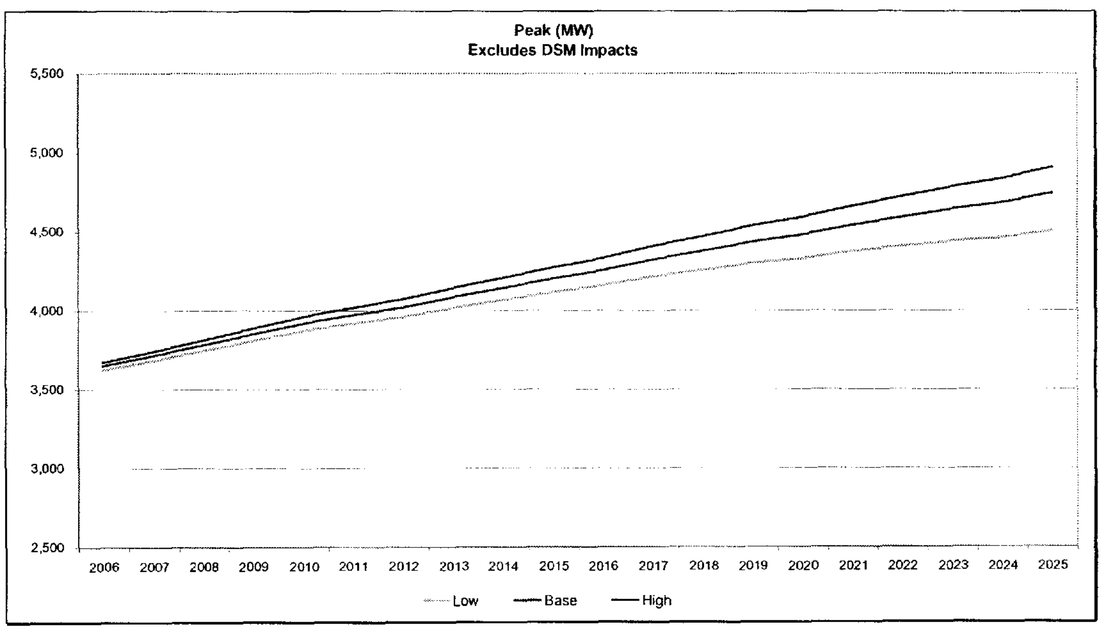
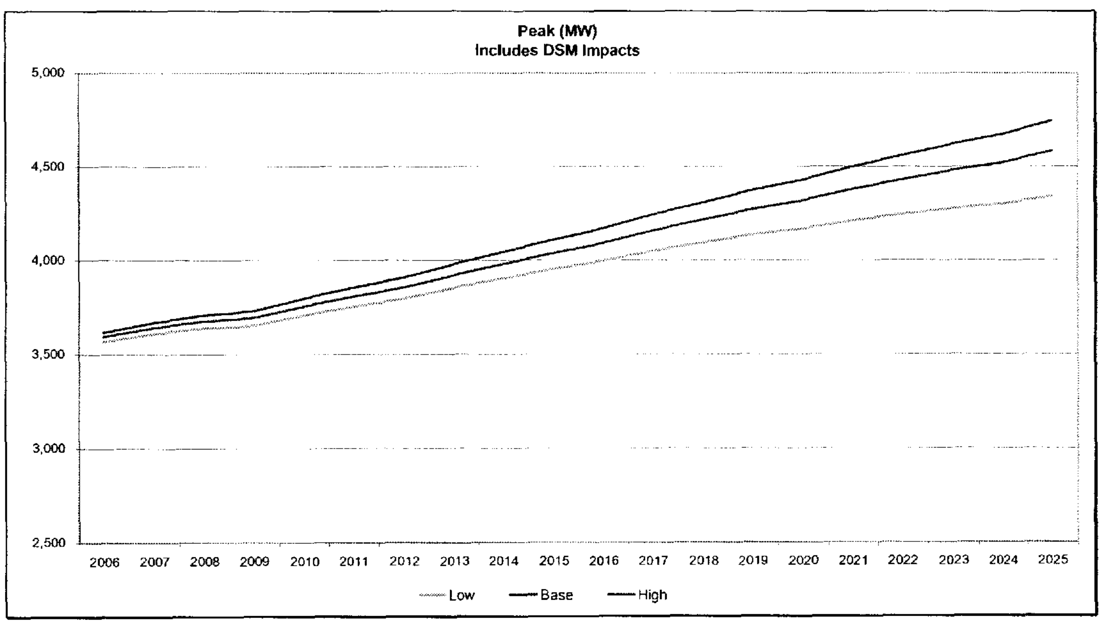


Table 6 Peak Uncertainty Analysis - Including DSM Impacts

Peak (MW): Including DSM Impact		Low Range	Base	High Range	DSM Impact on Peak
WN	2004		3,532		(25)
WN	2005		3,572		(25)
	2006	3,569	3,595	3,616	(55)
	2010	3,708	4,582	3,798	(164)
	2015	3,954	4,038	4,110	(164)
	2020	4,167	4,317	4,428	(164)
	2025	4,341	4,583	4,744	(164)
CAGR % Growth					
	04-'05		1.1%		
	04-'06		1.1%		
	05-'06	-0.1%	0.6%	1.2%	
	06-'10	1.0%	6.3%	1.2%	
	06-'15	1.1%	1.3%	1.4%	
	15-'25	0.9%	1.3%	1.4%	
	06-'25	1.0%	1.3%	1.4%	

Chart 7: Peak Uncertainty Analysis - Including DSM Impacts



Class Projections

The following sections of this report discuss the load profiles and peak demand forecast, the detailed analysis, which was conducted to develop mwh sales projections for each class, and the development of the forecast uncertainty bandwidths. Table 7 shows historical and forecasted sales for the classes as well as for the native system total. A more detailed explanation of class demand and peak demand can be found in the Energy and Demand Development section of this report.

Table 7 Revenue Class Projections (Actual)

Historical and Forecasted GWh Usage						
Year	Residential	Commercial	Industrial	Other Retail	Sales for Resale	Total Retail Load
1990	3,345	4,852	2,206	70	114	10,587
1995	3,825	5,419	2,006	65	78	11,394
2000	4,663	6,611	2,081	76	126	13,557
2003	5,026	6,939	2,044	85	133	14,227
2004	4,878	6,970	2,057	85	134	14,124
2005	5,249	7,280	2,114	81	138	14,862
2006	5,334	7,507	2,119	82	141	15,184
2010	5,765	8,247	2,193	86	151	16,441
2015	6,247	9,146	2,297	88	163	17,941
2020	6,634	10,008	2,408	89	175	19,314
2025	6,924	10,770	2,518	89	179	20,480

Annual Growth Rates						
1990-1995	2.7%	2.2%	-1.9%	-1.4%	-7.3%	1.5%
1995-2000	4.0%	4.1%	0.7%	3.0%	10.0%	3.5%
2000-2005	2.4%	1.9%	0.3%	1.3%	1.9%	1.9%
1990-2005	3.0%	2.7%	-0.3%	1.0%	1.3%	2.3%
2005-2006	1.6%	3.1%	0.2%	2.0%	2.4%	2.2%
2006-2010	2.0%	2.4%	0.9%	0.9%	1.6%	2.0%
2010-2015	1.6%	2.1%	0.9%	0.6%	1.5%	1.8%
2015-2020	1.2%	1.8%	0.9%	0.1%	1.5%	1.5%
2020-2025	0.9%	1.5%	0.9%	0.1%	0.5%	1.2%
2006-2025	1.4%	1.9%	0.9%	0.4%	1.2%	1.6%

SECTION 3: Residential

Summary

Energy sales to the residential class are projected to grow at an annual rate of 1.4% between 2006-2025. This represents a decrease from the historical growth rate of 3.0% during 1990-2005.

The decline in the growth rate of residential sales is accounted for by lower overall customer growth in Kansas and by lower growth in average use per customer in both Missouri and Kansas. Table 8 summarizes Missouri and Kansas residential gwh sales.

Table 8 Residential GWh Sales

Historical and Forecasted GWh Sales Residential			
Year	Missouri	Kansas	Total Residential
1990	1,811	1,534	3,345
1995	2,002	1,823	3,825
2000	2,320	2,343	4,663
2003	2,438	2,589	5,027
2004	2,347	2,532	4,879
2005	2,492	2,757	5,249
2006	2,510	2,824	5,334
2010	2,669	3,096	5,765
2015	2,860	3,387	6,247
2020	3,014	3,620	6,634
2025	3,143	3,781	6,924

Annual Growth Rates			
1990-1995	2.0%	3.5%	2.7%
1995-2000	3.0%	5.1%	4.0%
2000-2005	1.4%	3.3%	2.4%
1990-2005	2.2%	4.0%	3.0%
2005-2006	0.7%	2.5%	1.6%
2006-2010	1.6%	2.3%	2.0%
2010-2015	1.4%	1.8%	1.6%
2015-2020	1.1%	1.3%	1.2%
2020-2025	0.8%	0.9%	0.9%
2006-2025	1.2%	1.5%	1.4%

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 Kansas and Missouri.

Customers

Separate customer forecast models were estimated for Kansas and Missouri. Monthly regression models were estimated that relate household projections for KCP&L's service territory counties to historical monthly customer data using monthly data over the period of 1990 to 2005. The estimated model coefficients are all highly significant. Model adjusted R^2 varies from .988 to .999 with in sample MAPE of .20% to .26%. Table 9 show the models and forecast results by state.

Table 9 Residential Model Results

Variable	Kansas		Missouri	
	Coefficient	T-Stat	Coefficient	T-Stat
CONST	-7233	-3.3	52890	6.1
Households	19.9	3.3	117.6	7.7
LagDep(1)	1.0	78.9	0.4	5.6
AR(1)	-0.4	-6.3	0.8	13.1
Estimation Period	1/1990-7/2005		6/1993-7/2005	
MAPE	0.26%		0.20%	
R^2	0.999		0.988	

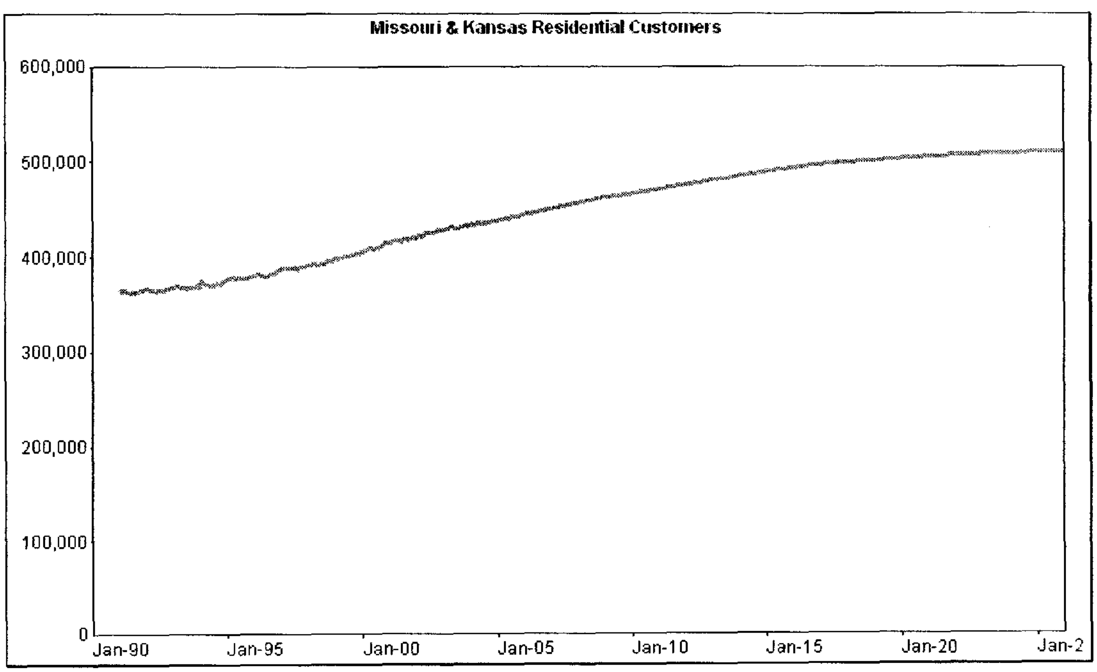
Table 10 shows historical and predicted average residential customers by state. Chart 8 shows historical and predicted values for the residential class as a whole. The gradual decline in the growth rate of new customers is due to a similar decline in the population growth rate forecasted by Economy.com for the KC metro area. They attribute this to a declining birth rate, 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 & Forecasted)

Historical and Forecasted Annual Average Residential Customers			
Year	Missouri	Kansas	Total Residential
1990	217,892	141,983	359,875
1995	221,028	156,346	377,374
2000	228,625	180,977	409,602
2003	234,169	196,308	430,477
2004	235,351	199,510	434,860
2005	236,612	202,770	439,382
2006	238,830	208,214	447,044
2010	244,000	224,426	468,426
2015	249,959	241,251	491,210
2020	252,821	251,394	504,215
2025	253,869	255,821	509,690

Annual Growth Rates			
1990-1995	0.3%	1.9%	1.0%
1995-2000	0.7%	3.0%	1.7%
2000-2005	0.7%	2.3%	1.4%
1990-2005	0.6%	2.4%	1.3%
2005-2006	0.9%	2.7%	1.7%
2006-2010	0.5%	1.9%	1.2%
2010-2015	0.5%	1.5%	1.0%
2015-2020	0.2%	0.8%	0.5%
2020-2025	0.1%	0.3%	0.2%
2006-2025	0.3%	1.1%	0.7%

Chart 8: Total Missouri and Kansas Residential Customers (Historical & Forecasted)



Residential End-Use Indices

Residential appliance saturation data was available from KCPL's 1996, 1998, 2000, and 2002 surveys, which have been conducted by KCP&L since 1964. The survey results are shown in Tables 11 and 12.

Table 11 KCPL Residential Appliance Saturation Survey - Kansas

	1996	1998	2000	2002
Central A/C (CAC)	**92%**	**94%**	**93%**	**91%**
Room A/C (RAC)	**6%**	**6%**	**12%**	**11%**
Electric Water Heaters (EWHeat)	**22%**	**25%**	**20%**	**21%**
Electric Ranges (ECook)	**88%**	**87%**	**76%**	**84%**
Second refrigerators (Ref2)	**23%**	**28%**	**21%**	**32%**
Freezers (Frz)	**47%**	**43%**	**43%**	**58%**
Dishwashers (Dish)	**91%**	**92%**	**74%**	**98%**
Clothes Washers (CWash)	**95%**	**96%**	**92%**	**96%**
Electric Clothes Dryers (EDry)	**72%**	**75%**	**67%**	**70%**
TV	**246%**	**267%**	**215%**	**219%**

Table 12 KCPL Residential Appliance Saturation Survey - Missouri

	1996	1998	2000	2002
Central A/C (CAC)	**71%**	**80%**	**88%**	**72%**
Room A/C (RAC)	**26%**	**22%**	**19%**	**31%**
Electric Water Heaters (EWHeat)	**18%**	**21%**	**24%**	**18%**
Electric Ranges (ECook)	**62%**	**63%**	**67%**	**65%**
Second refrigerators (Ref2)	**13%**	**19%**	**19%**	**20%**
Freezers (Frz)	**45%**	**42%**	**42%**	**45%**
Dishwashers (Dish)	**55%**	**57%**	**67%**	**63%**
Clothes Washers (CWash)	**82%**	**99%**	**88%**	**87%**
Electric Clothes Dryers (EDry)	**52%**	**65%**	**70%**	**64%**
TV	**199%**	**234%**	**218%**	**189%**

The EIA saturation trends were adjusted to fit the KCPL appliance saturation survey results. EIA estimates are from the recent RECS for the West North Central Census, which include Kansas and Missouri. The modified saturation trends along with the KCPL 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. The saturation and efficiency trends are combined to generate the end-use indices.

Chart 9: Forecast Saturation Trends - Kansas

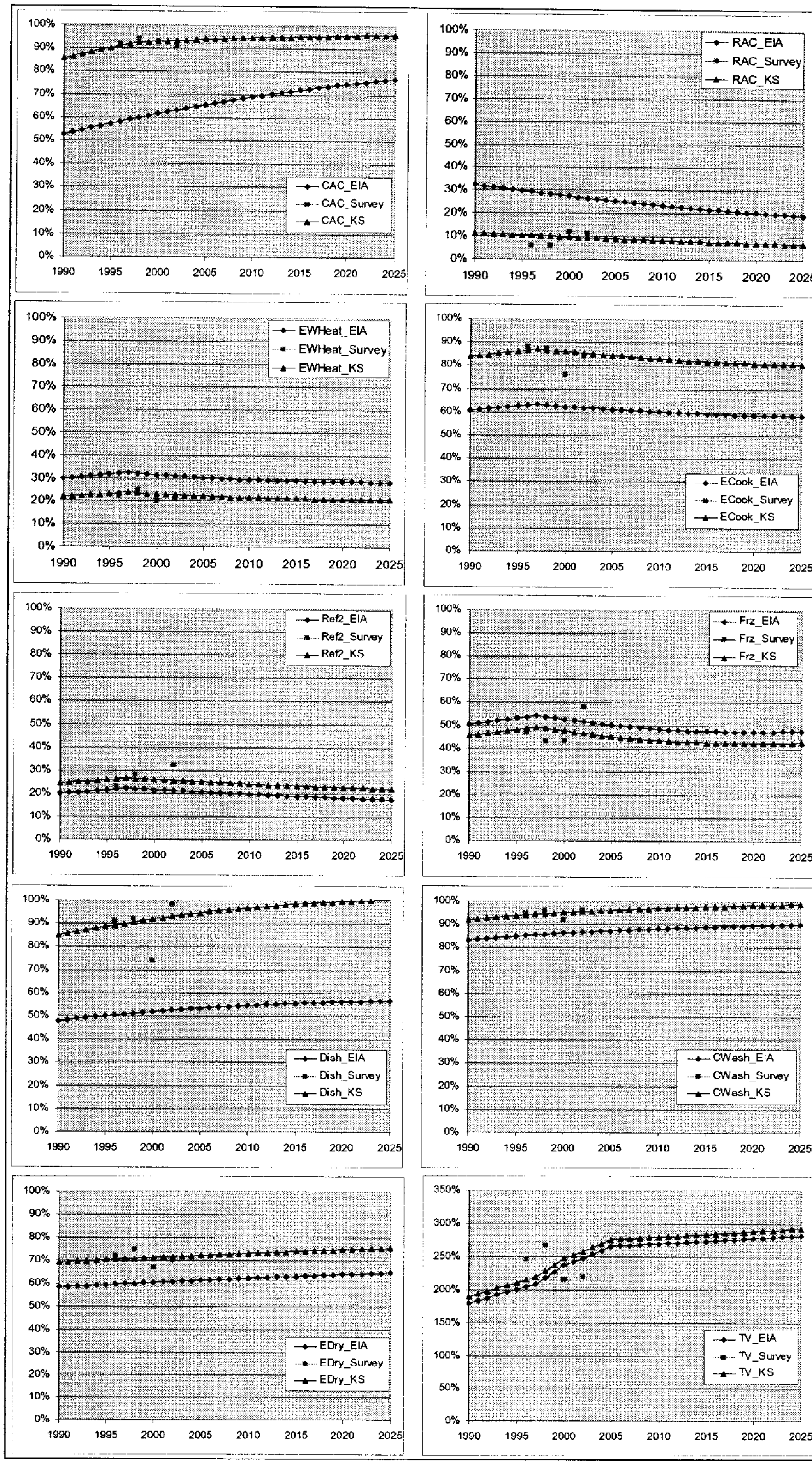
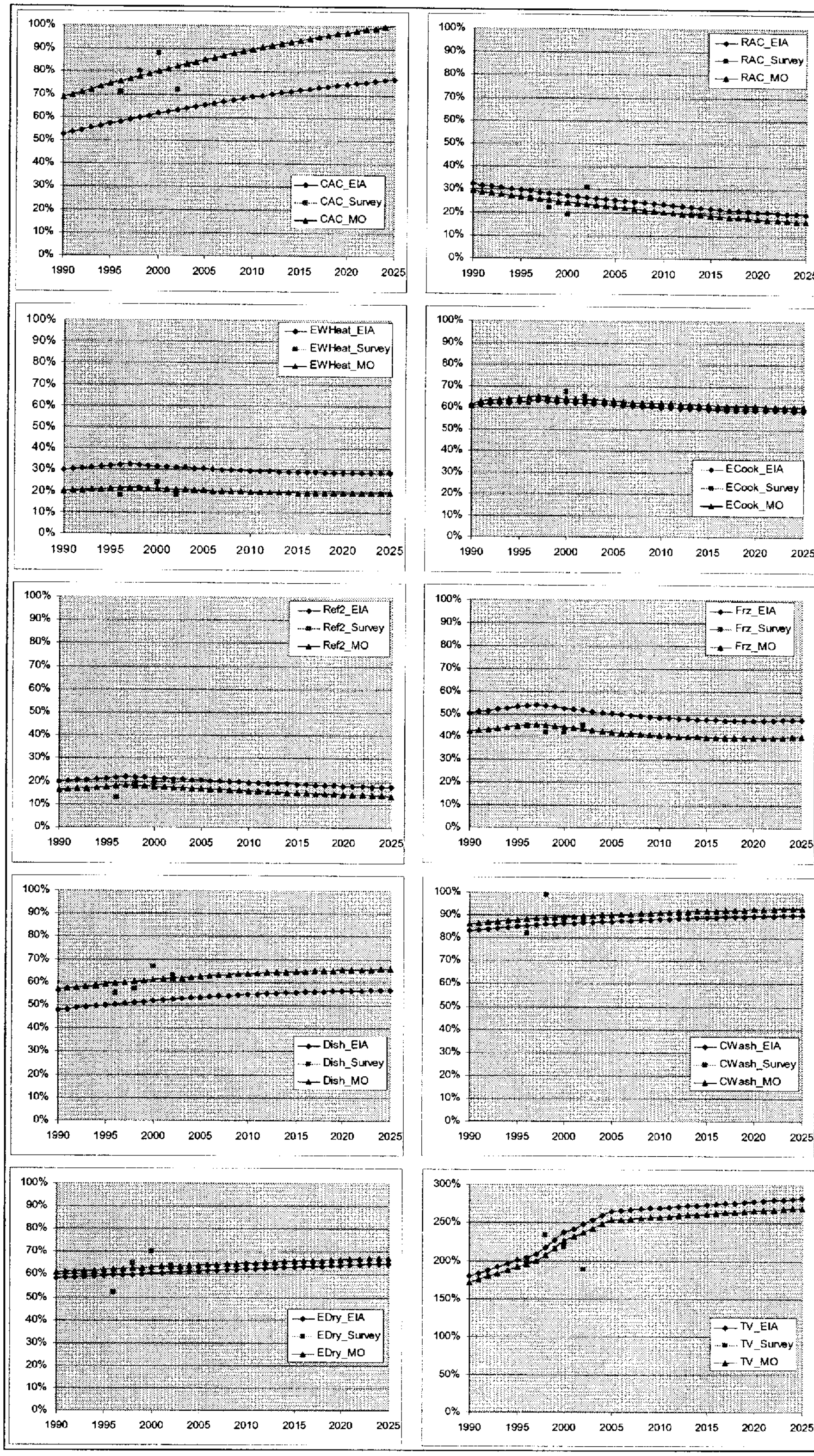


Chart 10: Forecast Saturation Trends - Missouri



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 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

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

While average use can be measured from sales and customer data, the end-use components cannot. Substituting estimates for the end-use elements gives equation 2.

Equation 2

$$Use_{y,m} = a + b_1 \times XHeat_{y,m} + b_2 \times XCool_{y,m} + b_3 \times XOther_{y,m} + \varepsilon_{y,m}$$

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 adjustment factors.

Heating End-Use Variable

Electricity use for space heating depends on heating degree days, the percentage of heaters using electricity, heating equipment operating efficiencies, dwelling thermal integrity and floor space, the number of billing days in a particular month, 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

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

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 were estimated for both residential models:

- Kansas Residential Urban (RU)
- Missouri Residential Urban (RU)

The $HeatIndex_y$ reflects changes in equipment saturation and efficiency trends relative to a base year, which was defined as 2001. 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, 2001. In other years, it will be greater than one if equipment saturation levels are above their 2001 level. This will be counteracted 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

$$HeatIndex_y = StructuralIndex_y \times \sum_{Type} Weight^{Type} \times \frac{\left(Sat_y^{Type} \Big/ Eff_y^{Type} \right)}{\left(Sat_{01}^{Type} \Big/ Eff_{01}^{Type} \right)}$$

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 2001 value:

Equation 5

$$StructuralIndex_y = \frac{BuildingShellEfficiencyIndex_y \times SurfaceArea_y}{BuildingShellEfficiencyIndex_{01} \times SurfaceArea_{01}}$$

Surface area is derived to account for roof and wall area of a standard dwelling based on the regional average square footage data obtained from EIA. 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

$$\text{SurfaceArea}_y = 892 + 1.44 \times \text{Footage}_y$$

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

$$\text{Weight}^{\text{Type}} = \frac{\text{Energy}_{98}^{\text{Type}}}{\text{HH}_{98}} \times \text{HeatShare}_{98}^{\text{Type}}$$

With these weights, the 2001 *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 *intensities* on the "*Efficiencies*" tab. A separate spreadsheet is constructed for each model.

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, price, and billing days. Since the heating degree days used in these models are in revenue month cycle, billing degree days is not used as a separate explanatory variable. Using the *REEPS* default elasticity parameters, the estimates for space heating equipment usage levels are computed as follows:

Equation 8

$$HeatUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{01}}\right)^{-0.20} \times \left(\frac{Income_{y,m}}{Income_{01}}\right)^{0.20} \times \left(\frac{HHSize_{y,m}}{HHSize_{01}}\right)^{0.20} \times \left(\frac{HDD_{y,m}}{HDD_{01}}\right)$$

where $Price_{y,m}$ is the average residential real price of electricity in year (y) and month (m), $Price_{98}$ is the average residential real price of electricity in 2001, $Income_{y,m}$ is the average real income per household in a year (y) and month (m), $Income_{98}$ is the real income per household in 2001, $HHSize_{y,m}$ is the average household size in a year (y) and month (m), $HHSize_{98}$ is the household size in 1998, $HDD_{y,m}$ is the revenue month heating degree days in year (y) and month (m), and HDD_{98} is the annual heating degree days for 2001.

By construction, the $HeatUse_{y,m}$ variable has an annual sum that is close to one in the base year (2001). 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, if the real price of electricity increases 10% the *HeatUse* variable will increase 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 and home 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 heating energy use in year (y) and month (m), $CoolIndex_y$ is the annual index of heating 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, housing size, and thermal integrity. Formally, the equipment index is defined as:

Equation 10

$$CoolIndex_y = StructuralIndex_y \times \sum_{Type} Weight^{Type} \times \frac{\left(Sat_y^{Type} \middle/ Eff_y^{Type} \right)}{\left(Sat_{01}^{Type} \middle/ Eff_{01}^{Type} \right)}$$

The annual saturation estimates are derived from KCP&L's survey data and EIA's study for 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, 2001 is used as a base year for normalizing the index. The ratio on the right is equal to 1.0 in 2001. In other years, it will be greater than one if equipment saturation levels are above their 2001 level. This will be counteracted by higher efficiency levels, which will drive the index downward. The weights are defined as follows.

Equation 11

$$\mathrm{Weight}^{\mathrm{Type}} = \frac{\mathrm{Energy}_{01}^{\mathrm{Type}}}{\mathrm{HH}_{01}} \times \mathrm{CoolShare}_{01}^{\mathrm{Type}}$$

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 revenue class.

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. Using the *REEPS* default parameters, the estimates of cooling equipment usage levels are computed as follows:

Equation 12

$$CoolUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{01}}\right)^{-0.20} \times \left(\frac{Income_{y,m}}{Income_{01}}\right)^{0.20} \times \left(\frac{HHSize_{y,m}}{HHSize_{01}}\right)^{0.20} \times \left(\frac{CDD_{y,m}}{CDD_{01}}\right)$$

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 2001.

By construction, the $CoolUse_{y,m}$ variable has an annual sum that is close to one in the base year (2001). 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.

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 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

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

The first term on the right hand side of this expression ($OtherEqpIndex_y$) 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

$$EWHeatIndex_{y,m} = Weight \times \frac{\left(Sat_y / Eff_y \right)}{\left(Sat_{01} / Eff_{01} \right)} \times MoMult_m$$

Equation 15

$$ApplianceIndex_{y,m} = Weight^{Type} \times \frac{\left(Sat_y^{Type} \Big/ \frac{1}{UEC_y^{Type}} \right)}{\left(Sat_{01}^{Type} \Big/ \frac{1}{UEC_{01}^{Type}} \right)} \times MoMult_m^{Type}$$

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 KCPL's residential saturation survey data and EIA's study for 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 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. 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

$$\text{Weight}^{\text{Type}} = \frac{\text{Energy}_{01}^{\text{Type}}}{\text{HH}_{01}} \times \text{Share}_{01}^{\text{Type}}$$

With these weights, the *OtherEqpIndex* value in 1998 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

$$OtherUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{01}}\right)^{-0.15} \times \left(\frac{Income_{y,m}}{Income_{01}}\right)^{0.10} \times \left(\frac{HSize_{y,m}}{HSize_{01}}\right)^{0.25} \times \left(\frac{BDays_{y,m}}{NormalBDays}\right)$$

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

Estimated Residential Model

Once the end-use variables are constructed, they are regressed on average 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. Models are estimated using monthly data over the period January 1990 to July 2005. The estimated model coefficients are all highly significant. Residential model R^2 are similar at .98 with in sample MAPE of 2.7% to 2.8%. Tables 13 through 15 show the resulting model coefficients by state and class.

Table 13 Average Use Residential Model Results

	MO Residential	KS Residential
Estimation Period	1/1994-7/2005	1/1994-7/2005
MAPE	2.71%	2.77%
R^2	0.985	0.984

Table 14 Coefficients for Kansas Average Residential Use

Variable	Coefficient	T-Stat
Constant	653	3.3
XHeat	1.667	13.4
XCool	1.237	24.7
XOther	0.155	0.7
Mar	-129	-1.8
Apr	-141	-1.9
Jul	238	3.3
Aug	111	1.3
Sep	187	2.1
Nov	-97	-1.3
Jun05	135	3.2
Sep03	-121	-3.0
Sep99	-112	-2.9
SAR(1)	0.924	24.3
SMA(1)	-0.661	-6.6

Table 15 Coefficients for Missouri Average Residential Use

Variable	Coefficient	T-Stat
Constant	998	1.4
XHeat	1.706	11.9
XCool	1.298	30.0
XOther	-0.008	0.0
Sep95	141	3.3
Jul96	51	2.0
Aug96	35	1.3
Sept97	73	2.7
Aug97	61	2.3
Sept98	120	4.6
SAR(1)	0.729	7.4
SAR(2)	0.240	2.4

Charts 11 and 12 show resulting actual and predicted values for each Residential class by state.

Chart 11: Missouri Residential Urban Average Use Model Results

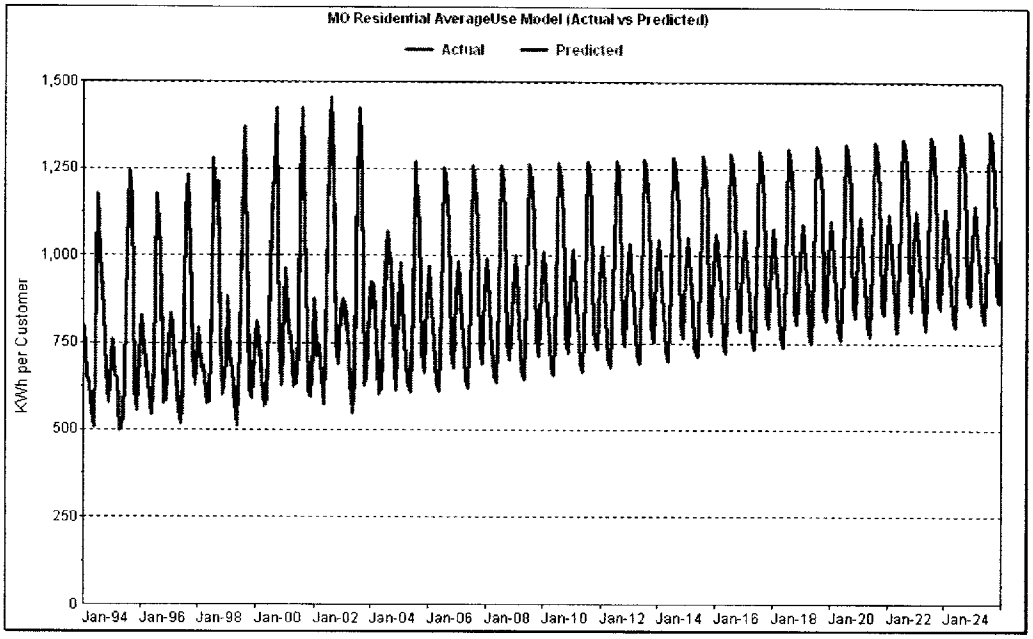
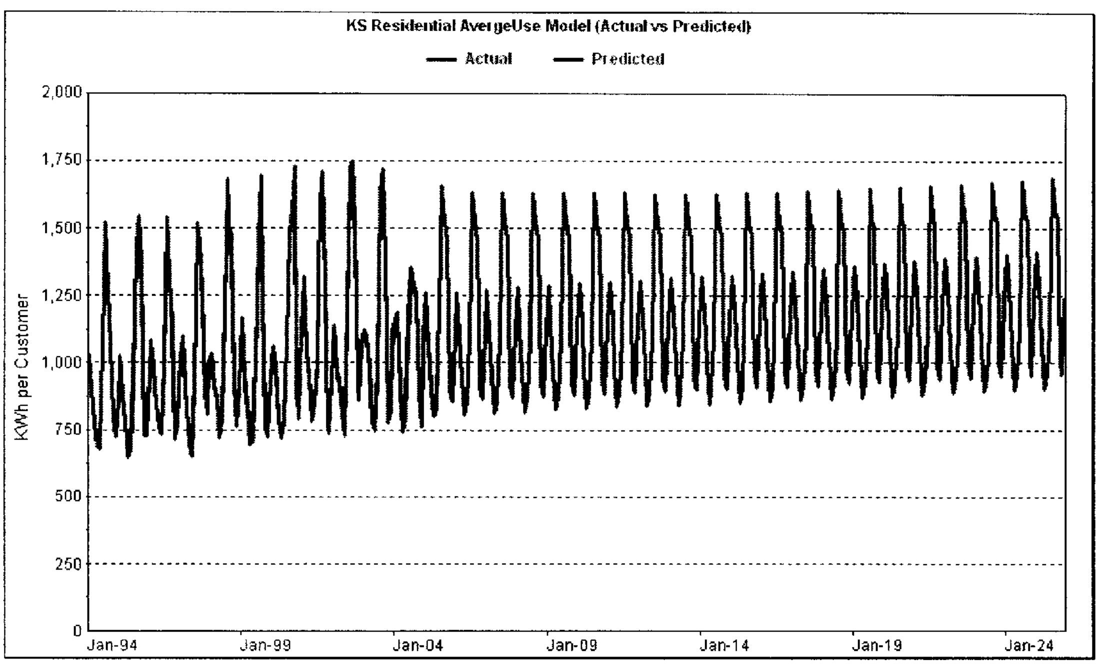


Chart 12: Kansas Residential Urban Average Use Model Results



Average Use Base Case Forecast

Table 16 shows the annual average use forecast and historical actual average use for the MO/KS residential class. The forecast shows a slow down in the growth of average use. This is primarily due to a slow down in the growth of population and households in the Kansas City Metropolitan area since new customers tend to have larger homes and thus higher usage than existing customers.

Table 16 Missouri and Kansas Average Use

Historical and Forecasted AverageUse Residential			
Year	**Missouri**	**Kansas**	**Total Residential**
1990	8,314	10,808	9,295
1995	9,060	11,660	10,136
2000	10,157	12,934	11,384
2003	10,416	13,185	11,678
2004	9,972	12,690	11,219
2005	10,510	13,560	11,946
2006	10,508	13,565	11,932
2010	10,939	13,795	12,307
2015	11,447	14,040	12,718
2020	12,000	14,398	13,157
2025	12,534	14,779	13,585

Annual Growth Rates			
1990-1995	1.7%	1.5%	1.7%
1995-2000	2.3%	2.1%	2.4%
2000-2005	0.7%	0.9%	1.0%
1990-2005	1.6%	1.5%	1.7%
2005-2006	0.0%	0.0%	-0.1%
2006-2010	1.0%	0.4%	0.8%
2010-2015	0.9%	0.4%	0.7%
2015-2020	0.9%	0.5%	0.7%
2020-2025	0.9%	0.5%	0.6%
2006-2025	0.9%	0.5%	0.7%

Daily Load Profiles

Annual end-use class sales for residential are combined with hourly end-use and class load profiles. The residential class profiles are based on 2003 hourly residential load research data with simulated shapes for 2004-2006, and the end use profiles are based on previous KCP&L analysis. Refer to Section 8, Energy and Demand Development for information about residential class and end-use daily load profiles and the use of these profiles in forecasting energy and demand.

SECTION 4: Commercial

Summary

Commercial class billed electricity consumption is expected to increase at a compounded annual rate of 1.9% percent between 2006 and 2025. During the same time, the commercial secondary class is expected to grow at 2.1% and commercial primary at 1.0%. The slow down in growth in the commercial class is being driven by a slow down in Kansas. The Kansas commercial secondary customers are slowing down due to a slow down in Residential customer growth, while commercial primary is forecasted to have no growth with average use declining compared to the late 90's and early 00's. Table 17 summarizes the commercial energy forecast.

Table 17 Commercial Actual Billed GWh Sales

Historical and Forecasted Billed GWh Sales Commercial			
Year	Missouri	Kansas	Total Commercial
1990	3,275	1,576	4,851
1995	3,547	1,872	5,419
2000	4,053	2,559	6,612
2003	4,095	2,843	6,938
2004	4,094	2,876	6,970
2005	4,263	3,017	7,280
2006	4,400	3,107	7,507
2010	4,714	3,533	8,247
2015	5,093	4,053	9,146
2020	5,495	4,513	10,008
2025	5,874	4,896	10,770

Annual Growth Rates			
1990-1995	1.6%	3.5%	2.2%
1995-2000	2.7%	6.5%	4.1%
2000-2005	1.0%	3.3%	1.9%
1990-2005	1.8%	4.4%	2.7%
2005-2006	3.2%	3.0%	3.1%
2006-2010	1.7%	3.3%	2.4%
2010-2015	1.6%	2.8%	2.1%
2015-2020	1.5%	2.2%	1.8%
2020-2025	1.3%	1.6%	1.5%
2006-2025	1.5%	2.4%	1.9%

Methodology

The SAE approach is also used to develop commercial models to forecast energy for the commercial classes of Missouri and Kansas. The models were developed by Itron as successors to EPRI's COMMEND models by the same staff the formerly supported the COMMEND models for EPRI.

Customers

Separate customer forecast models are estimated for each revenue class by state. Simple monthly regression models are estimated that relate residential customer projections for KCP&L's service territory to historical monthly commercial customer data. Models are estimated using monthly data over the period of 1990 to 2005. The estimated model coefficients are all highly significant with the exception of the Primary Other class. Model adjusted R^2 varies from .159 to .996 with in sample MAPE of .53% to 4.95%. Table 18 and 19 shows the model results by state and revenue class. Exponential smoothing was used to forecast Primary Other customers in Kansas.

Table 18 Missouri Commercial Customers Model Results

	MO Commercial Secondary	MO Primary Other
Estimation Period	1/1993-7/2005	1/1990-7/2005
MAPE	0.53%	2.91%
R^2	0.863	0.643

MO Commercial Secondary		
Variable	Coefficient	T-Stat
Constant	16813	3.0
RU_Cust	0.059	2.4
Jan00	-816	-4.8
Apr05	309	1.8
AR(1)	0.961	40.5

MO Primary Other		
Variable	Coefficient	T-Stat
Constant	16813	3.0
RU_Cust	0.059	2.4
Jan00	-816	-4.8
Apr05	309	1.8
AR(1)	0.961	40.5

Table 19 Kansas Commercial Customers Model Results

	KS Commercial Secondary	KS Commercial Primary Other
Estimation Period	1/1991-7/2005	1/1993-7/2005
MAPE	0.56%	4.95%
R^2	0.996	0.159

KS Commercial Secondary		
Variable	Coefficient	T-Stat
Constant	602	0.5
RU_Cust	0.121	17.4
AR(1)	0.940	27.2
MA(1)	-0.428	-5.2

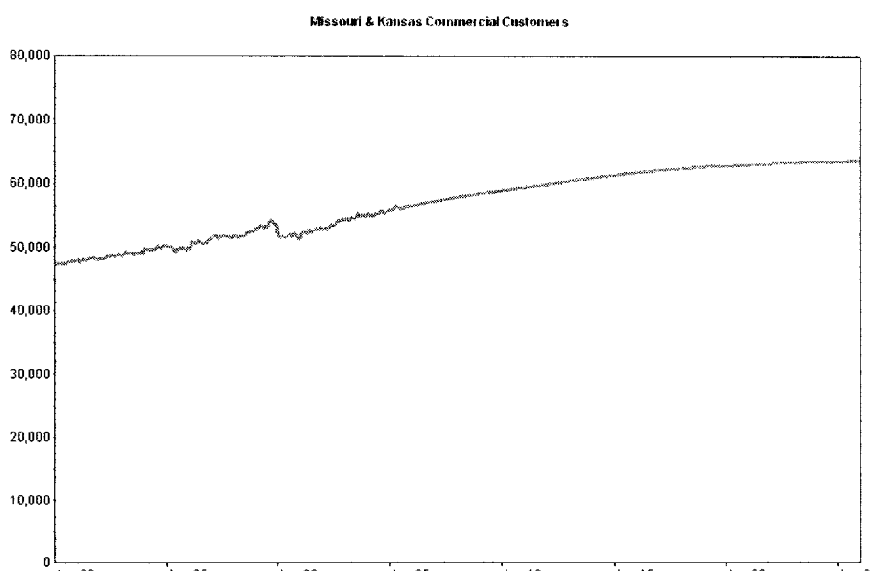
After the completion of each class model projection, then each revenue class is summed to create a state total and a commercial system total. Table 20 shows historical and predicted average commercial customers by state. Chart 13 shows historical and predicted values for the residential class as a whole (MO & KS).

Table 20 Commercial Customers

Historical and Forecasted Annual Average Commercial Customers			
Year	Missouri	Kansas	Total Sys Commercial
1990	30,410	17,134	47,544
1995	30,804	18,985	49,789
2000	29,195	22,496	51,691
2003	30,398	24,300	54,698
2004	30,478	24,815	55,293
2005	30,940	25,202	56,142
2006	31,087	25,744	56,831
2010	31,432	27,691	59,123
2015	31,795	29,718	61,513
2020	31,967	30,940	62,907
2025	32,030	31,474	63,504

Annual Growth Rates			
1990-1995	0.3%	2.1%	0.9%
1995-2000	-1.1%	3.5%	0.8%
2000-2005	1.2%	2.3%	1.7%
1990-2005	0.1%	2.6%	1.1%
2005-2006	0.5%	2.2%	1.2%
2006-2010	0.3%	1.8%	1.0%
2010-2015	0.2%	1.4%	0.8%
2015-2020	0.1%	0.8%	0.4%
2020-2025	0.0%	0.3%	0.2%
2006-2025	0.2%	1.1%	0.6%

Chart 13: Total Missouri and Kansas Commercial Customers (Historical & Forecasted)



Commercial End-Use Indices

The commercial indices are constructed solely using EIA's efficiency and end-use saturation series for the West North Central Census region. EIA analyzes 10 commercial building types and 10 different energy end-uses as part of their forecasting process. Table 21 details the end-uses and building types analyzed.

Table 21 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

Commercial SAE Model Specification

The SAE modeling framework used for the commercial class is similar to the residential SAE modeling in that commercial energy use is defined as commercial 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

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

Substituting estimates for the end-use elements gives Equation 20.

Equation 20

$$Use_{y,m} = a + b_1 \times XHeat_{y,m} + b_2 \times XCool_{y,m} + b_3 \times XOther_{y,m} + \varepsilon_{y,m}$$

where $XCool_{y,m}$, $XCool_{y,m}$, 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 adjustment factors. Examples of calculating XHeat, XCool, XOther, for Commercial Secondary (CS) and Primary Other (PO) are shown in Table 22.

Table 22 Calculations for XHeat, XCool, and Xother

XHeat CS	EconTrans.CS_Prc_Ind ^ Elas.Price_CS * EconTrans.GMP_Index ^ Elas.Output_CS * WthrTrans.HDD_Index * Convstock (Indices.Heating_CS)
XCool CS	EconTrans.CS_Prc_Ind ^ Elas.Price_CS * EconTrans.GMP_Index ^ Elas.Output_CS * WthrTrans.CDD_Index * Convstock (Indices.Cooling_CS)
XOther CS	EconTrans.CS_Prc_Ind ^ Elas.Price_CS * EconTrans.GMP_Index ^ Elas.Output_CS * WthrTrans.BDays_Index * Convstock (Indices.NonHVAC_CS) * Value (MoMults.Multipliers, 1998, month)
XHeat PO	EconTrans.PO_Prc_Ind ^ Elas.Price_PO * EconTrans.**GPMan_Ind** ^ Elas.Output_PO * WthrTrans.HDD_Index * Convstock (Indices.Heating_PO) * 1000
XCool PO	EconTrans.PO_Prc_Ind ^ Elas.Price_PO * EconTrans.**GPMan_Ind** ^ Elas.Output_PO * WthrTrans.CDD_Index * Convstock (Indices.Cooling_PO) * 1000
XOther PO	EconTrans.PO_Prc_Ind ^ Elas.Price_PO * EconTrans.**GPMan_Ind** ^ Elas.Output_PO * WthrTrans.BDays_Index * Convstock (Indices.NonHVAC_PO) * Value (MoMults.Multipliers, 1998, month) * 1000
XHeat CR	EconTrans.CR_Prc_Ind ^ Elas.Price_CR * EconTrans.GMP_Index ^ Elas.Output_CR * WthrTrans.HDD_Index * Convstock (Indices.Heating_CR)
XCool CR	EconTrans.CR_Prc_Ind ^ Elas.Price_CR * EconTrans.GMP_Index ^ Elas.Output_CR * WthrTrans.CDD_Index * Convstock (Indices.Cooling_CR)
XOther CR	EconTrans.CR_Prc_Ind ^ Elas.Price_CR * EconTrans.GMP_Index ^ Elas.Output_CR * WthrTrans.BDays_Index* Convstock (Indices.NonHVAC_CR) * Value (MoMults.Multipliers, 1998, month)
GMP_Index	Economics.GMP / IndexValues.GMP
GPNonMan_Ind	Economics.GP_Non_Man / IndexValues.GP_Non_Man
GPMan_Ind	Economics.GP_Man / IndexValues.GP_Man

Heating End-Use Variable

As presented in the residential SAE model section, energy use by space heating systems depends on heating degree days, heating equipment share levels, heating equipment operating efficiencies, the number of billing days, 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

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

where $XCool_{y,m}$ 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 commercial models for each state:

- Commercial Secondary (CS)
- Primary Other (PO)

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

$$HeatIndex_y = \left(\frac{kWh}{Sqft}\right)_{heating} \times \frac{\left(Sat_y / Eff_y\right)}{\left(Sat_{98} / Eff_{01}\right)}$$

The $HeatIndex_y$ reflects changes in equipment saturation and efficiency trends relative to a base year. The base year is defined as 2001. 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 2001. In other years, it will be greater than one if equipment saturation levels are above their 2001 level. This will be counteracted by higher efficiency levels, which will drive the index downward. The average space heating intensity is given in energy sales for space heating per square feet area.

Historical and projected heating equipment saturation trends are derived from EIA's Commercial Buildings Energy Consumption Survey (CBECS) for North West Central region. Heating equipment efficiency trends are obtained from EIA's study for 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, prices and billing days. Since the heating degree days used in these models are in revenue month cycle, billing degree days is not used as a variable. Using the COMMEND default elasticity parameters, the estimates for space heating equipment usage levels are computed as follows:

Equation 23

$$HeatUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{01}}\right)^{-0.20} \times \left(\frac{Output_{y,m}}{Output_{01}}\right)^{0.50} \times \left(\frac{HDD_{y,m}}{HDD_{01}}\right)$$

where $Price_{y,m}$ is the average commercial real price of electricity in year (y) and month (m), $Price_{01}$ is the average commercial real price of electricity in 2001, $Output_{y,m}$ is the economic output in year (y) and month (m), $Output_{98}$ is the economic output in 2001, $HDD_{y,m}$ is the revenue month heating degree days in year (y) and month (m), and HDD_{01} is the annual heating degree days for 2001.

By construction, the $HeatUse_{y,m}$ variable has an annual sum that is close to one in the base year (2001). 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, if the real price of electricity goes up 10% relative to the base year value, the price term will contribute a multiplier of about 0.98 (computed as 1.10 to the -0.20 power).

Cooling End-Use Variable

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

Equation 24

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

where $XCool_{y,m}$ is estimated cooling energy use in year (y) and month (m), $CoolIndex_y$ is 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

$$CoolIndex_y = \left(\frac{kWh}{Sqft}\right)_{cooling} \times \frac{\left(Sat_y / Eff_y\right)}{\left(Sat_{01} / Eff_{01}\right)}$$

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

Data values in 2001 are used as a base year for normalizing the index, and the ratio on the right is equal to 1.0 in 2001. In other years, it will be greater than one if equipment saturation levels are above their 2001 level. This will be counteracted by higher efficiency levels, which will drive the index downward. The average space cooling intensity is given in energy sales for space cooling per square feet area.

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

Equation 26

$$CoolUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{01}}\right)^{-0.20} \times \left(\frac{Output_{y,m}}{Output_{01}}\right)^{0.50} \times \left(\frac{CDD_{y,m}}{CDD_{01}}\right)$$

where $CDD_{y,m}$ is the revenue month cooling degree days in year (y) and month (m), and CDD_{98} is the annual cooling degree days for 2001.

By construction, the $CoolUse_{y,m}$ variable has an annual sum that is close to one in the base year (2001). 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.

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 billing days. 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

$$OtherIndex_y = \sum_{Type} Weight^{Type} \times \left(\frac{Sat_y^{Type} / Eff_y^{Type}}{Sat_{01}^{Type} / Eff_{01}^{Type}} \right)$$

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 given in energy sales for equipment usage per square feet area. The annual saturation and efficiency levels for non-HVAC equipment are taken from the spreadsheet developed by EIA's study for 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

$$OtherUse_{y,m} = \left(\frac{Price_{y,m}}{Price_{01}}\right)^{-0.20} \times \left(\frac{Output_{y,m}}{Output_{01}}\right)^{0.50} \times Mult_m$$

In this expression, *COMMEND* default values are used for the price and output elasticities. The *OtherUse* and *XOther* variables are constructed at the "*StrucVars*" transformation table in the project files.

Estimated Commercial Model

The Commercial Secondary (CS) revenue class is estimated using an average use per customer models. Commercial Primary Other (PO) models are estimated using total monthly billed sales. In addition to the variables shown in equation 20, both models also include binary indicator variables for certain months, a trend variable and an error correction term. Models are estimated using monthly data over the period January 1997 to July 2005. The SAE models explain historical sales well with adjusted R^2 from .87 to .95 and in sample MAPE of 2.5% to 5.4%. CS models had the best fit with in sample MAPE's of 2.5% for Kansas and 2.5% for Missouri. The PO MAPE is 5.4% for Kansas and 3.6% for Missouri. Tables 23 and 24 show the coefficients for the commercial models.

Table 23 Missouri Commercial Model Results

	MO Commercial Secondary	MO Commercial Primary Other
Estimation Period	1/1992-7/2005	1/1994-7/2005
MAPE	2.53%	3.56%
R^2	0.950	0.873

Missouri CS_AvgUse		
Variable	Coefficient	T-Stat
Constant	-8430	-9.1
XHeat_CS	0.242	2.2
XCool_CS	0.808	22.9
XOther_CS	0.538	7.4
Jan00	511	2.1
Jan01	904	3.6
Feb04	492	2.0
Apr03	-664	-2.6
Apr	-278	-3.6
May	-191	-2.4
Nov	-148	-2.1
TrendVar	0.33	9.6
AR(1)	0.369	4.7

Missouri PO_SALES		
Variable	Coefficient	T-Stat
XCool_PO	0.681	16.1
XOther_PO	0.134	1.8
May99	-37,529,861	-9.8
Jun99	34,556,322	9.1
Aug99	-9,363,092	-2.4
Sep99	7,387,090	1.9
Mar01	-15,461,734	-4.1
Apr01	11,133,530	2.9
Apr02	9,182,146	2.5
Jun02	-23,587,354	-6.4
Jan01	10,186,677	2.7
Aft2002	-12,865,300	-12.3
TrendVar	1,886	12.9
AR(1)	0.269	3.0

Table 24 Kansas Commercial Model Results

	KS Commercial Secondary	KS Commercial Primary Other
Estimation Period	1/1994-7/2005	1/1994-7/2005
MAPE	2.46%	5.45%
R^2	0.929	0.914

Kansas CS_AvgUse		
Variable	Coefficient	T-Stat
Constant	-8370	-9.8
XHeat_CS	0.927	6.8
XCool_CS	0.655	8.9
Jan01	776	2.9
Jan	-210	-1.7
Feb	-354	-3.0
Mar	-429	-4.2
Apr	-405	-4.8
Jun	269	2.3
Jul	490	2.4
Aug	369	1.7
Sep	415	2.2
Oct	229	2.3
TrendVar	0.422	18.1
AR(1)	0.215	2.4

Kansas Primary Other Sales		
Variable	Coefficient	T-Stat
CONST	-1,600,945	-0.577
XCool_PO	0.38	5.683
XOther_PO	0.499	4.071
Aug1998	3,978,569	2.314
AftJun99	5,788,224	9.421
Apr00	-5,306,328	-3.073
LagDep(12)	0.363	6.47
AR(1)	0.166	1.789

Charts 14 through 17 shows resulting actual and predicted values for each of the commercial revenue classes.

Chart 14: Missouri Commercial Secondary Average Use Model

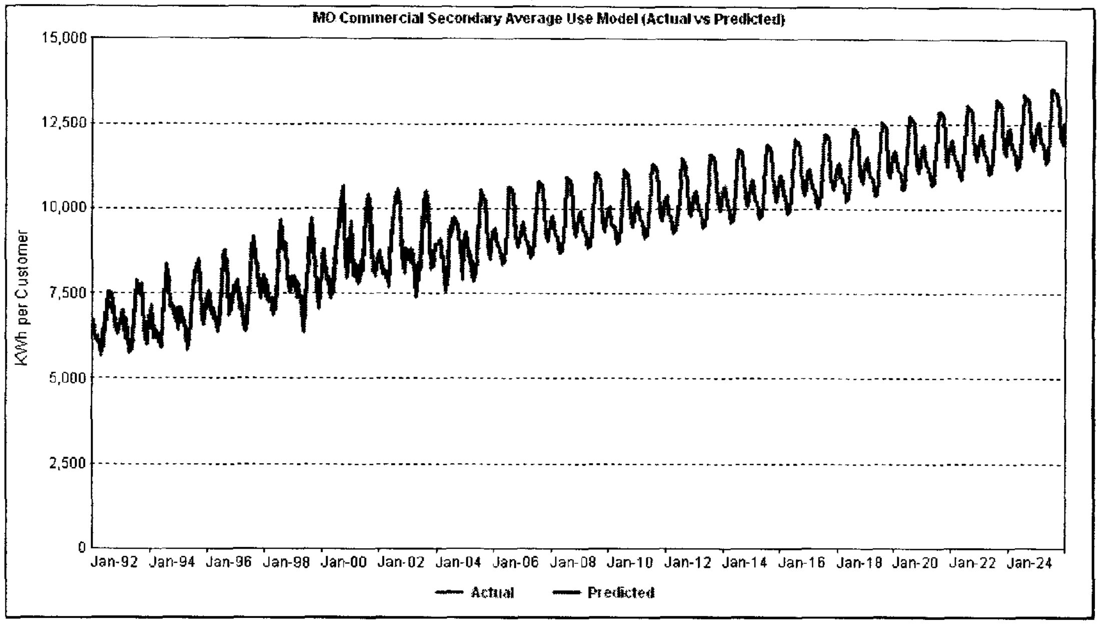


Chart 15: Missouri Primary Other Total kWh Sales Model

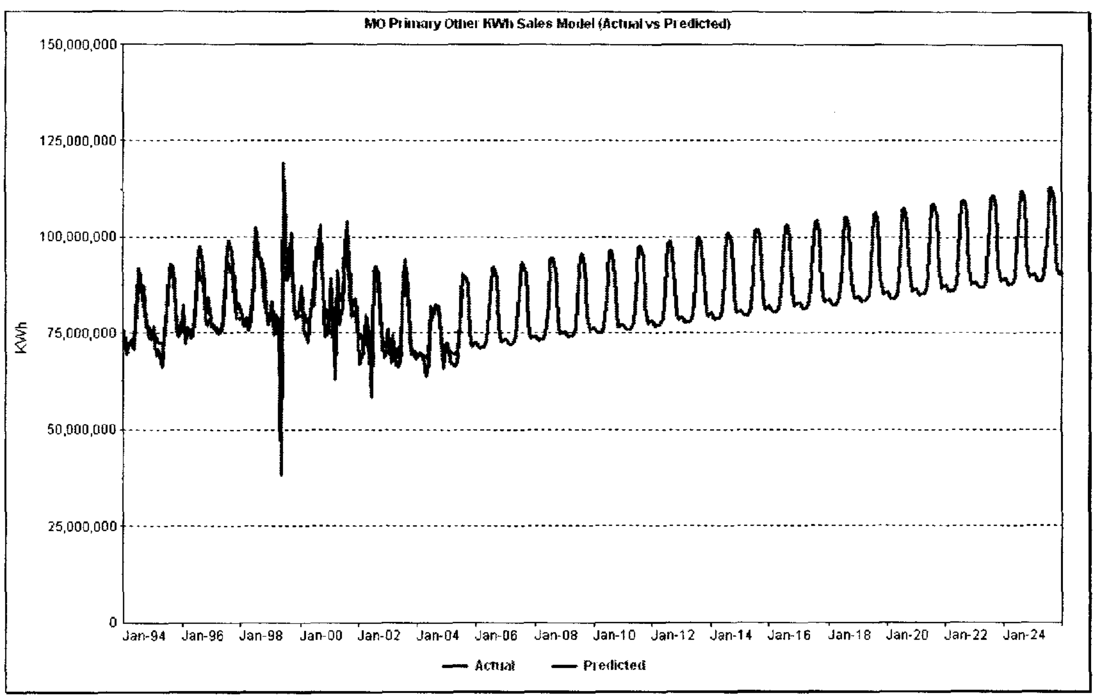


Chart 16: Kansas Commercial Secondary Average Use Model

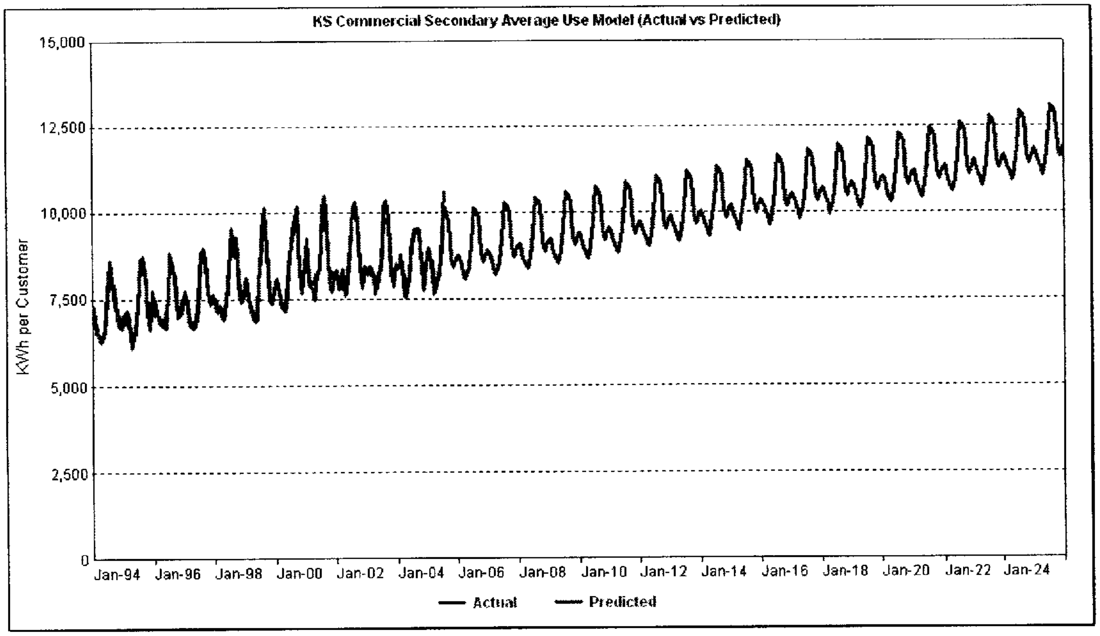
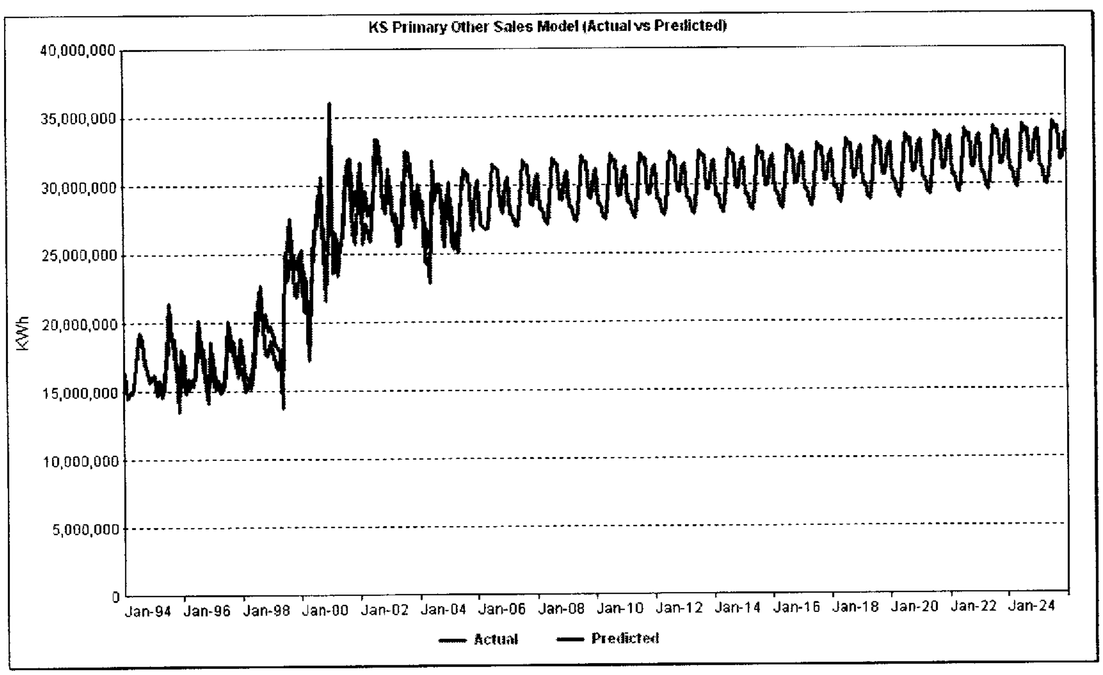


Chart 17: Kansas Primary kWh Total Sales Model



Average Use Base Case Forecast

The commercial 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 18 through 21 show the electric forecasts for Missouri and Kansas by voltage level. The jump in Kansas commercial primary (Chart 21) is due to the Sprint Campus. The decline in both Kansas and Missouri commercial primary is due to the recession, while Kansas also had an additional impact from Sprint scaling back on its operations.

Chart 18: Missouri Commercial Secondary

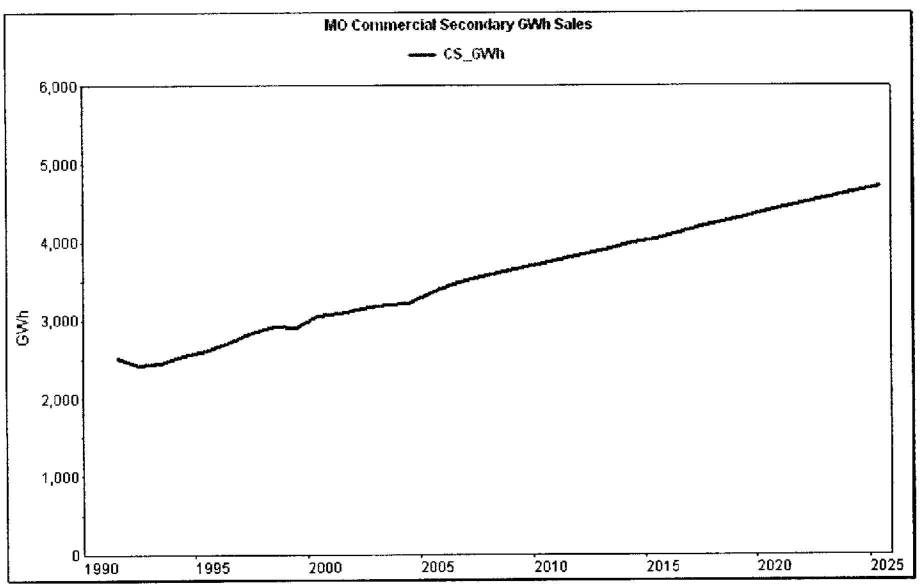


Chart 19: Missouri Commercial Primary Other

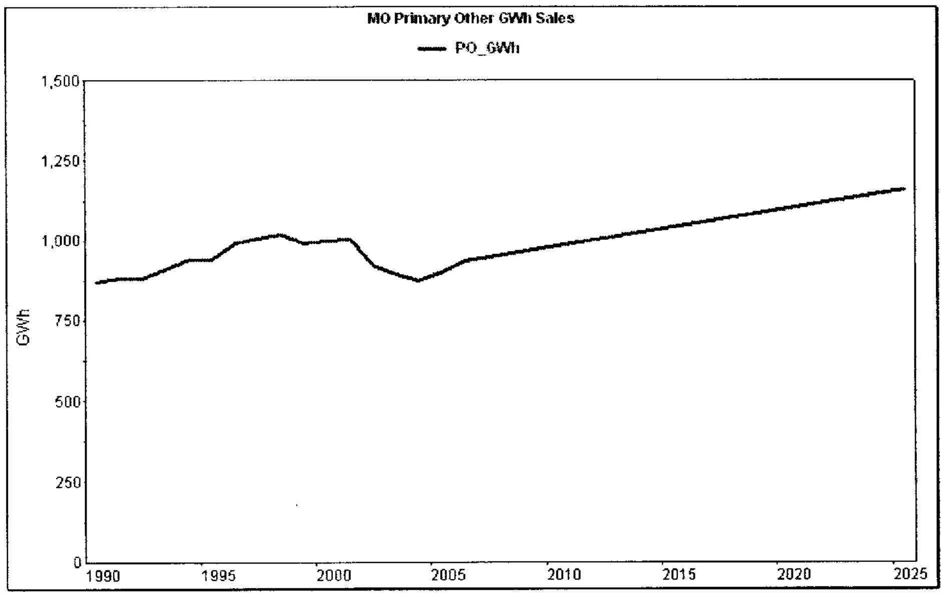


Chart 20: Kansas Commercial Secondary

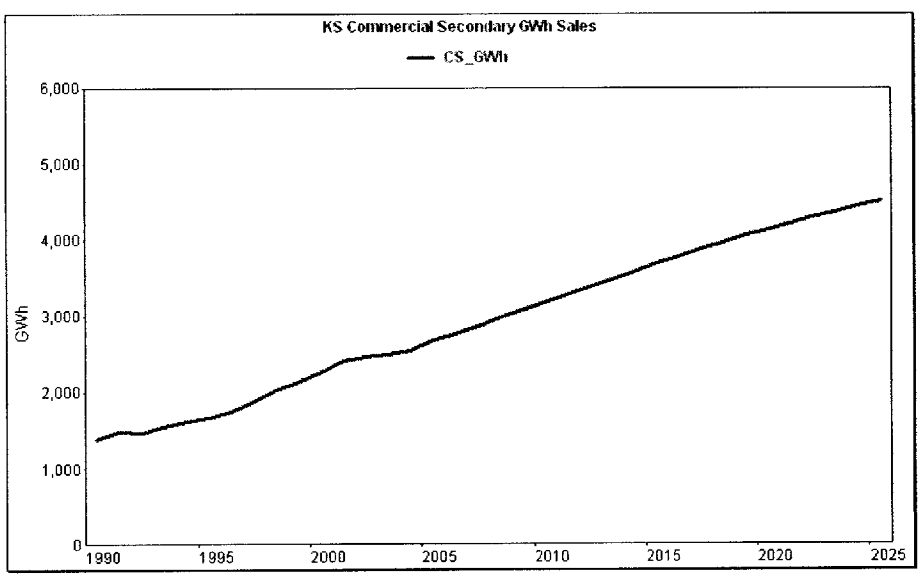
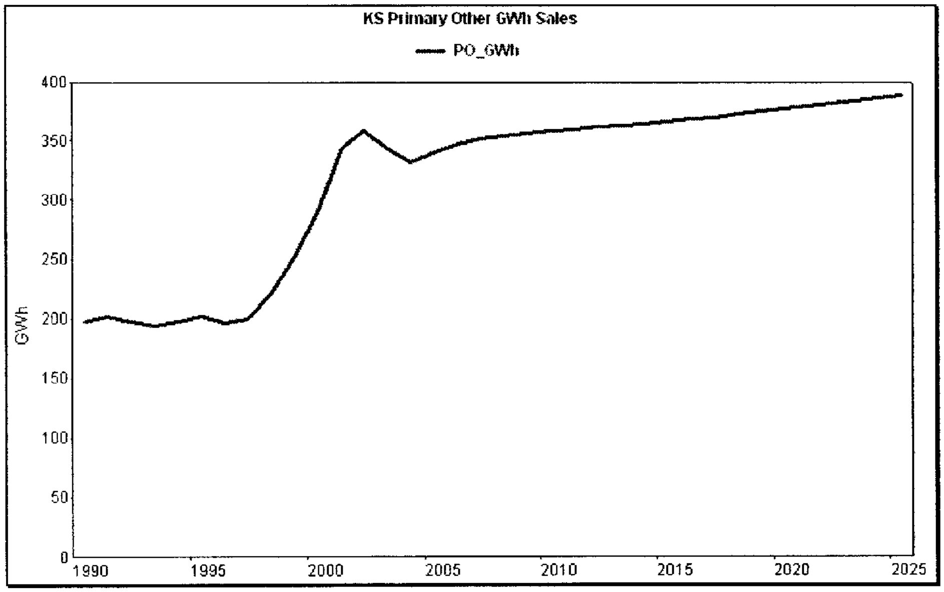


Chart 21: Kansas Commercial Primary



For the Kansas Commercial Secondary (CS) revenue class there's very little electric heating. Electric heating accounts for roughly 1% of total CS sales. Commercial Secondary cooling is roughly 10% of total CS sales. Base-use accounts for 89% of estimated commercial sales. Lighting accounts for the largest share of commercial non HVAC usage. For the West North Central region the EIA estimates that commercial lighting is approximately 37% of total commercial electric sales. Office and miscellaneous equipment use represents the next largest use accounting for roughly 27% of commercial energy use.

Load Shapes

Annual end-use class sales forecast for commercial are combined with hourly end-use and class hourly load profiles. The commercial end-use profiles are based on load research data and previous KCP&L analysis. Refer to Section 8, Energy and Demand Development for information about commercial class and end-use daily load profiles and the use of these profiles in forecasting energy and demand.

SECTION 5: Industrial

Summary

Sales to manufacturing customers accounted for 14% of KCP&L's total retail sales in 2005. KCP&L has a relatively small manufacturing 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, ITRON adapted their SAE model for the commercial sector to our smaller manufacturing customers served at a secondary voltage.

The largest nine industrial customers account for the majority of sales in the industrial class. During the forecast process, individual customer projections provided by the customer and KCP&L energy consultants are compared to the SAE models. The results are used to make adjustments for growth or cutbacks that cannot be modeled. For the current forecast period, there was no significant difference.

The industrial class forecast is separated at two voltage levels, Manufacturing Primary (MP) and Manufacturing Other (MO). The industrial class billed electricity consumption is expected to increase at a 0.9% compounded annual rate between 2005-2025. During the same time period, manufacturing primary is expected to grow at 0.6% and manufacturing other at 1.5%. The majority of growth will be seen on the Kansas side of KCP&L's service territory. Even with flat customer growth, GWh sales are expected to grow slightly. Table 25 summarizes the industrial energy forecast.

Table 25 Industrial Historical and Forecasted Billed GWh Sales

Historical and Forecasted Billed GWh Sales Industrial			
Year	Missouri*	Kansas	Total Industrial
1990	1,367	341	1,708
1995	1,563	442	2,005
2000	1,669	412	2,081
2003	1,653	392	2,045
2004	1,649	408	2,057
2005	1,689	424	2,113
2006	1,684	435	2,119
2010	1,729	464	2,193
2015	1,792	505	2,297
2020	1,859	549	2,408
2025	1,926	592	2,518

**Excludes GST Steel*

Annual Growth Rates			
1990-1995	2.7%	5.3%	3.3%
1995-2000	1.3%	-1.4%	0.7%
2000-2005	0.2%	0.6%	0.3%
1990-2005	1.4%	1.5%	1.4%
2005-2006	-0.3%	2.6%	0.3%
2006-2010	0.7%	1.6%	0.9%
2010-2015	0.7%	1.7%	0.9%
2015-2020	0.7%	1.7%	0.9%
2020-2025	0.7%	1.5%	0.9%
2006-2025	0.7%	1.6%	0.9%

Methodology

The SAE approach was used to develop models to forecast the sales of the Manufacturing Other classes in Missouri and Kansas. The techniques used are similar to those used in the residential and commercial modeling. However, the Manufacturing Primary class models are developed based on econometric models and not the SAE approach.

Customer Analysis

Separate customer forecast models were constructed for each revenue class by state. Simple monthly regression models were estimated that relate manufacturing employment for the Kansas City MSA to historical monthly customer data. Models are estimated using monthly data over the period of 1990 to July 2005. The estimated model coefficients are all highly significant. Model adjusted R^2 varies from .083 to .911

with in sample MAPE of 1.31% to 8.86%. The Manufacturing Primary class models did not perform as well as the Manufacturing Other models and so exponential smoothing was used to forecast customers in this class for both states. The Manufacturing Primary class has fewer customers with frequent monthly changes in the number of customers resulting in a higher error. Table 26 shows the model results by state and revenue class.

Table 26 Industrial Customer Model Results

	MO Manufacturing Primary	MO Manufacturing Other	KS Manufacturing Primary	KS Manufacturing Other
Estimation Period	1/1990-7/2005	1/1996-7/2005	1/1994-7/2005	1/1997-7/2005
MAPE	4.77%	0.99%	8.86%	1.31%
R^2	0.653	0.911	0.083	0.769

Kansas MO Customers		
Variable	Coefficient	T-Stat
Constant	556	15.9
Jun99	-60	-2.7
Jun00	-98	-4.5
Nov00	-58	-2.6
Dec00	-62	-2.8
Jan01	45	2.1
Nov02	-38	-1.7
Dec02	59	2.7
LagDep(24)	0.462	15.2

Missouri MO Customers		
Variable	Coefficient	T-Stat
Constant	1275	22.5
Sep99	31	2.5
Apr00	-25	-2.0
Jul03	65	5.0
Apr05	38	2.3
Emp_Man	-2.419	-3.1
SAR(1)	0.789	30.2

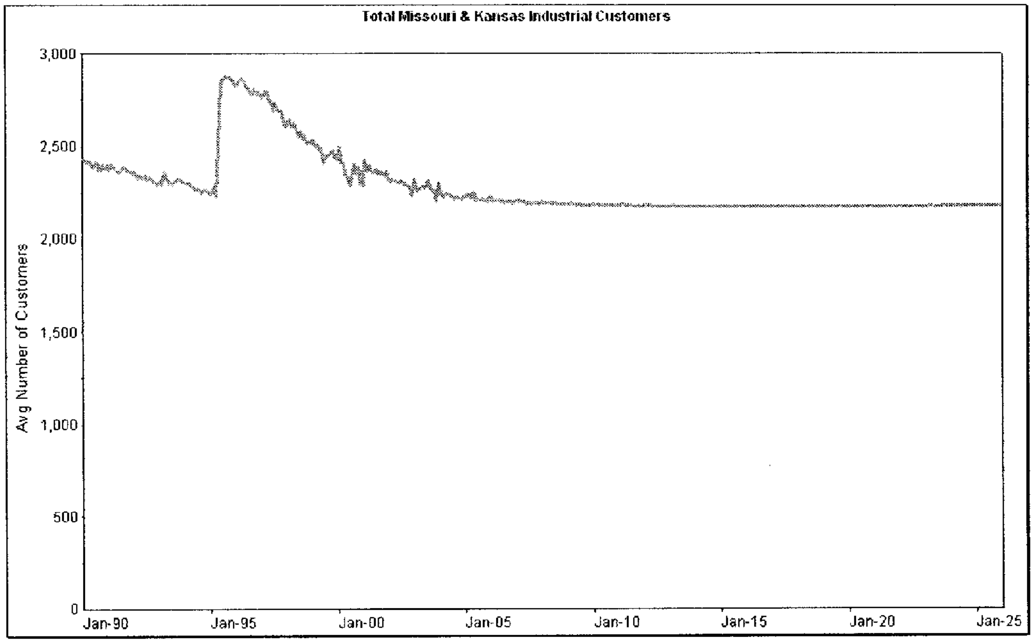
After completing the customer forecast model for each revenue class, they are summed to create a state total and system total. Table 27 shows historical and predicted average commercial customers by state. Chart 22 shows historical and predicted values for the commercial class as a whole (MO and KS). Both Missouri and Kansas Manufacturing Primary classes are expected to be flat over the forecast period 2006-2025. Missouri and Kansas industrial other will also be flat in customer growth over the 2006-2025 forecast period. On a system basis, customers will decrease 0.1% over the 2006-2025 forecast period.

Table 27 Annual Average Industrial Customers

Historical and Forecasted Annual Average Industrial Customers			
Year	Missouri	Kansas	Total Sys Industrial
1990	1,263	1,136	2,400
1995	1,396	1,281	2,677
2000	1,259	1,106	2,365
2003	1,205	1,067	2,272
2004	1,175	1,057	2,232
2005	1,167	1,054	2,221
2006	1,154	1,050	2,204
2010	1,136	1,046	2,182
2015	1,130	1,045	2,175
2020	1,131	1,045	2,176
2025	1,136	1,045	2,181

Annual Growth Rates			
1990-1995	2.0%	2.4%	2.2%
1995-2000	-2.0%	-2.9%	-2.4%
2000-2005	-1.5%	-1.0%	-1.3%
1990-2005	-0.5%	-0.5%	-0.5%
2005-2006	-1.1%	-0.4%	-0.8%
2006-2010	-0.4%	-0.1%	-0.3%
2010-2015	-0.1%	0.0%	-0.1%
2015-2020	0.0%	0.0%	0.0%
2020-2025	0.1%	0.0%	0.0%
2006-2025	-0.1%	0.0%	-0.1%

Chart 22: Missouri and Kansas Industrial Customers



Industrial End-Use Indices

Similar to commercial indices in that it is constructed solely using EIA's efficiency and end-use saturation series for the West North Central Census. EIA analyzes 10 different energy end-uses as part of their forecasting process.

Industrial Other SAE Model Specifications

The SAE modeling used for the Industrial Other class is similar to the commercial SAE modeling in that energy use is defined as Industrial Primary sector ($USE_{y,m}$) 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

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

Substituting estimates for the end-use elements gives Equation 31.

Equation 31

$$Use_{y,m} = a + b_1 \times XHeat_{y,m} + b_2 \times XCool_{y,m} + b_3 \times XOther_{y,m} + \varepsilon_{y,m}$$

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 of calculating XCool, XOther, for Industrial Other are shown in Table 28.

Table 28 Calculation of XHeat, XCool, and XOther

XHeat MP	EconTrans.MP_Prc_Ind ^ Elas.Price_MP * EconTrans.GPMan_Ind ^ Elas.Output_MP * WthrTrans.HDD_Index * Convstock (Indices.Heating_MP) * 1000
XCool MP	EconTrans.MP_Prc_Ind ^ Elas.Price_MP * EconTrans.GPMan_Ind ^ Elas.Output_MP * WthrTrans.CDD_Index * Convstock (Indices.Cooling_MP) * 1000
XOther MP	EconTrans.MP_Prc_Ind ^ Elas.Price_MP * EconTrans.GPMan_Ind ^ Elas.Output_MP * WthrTrans.BDays_Index * Convstock (Indices.NonHVAC_MP) * Value (MoMults.Multipliers, 1998, month) * 1000
XHeat MO	EconTrans.MO_Prc_Ind ^ Elas.Price_MO * EconTrans.GPMan_Ind ^ Elas.Output_MO * WthrTrans.HDD_Index * Convstock (Indices.Heating_MO)
XCool MO	EconTrans.MO_Prc_Ind ^ Elas.Price_MO * EconTrans.GPMan_Ind ^ Elas.Output_MO * WthrTrans.CDD_Index * Convstock (Indices.Cooling_MO)
XOther MO	EconTrans.MO_Prc_Ind ^ Elas.Price_MO * EconTrans.GPMan_Ind ^ Elas.Output_MO * WthrTrans.BDays_Index * Convstock (Indices.NonHVAC_MO) * Value (MoMults.Multipliers, 1998, month)
GMP_Index	Economics.GMP / IndexValues.GMP
GPNonMan_Ind	Economics.GP_Non_Man / IndexValues.GP_Non_Man
GPMan_Ind	Economics.GP_Man / IndexValues.GP_Man
MP_Prc_Ind	Price.MP / IndexValues.MP_Price
MO_Prc_Ind	Price.MO / IndexValues.MO_Price

Estimated Industrial Model

Industrial Primary (MP) models are estimated using total monthly billed sales. Industrial Other (MO) is estimated using SAE based average use per customer models. These models include binary indicator variables for certain months, a trend variable and error correction terms. Models are estimated using monthly data over the period January 1992 to July 2005. The SAE and econometric models explain historical sales well with adjusted R^2 from .67 to .94 and in sample MAPE of 2.6% to 4.0%. Table 29 shows the results from the models.

Table 29 Missouri and Kansas Industrial Model Results

	MO Industrial Primary	MO Industrial Other	KS Industrial Primary	KS Industrial Other
Estimation Period	1/1994-7/2005	1/1993-7/2005	1/1995-7/2005	1/1992-5/2004
MAPE	2.64%	3.33%	4.04%	3.86%
R^2	0.671	0.823	0.939	0.908

Kansas MO_AvgUse		
Variable	Coefficient	T-Stat
Constant	-44979	-5.4
XCool_MO	0.498	16.6
XOther_MO	0.031	3.1
Jan98	-2049	-2.4
Jul99	6692	7.6
Aug99	-4995	-5.6
Jan00	-1542	-1.8
Jan02	-2016	-2.3
TrendVar	1.549	6.6
AR(1)	0.918	17.0
MA(1)	-0.661	-6.5

Missouri MO_AvgUse		
Variable	Coefficient	T-Stat
Constant	-4205	-0.7
XCool_MO	0.494	12.0
XOther_MO	0.213	2.8
Oct94	2088	2.6
May95	-1761	-2.2
Nov96	-1665	-2.1
Jan98	-2766	-3.5
May98	-1880	-2.4
May99	-1238	-1.6
Jul99	3599	4.0
Aug99	1925	2.1
Feb01	1599	2.0
TrendVar	0.584	3.2
AR(1)	0.652	9.8

Kansas MP_Sales		
Variable	Coefficient	T-Stat
Sep96	-3,715,434	-4.9
Oct96	1,734,487	2.3
Jan01	1,873,317	2.6
Aug97	2,363,415	3.3
MP_Struc	10,505,127	3.9
Jan	-443,001	-2.0
Feb	-747,940	-3.4
May	576,785	2.5
Jun	1,470,904	6.2
Jul	2,185,246	8.9
Aug	1,869,156	7.1
Sep	1,653,828	6.4
Oct	972,524	3.9
AR(1)	0.983	92.0
MA(1)	-0.538	-6.3

Missouri MP_Sales		
Variable	Coefficient	T-Stat
Constant	18,730,617	1.6
XCool_MP	0.134	5.2
May97	-8,969,599	-2.3
Oct98	10,913,631	2.8
Sep01	-13,154,499	-3.4
Dec03	9,822,026	2.5
Apr05	6,143,211	1.6
Jun04	4,099,013	1.0
Jan	-1,346,120	-1.1
Feb	-3,806,209	-2.8
LagDep(12)	0.354	4.6
TrendVar	1,365	3.5
July05	393,659	0.1

Charts 23 through 26 shows resulting actual and predicted values for each of the Industrial revenue classes.

Chart 23: Missouri Industrial Primary

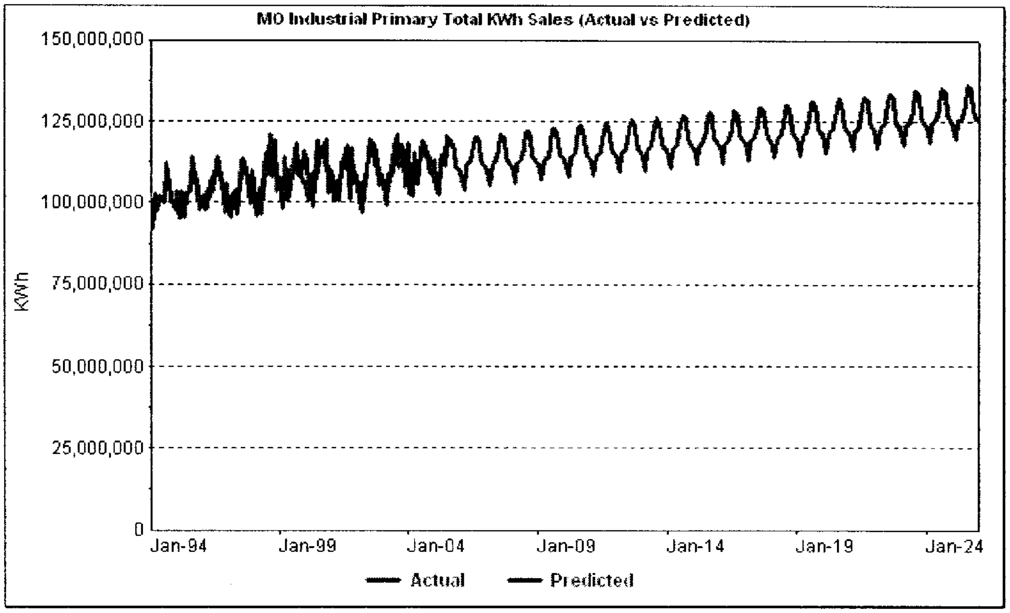


Chart 24: Missouri Industrial Other

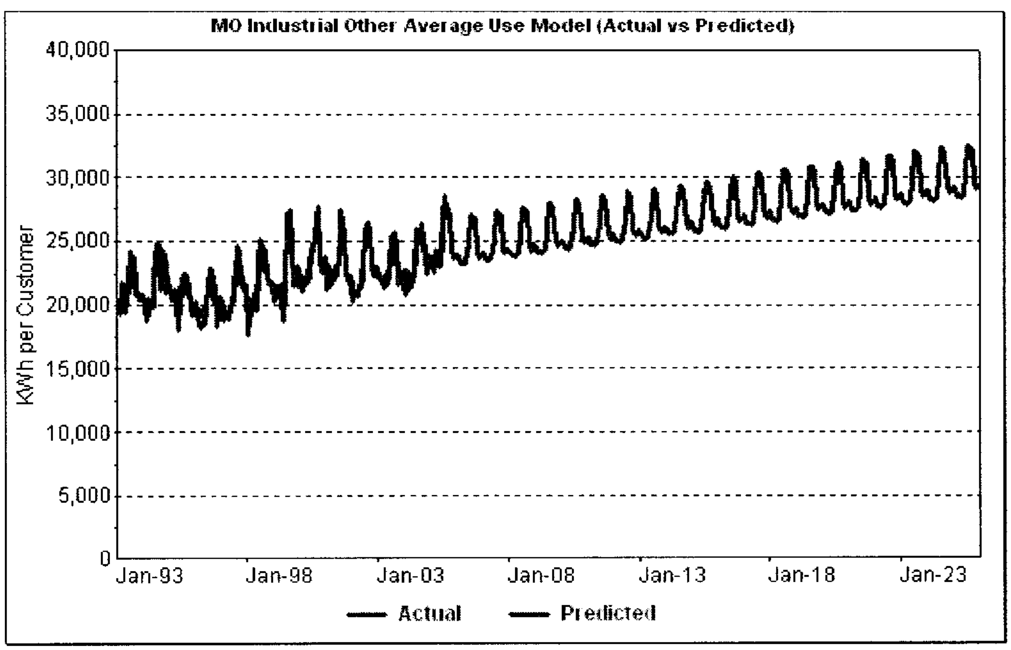


Chart 25: Kansas Industrial Primary

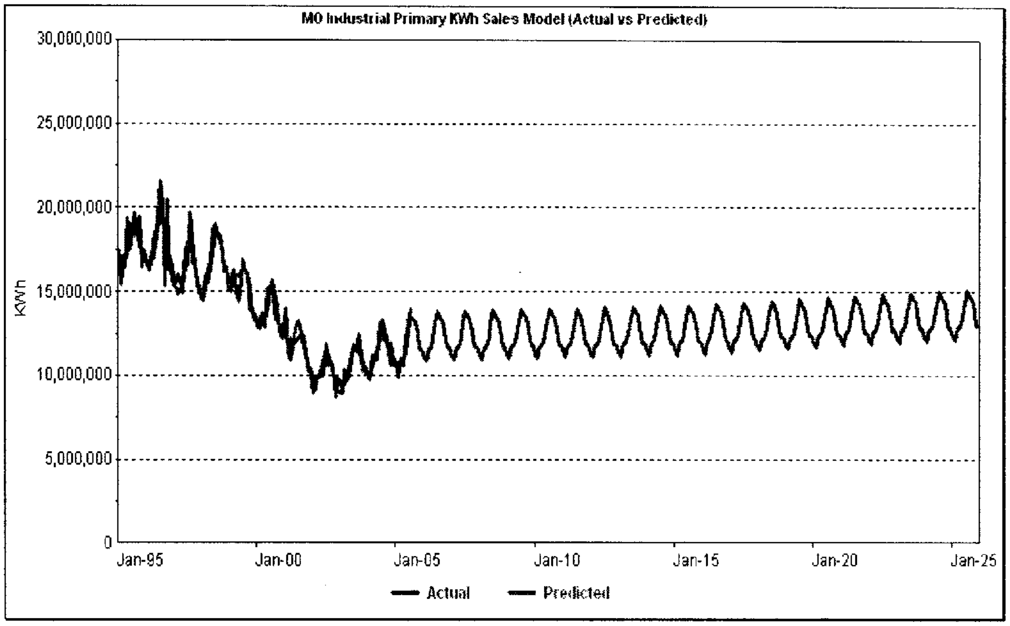
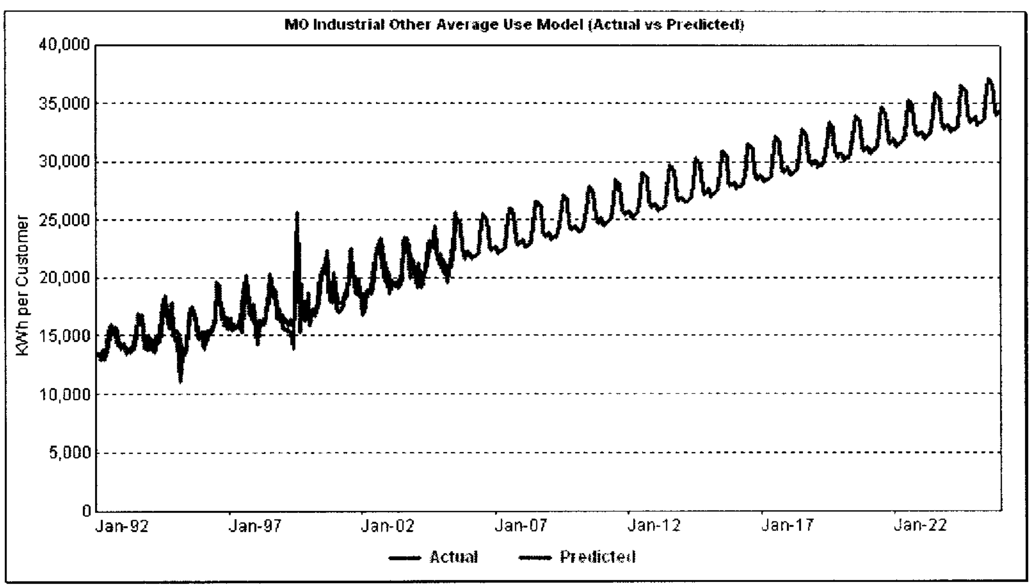


Chart 26: Kansas Industrial Other



Base Case Forecast

Total industrial sales forecast are generated as a product of the monthly sales (Industrial Primary) and monthly average use (Industrial Other). Charts 27 through 30 show the annual energy forecast for Missouri and Kansas industrial revenue classes.

Chart 27: Missouri Industrial Primary Base Forecast

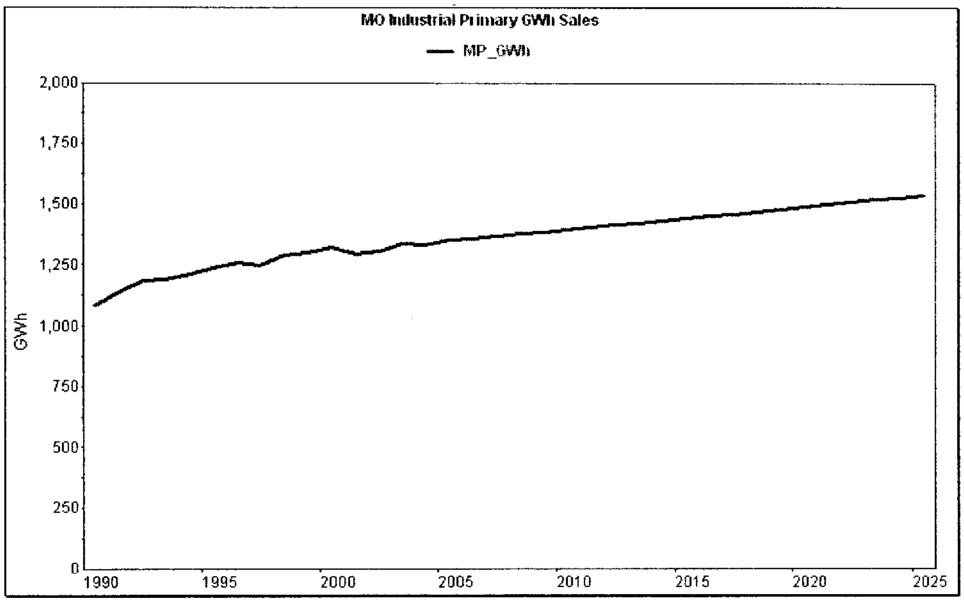


Chart 28: Missouri Industrial Other Base Forecast

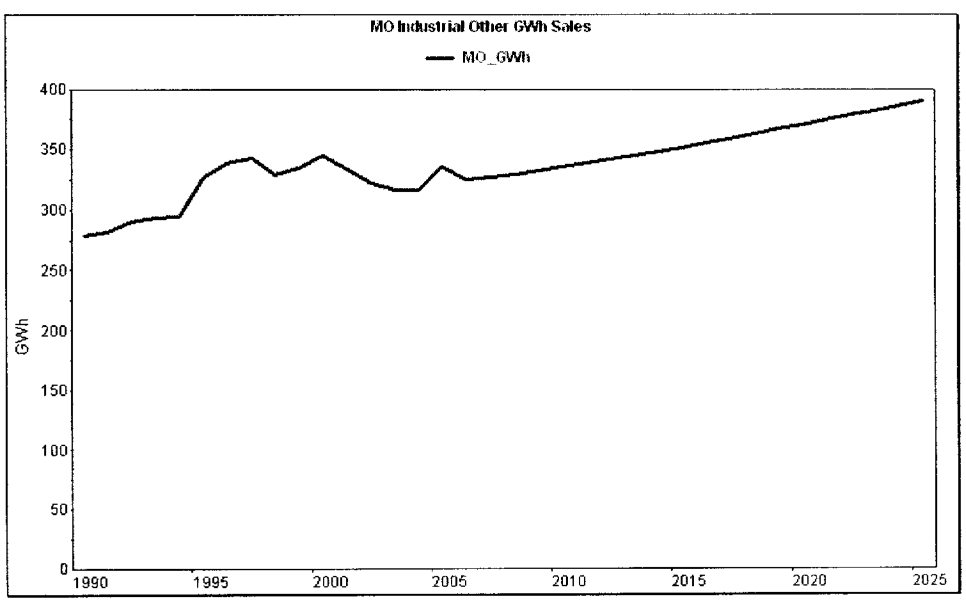


Chart 29: Kansas Industrial Primary Base Forecast

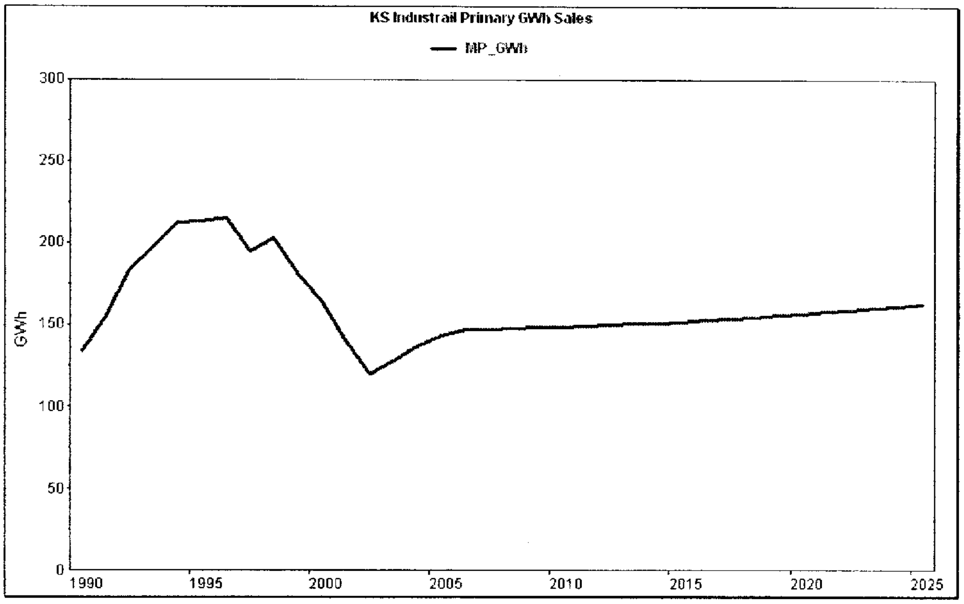
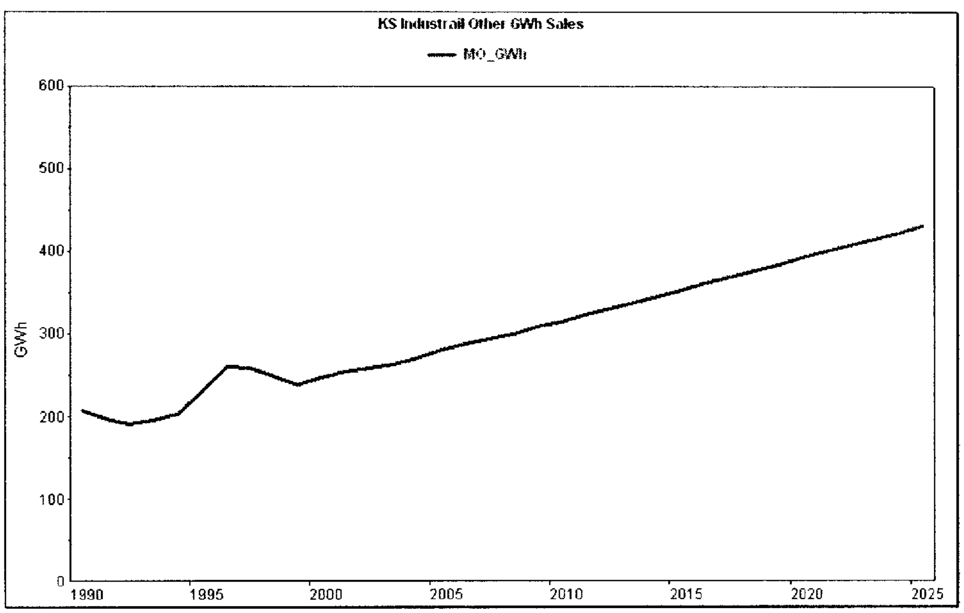


Chart 30: Kansas Industrial Other Base Forecast



Load Shapes

The Industrial end-use profiles are based on load research data and previous KCP&L analysis. Refer to Section 8, Energy and Demand Development for information about Industrial class and end-use daily load profiles and the use of these profiles in forecasting energy and demand.

SECTION 6: Other Retail Sales

Summary

The Public Street Light and Traffic Signals classes account for less than one percent of total system sales. Sales for this group are expected to grow at 0.4 percent over the 2006-2025 forecast.

Table 30 Other Retail GWh Sales

Historical and Forecasted Billed GWh Sales Other			
Year	**Street Lights**	**Traffic Signals**	**Total Other**
1990	68.8	1.2	70.1
1995	64.0	1.4	65.5
2000	74.3	1.6	75.9
2003	83.1	1.6	84.7
2004	83.5	1.5	85.0
2005	79.5	1.6	81.1
2006	80.9	1.5	82.4
2010	84.0	1.5	85.5
2015	86.7	1.6	88.3
2020	87.2	1.6	88.8
2025	87.7	1.6	89.3

Annual Growth Rates			
1990-1995	-1.4%	2.9%	-1.4%
1995-2000	3.0%	1.9%	3.0%
2000-2005	1.4%	-0.2%	1.3%
1990-2005	1.0%	1.5%	1.0%
2005-2006	1.8%	-2.4%	1.7%
2006-2010	0.9%	-0.3%	0.9%
2010-2015	0.6%	1.3%	0.6%
2015-2020	0.1%	0.0%	0.1%
2020-2025	0.1%	0.0%	0.1%
2006-2025	0.4%	0.3%	0.4%

Street Lighting

Street lighting contributes less than one percent of total KCP&L sales. The forecast models are built from historical usage and driven by population. Table 31 shows the model coefficients for street lighting.

Table 31 Model Coefficients for Street Lighting

Kansas Street Lighting		
Variable	Coefficient	T-Stat
CONST	1,830,964	23.7
Jun99	188,891	4.2
Jan	44,471	0.5
Feb	-263,083	-2.8
Mar	-277,606	-3.0
Apr	-506,349	-5.4
May	-627,086	-6.6
Jun	-806,367	-8.5
Jul	-730,470	-7.7
Aug	-601,191	-6.2
Sep	-490,668	-5.1
Oct	-286,359	-3.0
Nov	-115,146	-1.2
SAR(1)	0.779	8.0
SAR(2)	-0.123	-1.2

Missouri Street Lighting		
Variable	Coefficient	T-Stat
CONST	-4,823,839	-0.3
Population	5,240	0.6
Feb00	1,263,436	17.0
Feb03	-888,678	-12.0
May03	923,362	12.4
Jan04	-254,623	-3.0
Feb04	-165,409	-1.9
Dec04	4,889,555	65.9
AR(1)	0.949	22.6

Traffic Signals

Traffic signals contribute only a small fraction to total system sales. Simple regression and ARIMA models are used.

SECTION 7: Sales for Resale

Individual class regression models were created for each state. The Missouri Sales for Resale (SFR) class consists of SFR Muni and SFR Private customer classifications and in Kansas SFR Muni and SFR COOP. SFR is expected to grow 1.2 percent per year during the 2006-2025 forecast period. Generally the drivers are weather, usage, price, and a trend or lagged variable. SFR customer growth is expected to remain constant during the forecast period, four customers in Missouri and seven in Kansas. Table 32 shows the GWh sales for the Sales for Resale classifications.

Table 32 Sales for Resale GWh Sales

Historical and Forecasted Billed GWh Sales SFR				
Year	SFR Muni	SFR Priv	SFR COOP	Total SFR
1990	76.8	2.9	34.1	113.8
1995	35.9	3.4	38.8	78.1
2000	77.4	4.9	43.6	125.9
2003	74.4	4.6	54.0	133.0
2004	75.3	4.7	54.3	134.3
2005	75.8	4.8	57.5	138.1
2006	77.5	4.9	58.9	141.3
2010	79.6	5.1	65.9	150.6
2015	82.3	5.3	75.0	162.6
2020	84.9	5.8	84.1	174.8
2025	79.6	6.2	93.1	178.9

Annual Growth Rates				
1990-1995	-14.1%	3.2%	2.6%	-7.3%
1995-2000	16.6%	7.6%	2.4%	10.0%
2000-2005	-0.4%	-0.4%	5.7%	1.9%
1990-2005	-0.1%	3.4%	3.5%	1.3%
2005-2006	2.2%	2.1%	2.4%	2.3%
2006-2010	0.7%	1.0%	2.8%	1.6%
2010-2015	0.7%	0.8%	2.6%	1.5%
2015-2020	0.6%	1.8%	2.3%	1.5%
2020-2025	-1.3%	1.3%	2.1%	0.5%
2006-2025	0.1%	1.2%	2.4%	1.2%

The model coefficients for SFR are shown in Table 33.

Table 33 Sales for Resale Model Coefficients

Kansas SFR Cooperatives		
Variable	Coefficient	T-Stat
CONST	-12,183,690	-13.8
HDD	1,489	11.2
CDD	3,907	9.7
Jul94	-999,282	-3.4
Jul95	-549,733	-2.0
Aug95	666,923	2.7
Nov97	-536,082	-2.0
Oct98	1,127,688	4.6
Nov98	-1,185,692	-4.5
Sep99	-948,349	-3.6
Aug00	1,347,753	5.5
Sep00	-477,180	-1.7
Dec00	-3,231,946	-12.8
Aug03	1,144,383	4.4
Sep03	-1,305,263	-5.2
Oct03	-728,884	-2.9
Feb	-712,451	-5.7
Mar	-433,490	-3.7
Apr	-570,494	-4.8
May	-249,706	-2.0
Jul	750,316	5.4
TrendVar	414	17.3
Oct	-220,101	-1.7
SMA(1)	0.393	4.0

Missouri SFR Private		
Variable	Coefficient	T-Stat
CONST	-558,135	-7.9
HDD	127	6.7
CDD	487	9.9
SFRP_Struc	3,207,846	11.6
Jul94	-54,071	-1.6
Aug94	-58,240	-1.7
Feb98	-38,894	-1.2
Jan99	-67,776	-2.1
Dec00	133,023	4.0
Feb01	141,644	4.4
Sep02	-84,899	-2.6
Dec04	127,036	3.5
Apr	-30,368	-1.9
May	-21,534	-1.3
Aug	-17,389	-1.0
Oct	-23,065	-1.4
Dec	39,637	2.3
Jan	24,761	1.4
SMA(1)	0.413	4.5

Kansas SFR Municipals		
Variable	Coefficient	T-Stat
HDD	799	5.0
CDD	2,760	7.7
May98	713,117	3.2
Jun00	-806,435	-3.8
Dec00	4,410,208	19.9
Nov02	517,854	2.4
Nov04	331,320	1.5
SFRM_Struc	2,153,635	9.5
Jan	-200,434	-1.8
Feb	-269,552	-2.9
Aug	-158,150	-1.5
Sep	-270,950	-2.3
Oct	-288,967	-2.8
May	-226,824	-2.7

Missouri SFR Municipals		
Variable	Coefficient	T-Stat
CDD	2,504	9.1
Jan	525,195	4.2
Jun	217,159	1.7
Jul	267,910	1.9
Oct	245,284	1.9
Dec	623,688	4.7
TrendVar	112	77.7
Jun00	-2,733,821	-7.5
Nov97	3,278,995	9.5

SECTION 8: Energy and Demand Forecast

Overview

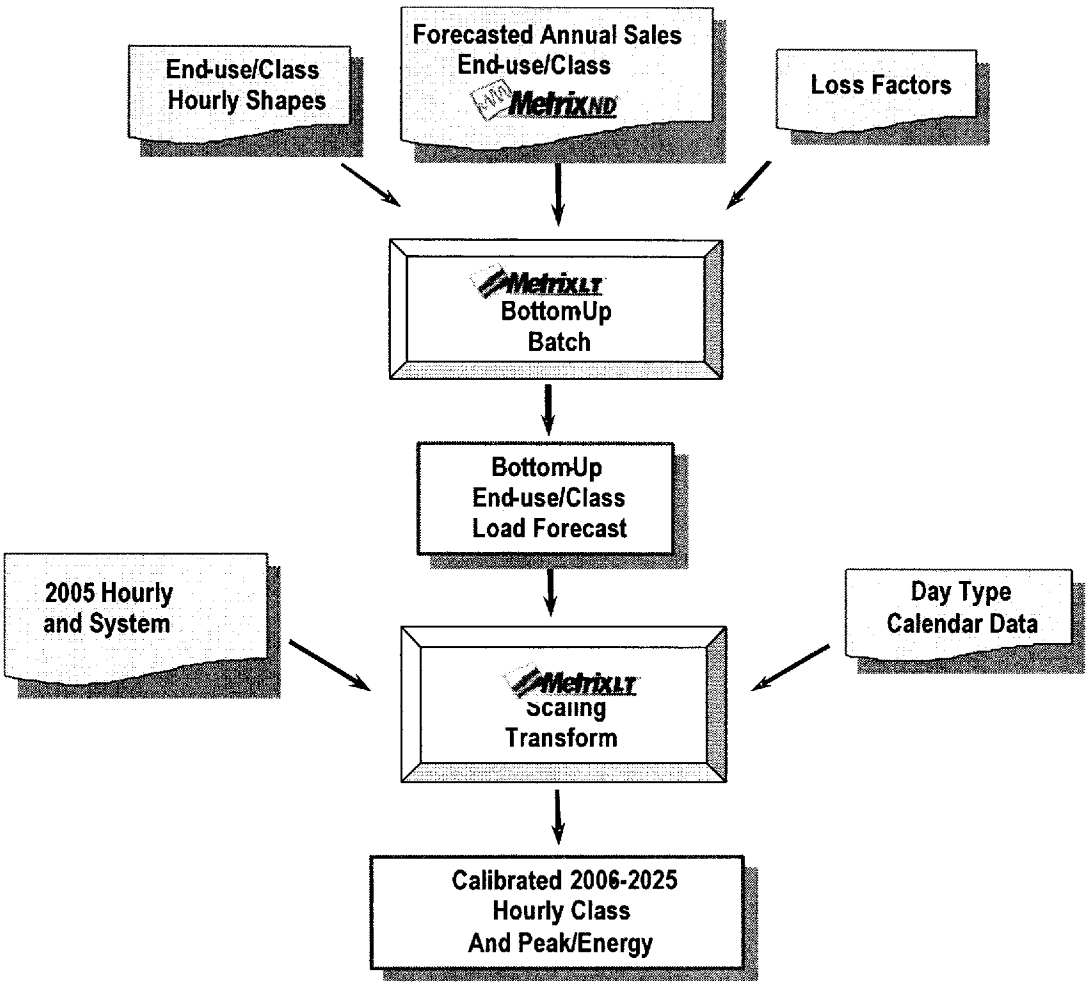
This section provides an overview of the model used to construct an hourly load peak demand forecast, which was developed using *MetrixLT* software.

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, and calibrating to a system control total.

Annual end-use sales for the residential sector and annual class sales forecast for commercial, industrial, and street lighting are combined with hourly end-use and class hourly load profiles. The residential end-use profiles are based on KCP&L data. The residential end-use hourly load forecast is calibrated to estimated hourly residential load research data for 2005. The industrial, commercial, and street lighting hourly load profile is constructed from KCP&L 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 last step is to then calibrate the initial hourly load forecast to an estimated system hourly load for 2005. The calibrated system load model is then used to generate monthly class and system peak forecasts for 2006 to 2025. Figure 1 depicts the forecast process.

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



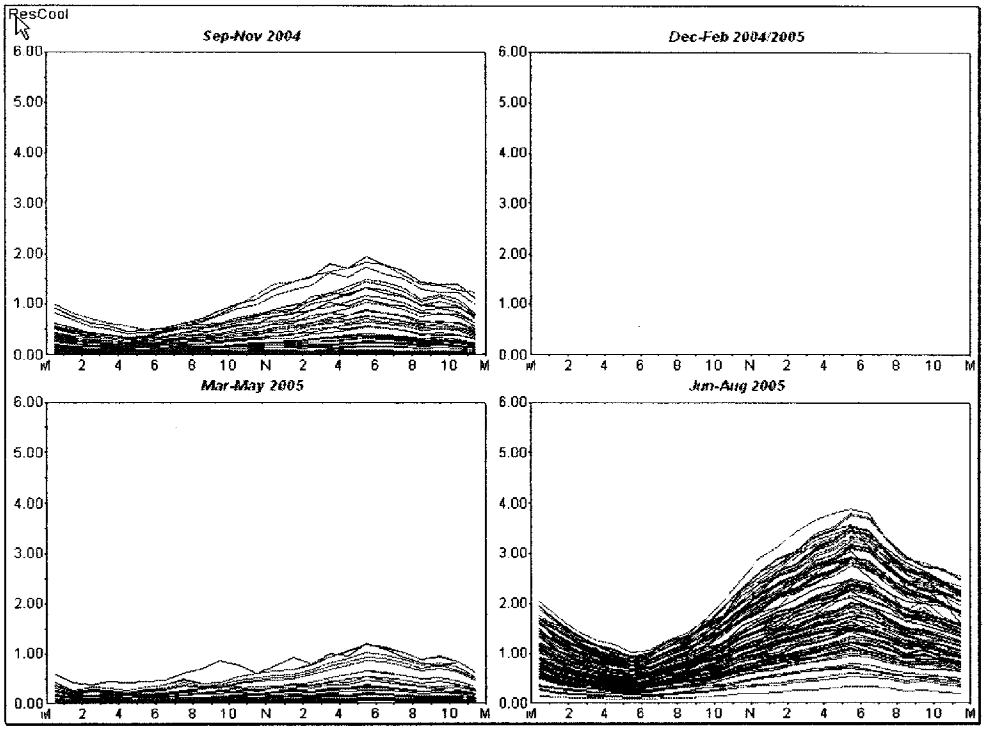
Forecast Methodology

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

Step 1: Construct Residential End-Use Profiles

The residential end-use profiles are generated using *MetrixLT* "day-type" profiles. KCPL provided day-type profiles for residential heating, cooling, and other uses. The day-type profiles represent typical usage patterns for a weekday, weekend, and peak day. A separate set of profiles was provided for each month. The profiles are combined with a daily weather response function that reflects actual daily temperatures over the historical period and normal daily temperatures through the forecast period. The result is an hourly end-use profile. Figure 2 shows the day-type profile generated for residential air conditioning.

Figure 2: Residential Air Conditioning Daytype Profile



Step 2: Develop Hourly Load Profiles for Nonresidential sector

Hourly load profile models are developed for each of the nonresidential classes – commercial, industrial, street lighting, and resale. The models are estimated using *MetrixND* and are constructed from KCP&L estimated class hourly load research data for 2005 and 2005 calendar and weather data. Class profiles are generated through the forecast period based on a calendar and normal weather conditions. Street lighting profile is constructed as a *Daytype* model. The profiles are then imported into the *MetrixLT* project file as *Interval Data*. Figures 3 and 4 show the resulting commercial and industrial hourly load shapes.

Figure 3: Commercial Load Profile

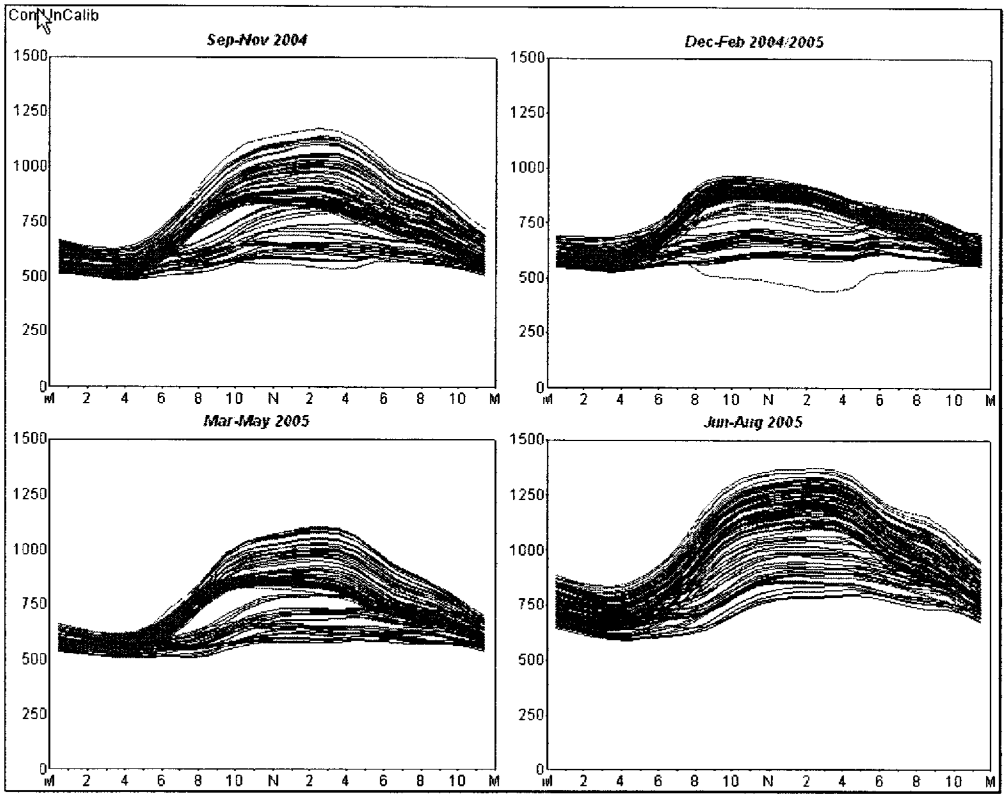
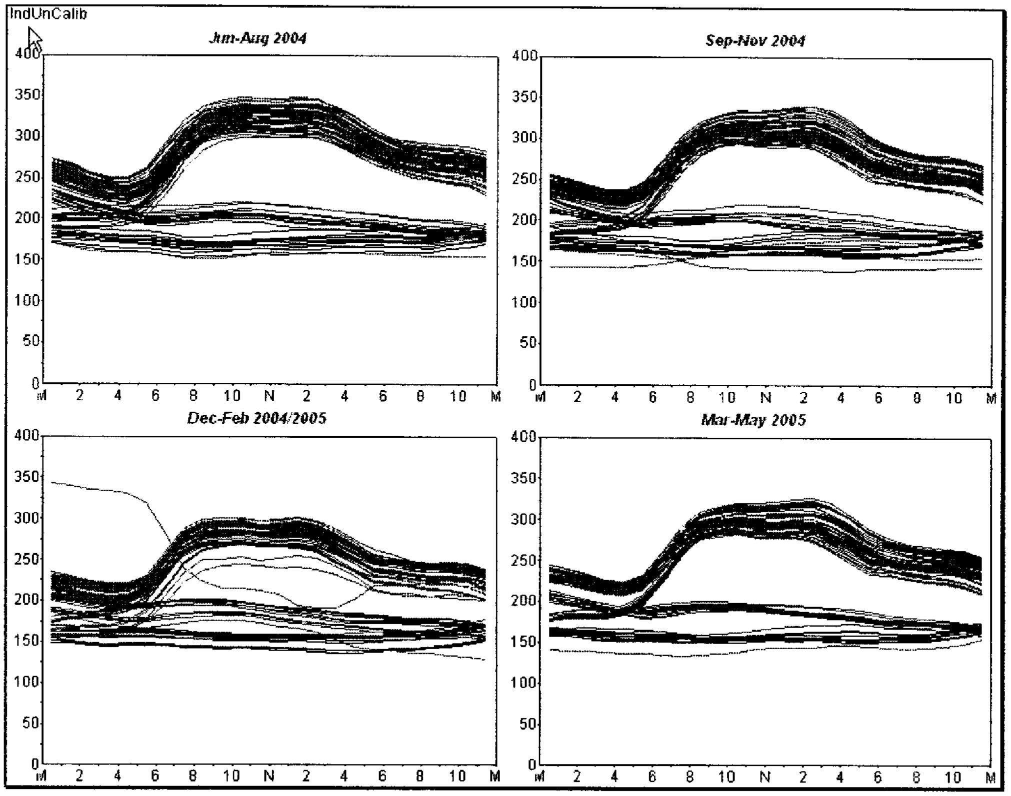


Figure 4: Industrial Load Profile



Step 3: Construct Uncalibrated System Hourly Load Forecast

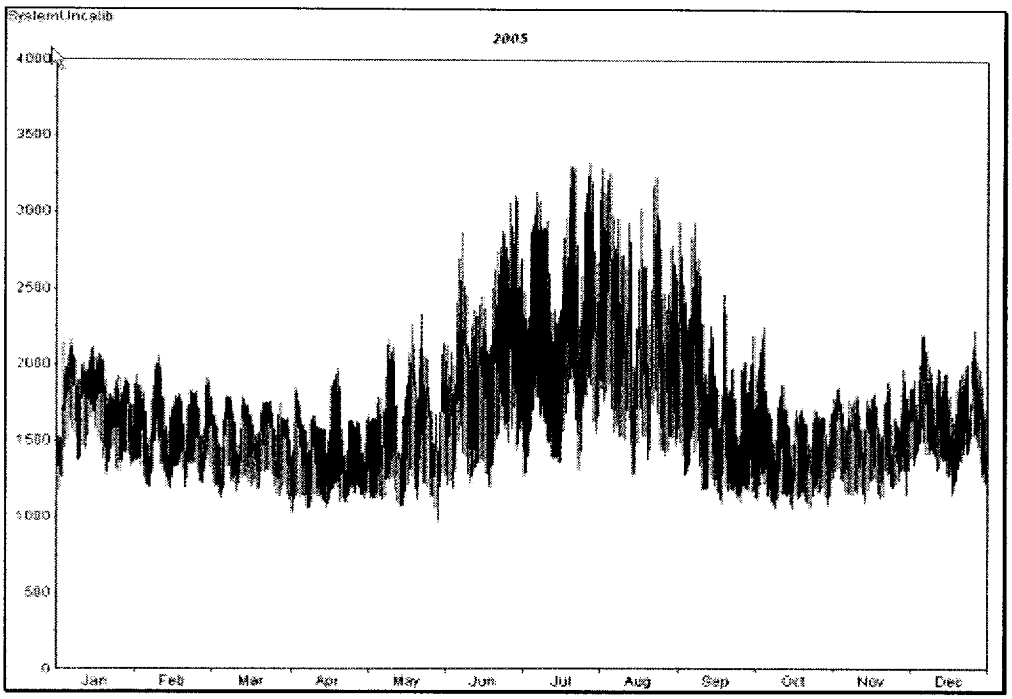
The hourly load forecast is constructed by combining the end-use and class annual sales forecast with the end-use and class hourly load profiles generated in Steps 1 and 2. The bottom-up forecast is built using a *Batch Transform* object.

Residential Hourly Load Forecasts. The residential end-use hourly load forecasts are generated by combining the annual end-use sales forecasts with the residential end-use *Daytype* profiles. *MetrixLT* allocates the annual 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 residential hourly load forecast.

Nonresidential Hourly Load Forecasts. Combining the class sales forecasts with the class hourly load profiles generates hourly load forecasts for commercial, industrial, street lighting, and resale sectors. The annual hourly load forecasts are allocated to each hour of the year based on the class profiles. Profiles are adjusted for line losses.

Initial System Hourly Load Forecast. The initial system hourly load forecast is calculated by summing the class hourly load forecasts. Figure 5 shows the resulting uncalibrated system load forecast.

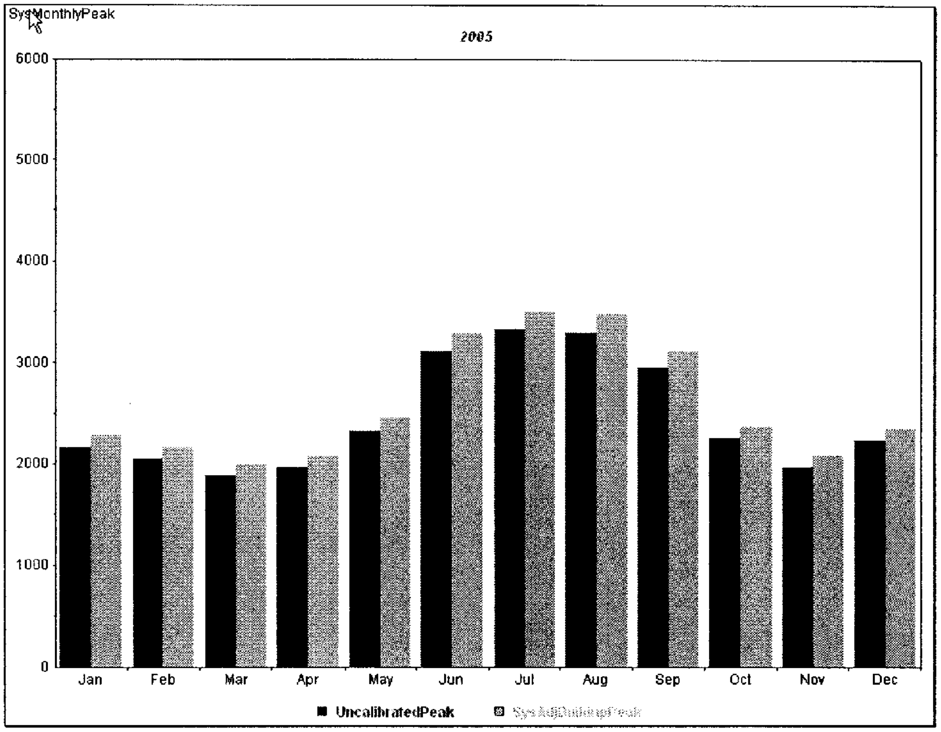
Figure 5: Uncalibrated System Hourly Load Forecast



Step 4. Calibrate the Bottom-Up Forecast to System Hourly Load

The “bottom-up” hourly load forecast is calibrated using an estimated 2005 system hourly load based on actual 2004 system hourly load data through a *Scaling Transform.* The *bottom-up* forecast is overlayed on an estimated 2005 system hourly load data. *MetrixLT* calculates a set of adjustment factors based on the ratio of actual system hourly load to the bottom-up forecasts. The ratios are then applied to the *bottom-up* forecast to generate a long-term calibrated system hourly load forecast. Figure 6 compares the 2005 calibrated and uncalibrated peak forecast.

Figure 6: Calibrated and Uncalibrated System Peak Forecast Comparison

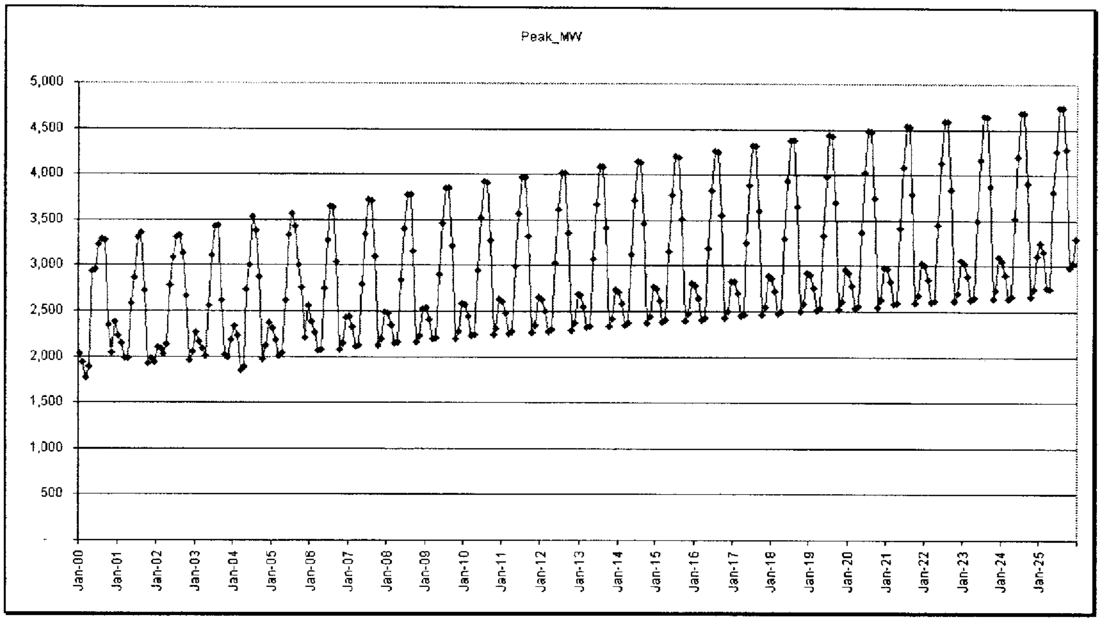


The dark color (red) is the unadjusted system peak forecast; the light color (yellow) represents the adjusted system peak forecast. As illustrated, the initial build-up forecast is adjusted upwards. The upward adjustment is largely due to the simplification of using a peak-day profile to represent heating and cooling residential use. While the calibration process adjusts the initial build-up model upwards, the calibrated system load model still captures differences in end-use and class energy growth on peak demand over time.

Results

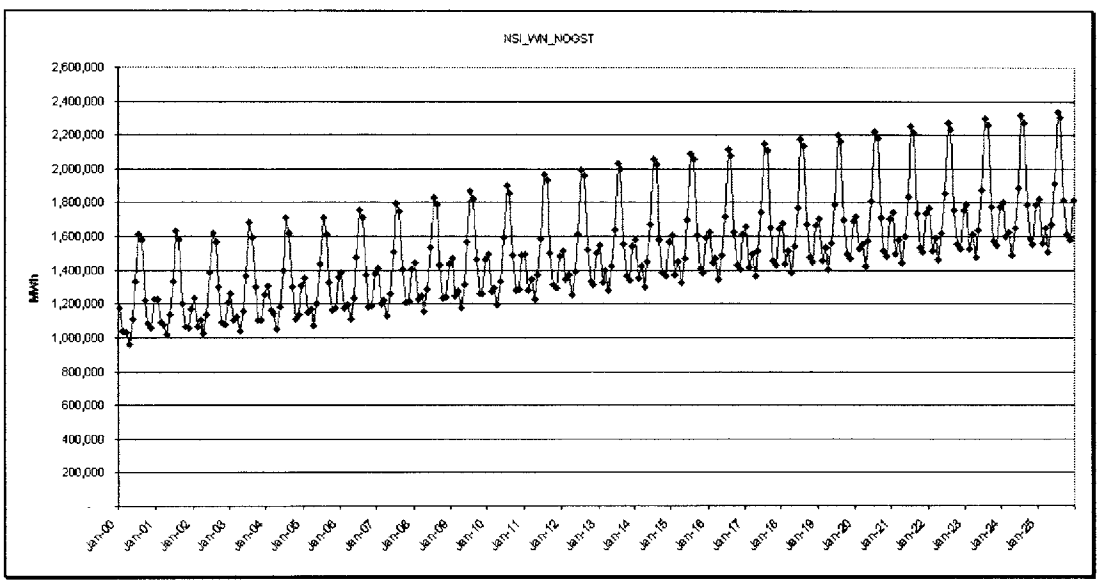
Chart 41 and 42 show forecasted monthly peaks and system energy through 2025. The figure shows actual system peaks and energy less DSM from January 2000 to December 2005 and peak and energy forecasts based on normal weather conditions from January 2006 to December 2025. The system peak occurs in July with the system peak growing at an average annual growth rate of 1.4%. This compares with system energy growth rate forecast of 1.5%. The proposed DSM impacts for energy were accounted for after completing the hourly load and peak forecast process.

Chart 41: Monthly System Weather Normalized Peak Forecast (MW) Less DSM



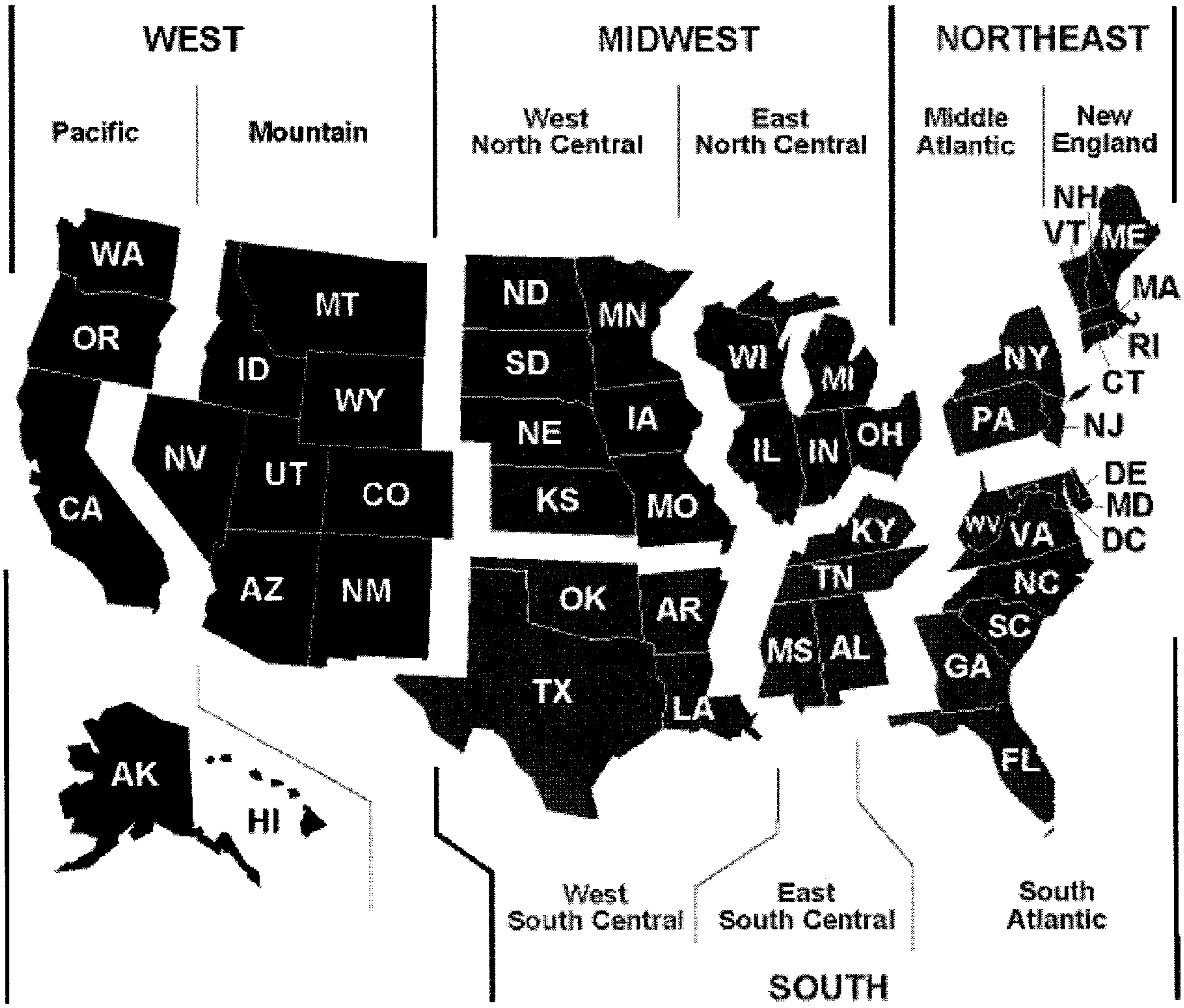
GST Steel historical data has been removed

Chart 42: Monthly Weather Normalized NSI Forecast (MWH) Less DSM



GST Steel historical data has been removed.

APPENDIX A: RESIDENTIAL & COMMERCIAL SAE MODEL REGIONS



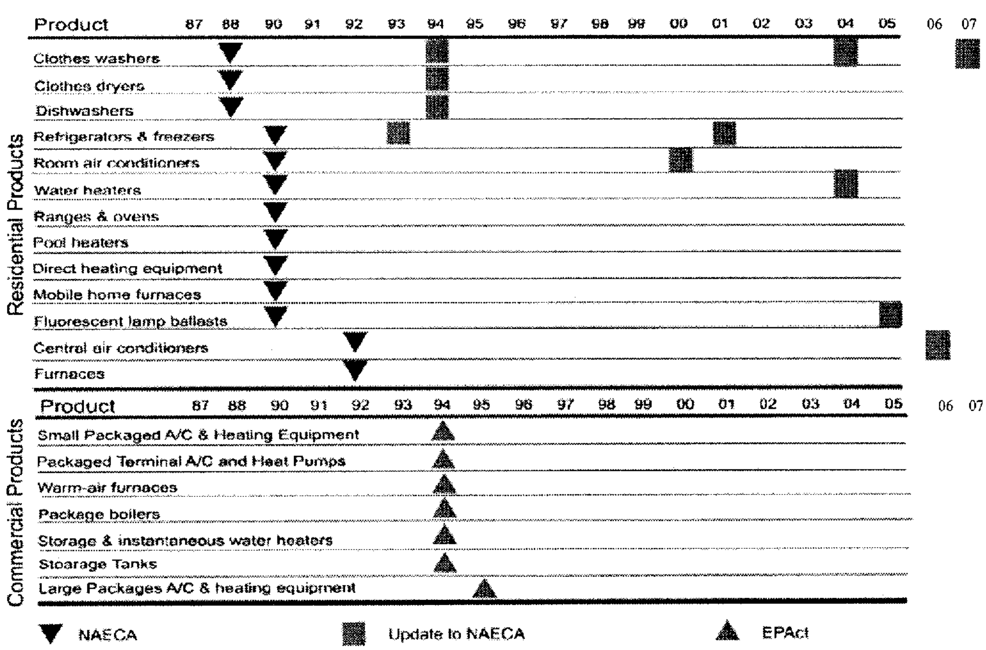
APPENDIX B: Efficiency Standards Promulgated To Date

Summary of Priorities
Standards, Determinations, and Coverage

High Priority Products
Beverage Merchandisers/Vending Machines (Coverage)
Ceiling Fans (Coverage)
Commercial Air-Cooled Central Air Conditioners and Air Source Heat Pumps (65-240 kBtu/h)
Commercial Central Air Conditioners and Heat Pumps, 3 Phase, <65 kBtu/h
Commercial Oil and Gas-Fired Packaged Boilers
Commercial Reach-In Refrigerators/Freezers (Coverage)
Distribution Transformers
High Intensity Discharge Lamps (Determination)
Packaged Terminal Air Conditioners and Heat Pumps
Residential Central AC/HP (Small Duct High Velocity)
Residential Furnaces and Boilers
Small Electric Motors (Determination)
Tankless Gas-Fired Instantaneous Water Heater
Torchieres (Coverage)

Medium Priority Products
Dishwashers

Low Priority Products
Clothes Dryers
Clothes Washers
Commercial Water-Cooled A/C and Water-Source Heat Pumps
Commercial Furnaces
Commercial Water Heaters
Cooking Products
Direct Heating Equipment
Electric Motor, 1-200 HP
Fluorescent Lamp Ballasts
Lamps, Fluorescent
Lamps, Incandescent General Service
Lamps, Incandescent Reflector
Plumbing Fixtures/Fittings
Pool Heaters, Gas
Refrigerators
Residential Water Heaters
Room Air Conditioners



APPENDIX C: Kansas City MSA Economic Drivers

Economic Drivers Provided By Economy.Com

	GMP	Population	Households	Personal Income	Employment NonManufacturing	Employment Manufacturig	GMP Non Manufacturing	GMP Manufacturing	Employment Total	CPI
1990	48,936	1,643	632	39,913	738.0	90.5	42,638	5,430	828.5	124.9
1991	49,484	1,661	640	40,702	740.0	89.0	43,444	5,423	829.1	130.3
1992	51,130	1,678	648	42,296	752.6	88.6	44,904	5,560	841.2	133.7
1993	51,522	1,700	657	43,094	769.3	88.1	45,359	5,437	857.4	137.4
1994	54,575	1,719	665	44,749	789.1	88.6	47,062	5,800	877.7	140.6
1995	56,327	1,737	673	46,033	809.9	89.8	48,470	6,153	899.7	144.4
1996	58,928	1,760	684	47,648	829.3	91.9	50,933	6,432	921.2	150.3
1997	62,324	1,783	694	49,670	852.2	95.1	53,452	6,993	947.4	155.0
1998	66,836	1,804	703	53,338	869.3	97.3	56,976	7,359	966.6	157.4
1999	69,557	1,824	712	55,401	877.6	96.5	58,678	7,003	974.1	159.4
2000	72,220	1,845	721	58,249	887.0	93.6	60,072	7,005	980.6	165.3
2001	72,418	1,867	730	58,659	885.4	90.6	60,818	6,702	976.0	171.3
2002	73,498	1,889	739	59,114	877.9	84.6	61,315	6,709	962.5	173.5
2003	75,023	1,906	746	59,567	876.1	82.6	62,793	6,904	958.6	176.5
2004	77,031	1,922	753	60,770	882.3	83.7	64,111	7,166	966.0	179.8
2005	79,904	1,940	764	62,560	898.9	84.3	66,899	7,541	983.2	184.0
2006	82,975	1,956	772	64,306	919.7	84.7	69,757	7,871	1,004.4	188.6
2007	85,533	1,968	779	65,664	930.1	84.3	71,886	8,091	1,014.4	193.6
2008	88,241	1,978	786	67,124	941.4	84.0	74,156	8,306	1,025.4	198.0
2009	90,619	1,985	791	68,507	952.2	84.0	76,203	8,489	1,036.2	202.2
2010	92,747	1,990	797	69,779	960.6	83.8	78,099	8,643	1,044.4	206.5
2011	94,905	1,995	802	71,122	969.4	83.4	80,058	8,794	1,052.8	210.8
2012	97,245	2,005	810	72,603	980.5	83.3	82,159	8,962	1,063.8	215.0
2013	99,463	2,014	817	73,960	990.8	83.1	84,158	9,113	1,074.0	219.3
2014	101,540	2,020	822	75,244	1,000.1	83.0	86,024	9,243	1,083.0	223.6
2015	103,478	2,024	827	76,477	1,007.9	82.7	87,745	9,356	1,090.6	227.8
2016	105,457	2,026	830	77,578	1,013.6	82.5	89,482	9,473	1,096.1	232.6
2017	107,579	2,027	832	78,655	1,019.0	82.2	91,371	9,609	1,101.1	237.6
2018	109,644	2,028	835	79,701	1,024.0	81.9	93,202	9,738	1,105.8	242.7
2019	111,708	2,030	837	80,706	1,029.1	81.5	94,909	9,855	1,110.6	247.9
2020	113,748	2,032	839	81,682	1,033.8	81.1	96,660	9,974	1,114.9	253.3
2021	115,758	2,034	841	82,638	1,037.8	80.7	98,299	10,082	1,118.5	258.7
2022	117,818	2,035	842	83,616	1,041.5	80.2	99,998	10,193	1,121.7	264.1
2023	119,899	2,037	843	84,612	1,044.5	79.8	101,731	10,307	1,124.3	269.7
2024	121,922	2,038	843	85,607	1,046.3	79.2	103,475	10,418	1,125.5	275.3
2025	124,156	2,040	843	86,670	1,048.8	78.7	105,288	10,536	1,127.6	281.0

Annual Growth Rates										
1990-1995	2.9%	1.1%	1.3%	2.9%	1.9%	-0.2%	2.6%	2.5%	1.7%	2.9%
1995-2000	5.1%	1.2%	1.4%	4.8%	1.8%	0.8%	4.4%	2.6%	1.7%	2.7%
2000-2005	2.0%	1.0%	1.1%	1.4%	0.3%	-2.1%	2.2%	1.5%	0.1%	2.2%
1990-2005	3.3%	1.1%	1.3%	3.0%	1.3%	-0.5%	3.0%	2.2%	1.1%	2.6%
2005-2006	3.8%	0.8%	1.1%	2.8%	2.3%	0.5%	4.3%	4.4%	2.2%	2.5%
2006-2010	2.8%	0.4%	0.8%	2.1%	1.1%	-0.3%	2.9%	2.4%	1.0%	2.3%
2010-2015	2.2%	0.3%	0.7%	1.9%	1.0%	-0.2%	2.4%	1.6%	0.9%	2.0%
2015-2020	1.9%	0.1%	0.3%	1.3%	0.5%	-0.4%	2.0%	1.3%	0.4%	2.1%
2020-2025	1.8%	0.1%	0.1%	1.2%	0.3%	-0.6%	1.7%	1.1%	0.2%	2.1%
2006-2025	2.7%	0.6%	0.8%	2.2%	1.0%	-0.4%	2.6%	1.9%	0.9%	2.3%

KANSAS CITY

DataBuffet® users use MSA code: *MKAN*

EMPLOYMENT GROWTH RANK
Best=1, Worst=387

2004-06
136
2nd quintile

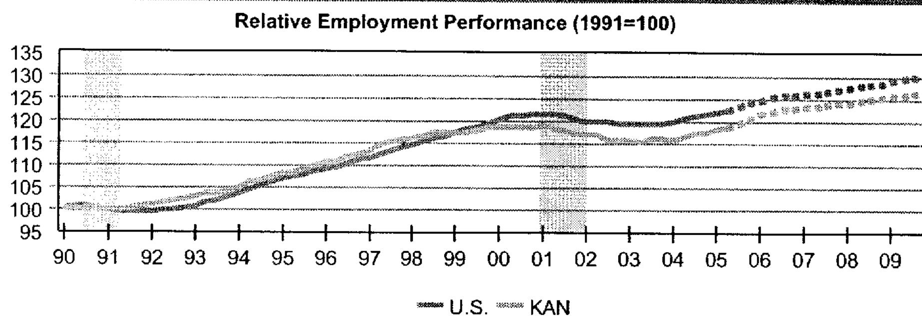
2004-09
173
3rd quintile

LIFE CYCLE PHASE
Growth/Mature

VITALITY (Best=1, Worst=387)
31
1st quintile

COST OF DOING BUSINESS
U.S.= 100%
96%

COST OF LIVING
U.S.= 100%
93%



1998	1999	2000	2001	2002	2003	2004	Indicators	2005	2006	2007	2008	2009
66.8	69.6	72.2	72.4	73.5	75.7	77.3	**Gross Metro Product, C$B**	80.7	84.2	86.7	89.4	91.8
7.2	*4.1*	*3.8*	*0.3*	*1.5*	*2.9*	*2.2*	*% Change*	*4.4*	*4.3*	*3.0*	*3.1*	*2.7*
966.6	974.1	980.7	976.0	962.5	958.7	966.0	**Total Employment (000)**	985.7	1,011.2	1,020.7	1,031.3	1,042.2
2.0	*0.8*	*0.7*	*-0.5*	*-1.4*	*-0.4*	*0.8*	*% Change*	*2.0*	*2.6*	*0.9*	*1.0*	*1.1*
3.7	3.1	3.2	4.4	5.6	6.1	6.2	**Unemployment Rate**	5.6	5.3	5.5	5.3	5.2
8.3	5.6	7.8	3.1	3.3	2.5	4.6	**Personal Income Growth**	5.2	5.5	4.5	4.3	4.2
1,801.4	1,821.4	1,842.6	1,863.6	1,886.7	1,904.9	1,919.9	**Population (000)**	1,937.9	1,955.1	1,966.5	1,977.0	1,984.1
10,254	11,391	9,404	9,868	10,899	11,944	11,424	**Single-Family Permits**	11,216	10,166	8,396	8,372	8,271
3,697	5,192	3,650	5,248	3,096	3,045	2,393	**Multifamily Permits**	4,734	4,301	3,857	4,315	4,255
112.4	119.1	124.5	132.0	135.5	141.5	147.1	**Existing Home Price ($Ths)**	153.1	153.8	159.0	166.8	171.8
10,206	8,265	7,416	15,121	16,976	21,580	14,072	**Mortgage Originations ($Mil)**	11,339	8,725	8,967	9,625	9,751
9.3	8.3	9.6	9.2	10.8	5.8	2.4	**Net Migration (000)**	5.4	4.5	-1.5	-2.4	-5.9
8,704	7,766	7,429	9,507	11,162	12,287	12,659	**Personal Bankruptcies**	11,455	10,423	10,732	11,656	11,709

STRENGTHS & WEAKNESSES

STRENGTHS

- Favorable cost structure.
- Well developed transportation and distribution network.
- Large government sector brings stability to the area.

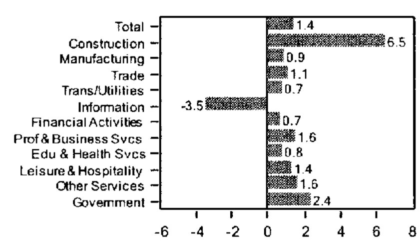
WEAKNESSES

- High dependence on Sprint and telecom.
- KAN suffers from suburban sprawl.

CURRENT EMPLOYMENT TRENDS

May 2005 Employment Growth

% change year ago, 3 mo. MA



FORECAST RISKS

SHORT TERM ↓ LONG TERM ↓ RISK-ADJUSTED RETURN, '04-09 **0.18%**

UPSIDE

- The service sector grows beyond current expectations.
- KAN gains more back-office business, which revitalizes the downtown office market.

DOWNSIDE

- The auto industry suffers further setbacks.
- Defense-related manufacturing suffers from defense budget cuts.

ANALYSIS

Recent Performance. The Kansas City economy posted significant job growth in the first quarter of 2005. Retail employment has been the main driver of job gains in this last quarter while other service industries leveled off. However, despite the recent slowdown, the service industries continue to be the long-term drivers of the KAN economy. Some of the recent losses in service employment can be attributed to the reorganization of Sprint PCS. As manufacturing employment remains stagnant, the service industry's impact on the economy becomes even more significant.

Retail trade. Retail employment has shown robust growth in the last few quarters, and is expected to continue growing as the economy expands. The rise in retail employment is consistent with statewide trends, and is a sign that consumer spending is rising. Consistent income gains in KAN have supported growth in the retail industry. Uncertainty regarding interest rates caused a brief setback in consumption late last year, but consumer confidence is increasing. The retail industry is expected to continue growing as the economy expands.

Rapid expansion in services can have a negative effect on income trends. Service jobs in general, and retail in particular, pay low wages, and cannot compensate for the loss of well-paid manufacturing jobs. Therefore, KAN will need to attract higher paying service jobs in order to sustain the area's above average per capita income.

Demographics. Net migration in KAN is on a downward trend, which will constrain the area's growth. This is partially due to the continuous loss in manufacturing employment in the area, which causes workers to leave in search of new employment opportunities. Sprint's restructuring of the last two years also contributed to the uncertainty in the labor market causing an increase in out-migration. As the baby boomers retire and move to southern areas favored by retirees, the negative migration trend is expected to continue. Weak population growth will be a constraint on the expansion of consumer-based services. Moreover, the loss of retirees will impact the retail, personal services, housing and leisure and hospitality industries, which are some of the fastest growing service sectors in KAN.

Downtown office space. KAN will rely on expansions in the services sector to restore the vitality of its office market. The metro area suffers from high office vacancy rates, especially in the downtown market, due to a growing preference to locate and expand in suburban areas. In addition, growing downtown office vacancy rates can partially be attributed to the reorganization of Sprint PCS, KAN's largest employer. Sprint is relocating its headquarters to Reston, VA and, in the process, it is vacating a large number of offices in KAN's downtown area, which has resulted in downtown vacancy rates as high as 25%. Various services comprise the bulk of demand for downtown office space, but have been slow to expand and thus vacancy rates remain high. On the upside, high vacancy rates are causing office rents to decrease, boosting affordability. Decreasing office rents are expected to help the downtown market regain its popularity among local businesses.

The Kansas City economy has been growing steadily and is expected to continue expanding in line with state and national trends. Going forward, the services industry will maintain its leading role in the area's recovery. In the long run, weak population growth and a shift to lower-wage service jobs will restrain KAN's performance to no better than average.

Margarita Kirilova
June 2005

EMPLOYMENT & INDUSTRY

TOP EMPLOYERS

Sprint Corporation	20,623
Community Health Group	7,326
DST Systems, Inc.	6,109
Ford Motor Company	5,837
HCA, Inc.	5,776
Hallmark Cards, Inc.	5,000
Saint Luke's Health System	4,493
UPS	4,377
Cerner Corporation	3,207
AT&T Corporation	3,154
Children's Mercy Hospital & Clinics	3,122
General Motors Corporation	3,100
University of Kansas Hospital	2,910
Honeywell, Inc.	2,799
University of Missouri - Kansas City	2,799
Truman Medical Center	2,791
Applebee's International, Inc.	2,478
Black & Veatch, LLP	2,400
UMB Financial Corporation	2,384
Burlington Northern/Santa Fe Corporation	2,300

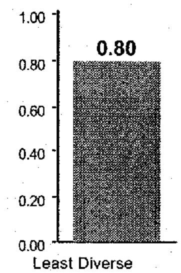
Source: The Business Journal, March 2004

Public

Federal	27,223
State	15,730
Local	101,047

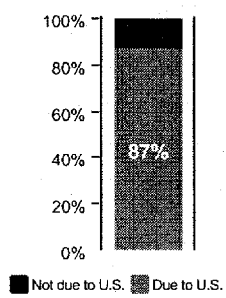
2004

INDUSTRIAL DIVERSITY

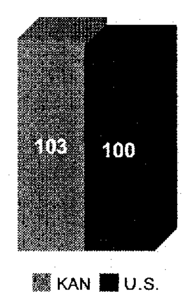


EMPLOYMENT VOLATILITY

DUE TO U.S. FLUCTUATIONS



RELATIVE TO U.S.

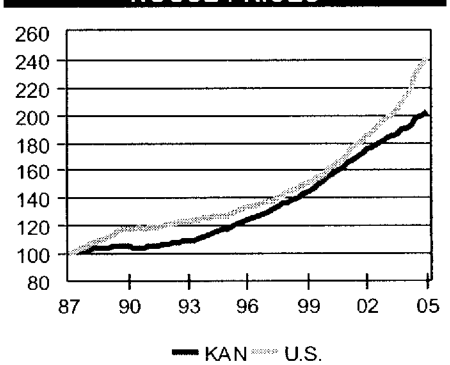


COMPARATIVE EMPLOYMENT AND INCOME

Sector	% of Total Employment KAN	MO	US	Average Annual Earnings KAN	MO	US
Construction	5.2%	5.1%	5.3%	$51,005	$41,471	$44,373
Manufacturing	8.7%	11.6%	10.9%	$64,280	$57,954	$63,129
Durable	*57.3%*	*62.6%*	*62.3%*	*nd*	*$61,342*	*$65,880*
Nondurable	*42.7%*	*37.4%*	*37.7%*	*nd*	*$52,541*	*$58,627*
Transportation/Utilities	4.7%	3.8%	3.7%	nd	$45,984	$51,868
Wholesale Trade	4.8%	4.4%	4.3%	nd	$54,168	$59,828
Retail Trade	11.5%	11.6%	11.4%	$26,337	$23,389	$26,190
Information	4.7%	2.4%	2.4%	$82,666	$67,417	$78,059
Financial Activities	7.3%	6.1%	6.1%	$44,979	$37,039	$51,058
Prof. and Bus. Services	13.2%	11.3%	12.5%	$47,687	$45,577	$47,411
Educ. and Health Services	11.3%	13.3%	12.9%	$37,972	$35,564	$38,538
Leisure and Hosp. Services	9.6%	9.9%	9.5%	$19,186	$17,260	$18,779
Other Services	4.2%	4.4%	4.1%	$22,523	$20,902	$22,334
Government	14.9%	15.9%	16.4%	$48,452	$42,396	$49,194

Source: Percent of total employment - Economy.com & BLS, 2004; Average annual earnings - BEA, 2003

HOUSE PRICES



Source: OFHEO, 1987Q1=100, NSA

CREDIT QUALITY

FITCH	MOODY'S
N/A	COUNTY Aa1

LEADING INDUSTRIES

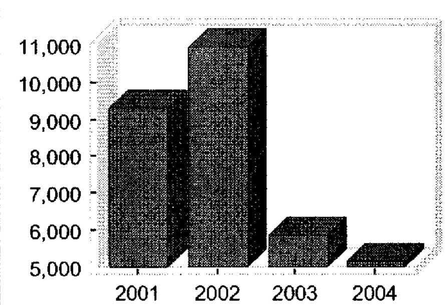
NAICS	Industry	Employees (000)
GVSL	State & Local Government	116.8
7221	Full-Service Restaurants	33.3
6221	General Medical and Surgical Hospitals	27.5
7222	Limited-Service Eating Places	27.3
GVF	Federal Government	27.2
5171	Wired Telecommunications Carriers	23.0
5613	Employment Services	18.4
5221	Depository Credit Intermediation	18.1
FR	Farms	15.8
4521	Department Stores	15.6
6211	Offices of Physicians	15.0
4529	Other General Merchandise Stores	14.3
5241	Insurance Carriers	13.7
5617	Services to Buildings and Dwellings	13.6
5511	Management of Companies and Enterprises	13.0
	High-tech employment	60.3
	As % of total employment	6.1

Sources: BLS, Economy.com, 2004

MIGRATION FLOWS

Into Kansas City	Number of Migrants	Median Income
Lawrence KS	2,042	22,581
St. Louis MO	1,234	33,920
Wichita KS	1,184	24,495
Topeka KS	1,172	22,702
St. Joseph MO	905	23,047
Chicago IL	885	38,896
Dallas TX	776	43,125
Denver CO	753	35,808
Los Angeles CA	681	21,828
Springfield MO	679	19,808
Total Inmigration	55,084	27,271
From Kansas City		
Lawrence KS	1,726	18,534
St. Louis MO	1,365	36,706
Phoenix AZ	868	26,724
Topeka KS	864	22,362
Dallas TX	838	39,581
St. Joseph MO	837	21,585
Springfield MO	801	22,041
Denver CO	695	34,430
Wichita KS	689	27,347
Chicago IL	663	35,795
Total Outmigration	53,367	52,083
Net Migration	**1,717**	**-24,813**

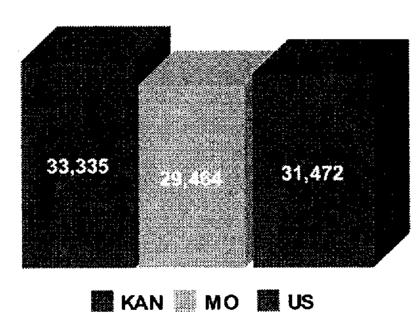
Net Migration, KAN



	2001	2002	2003	2004
Domestic	4,510	6,275	1,300	599
Foreign	4,775	4,674	4,544	4,529
Total	9,285	10,949	5,844	5,128

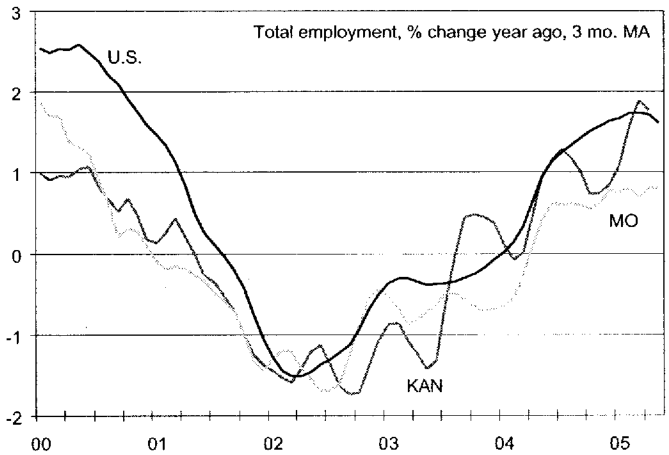
Source: IRS (top), 2003; Census Bureau & Economy.com, 2004

PER CAPITA INCOME

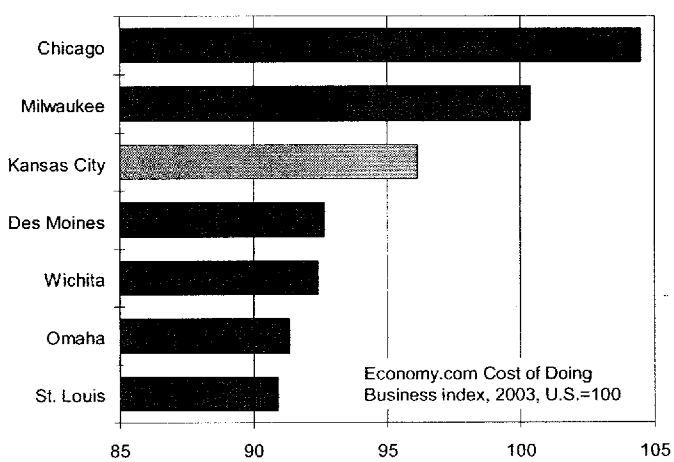


Source: Bureau of Economic Analysis, 2003

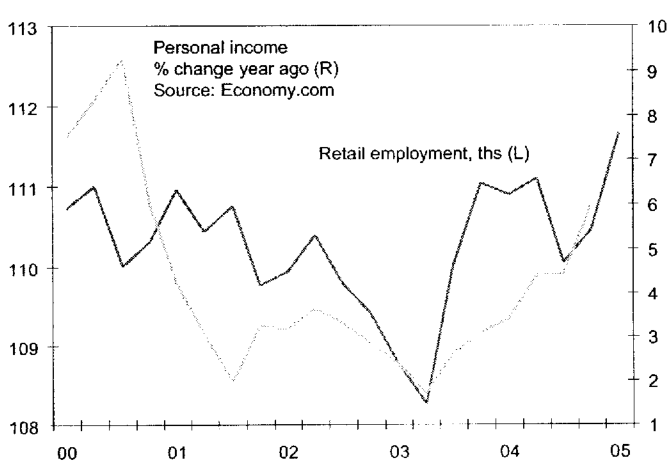
Kansas City Lags the Nation Due to Inconsistent Recovery



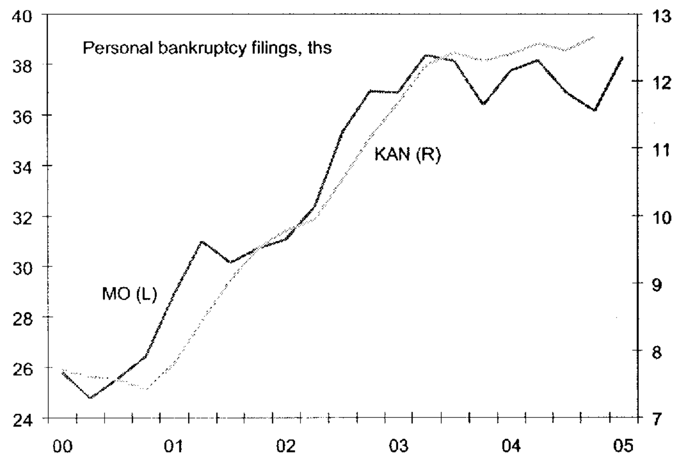
Business Costs in Kansas City Remain Relatively High



Consumer Confidence on the Rise

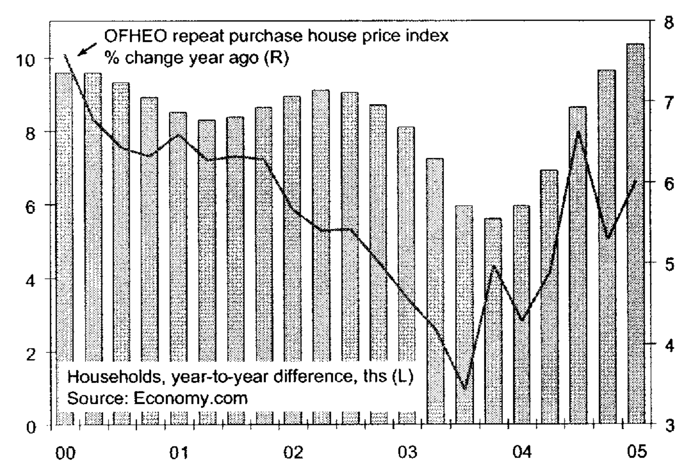


Personal Balance Sheets Stabilize Following State Trends



Following state trends, bankruptcy rates are finally stabilizing after their rapid increase during the last recession. Relatively high house-price appreciation, combined with growing personal incomes and an expanding job market, are now bringing financial stability to KAN households. Going forward, the positive income and housing trends are expected to lead to an improvement in the personal bankruptcy rate. However, new bankruptcy legislation may result in some increase in the rate of filings unrelated to fundamentals.

Strong Housing Demand Is Driving Price Growth



With long-term interest rates remaining low, housing demand is again on the rise. Strong household growth is supporting this trend. Moreover, despite rising prices, affordability remains relatively high, which is also supporting demand. The high level of affordability means that KAN will not suffer from sharp price corrections once interest rates increase, which is possible in regions that have seen more significant house-price appreciation. The outlook is for a gradual slowdown in the level of housing demand as long-term interest rates increase.

Assumptions for Low Growth (High Energy Price) Scenario (May 2005) scenario:

In the *High Energy Price Scenario*, the economy slides back into recession in early 2006 in response to continued high energy prices.

In this scenario, the price of WTI rises to near $75 per barrel by mid-2006. This is close to the all-time high in oil prices (in today's dollars) reached during the early 1980s. Driving the higher prices are an assumed colder than normal winter and further terrorist attacks and social unrest in Saudi Arabia.

The higher prices and the prospects of out-right global shortages of oil cause financial markets and consumer and business confidence to falter.

Both monetary and fiscal policy are slow to respond to the foundering economy. Fiscal policy is hamstrung by currently large budget deficits, while monetary policy is unsure how to respond due to the potential impact of higher energy prices on broader inflation and inflation expectations.

Oil prices do begin to moderate in 2007 as global energy demand abates and the weather returns to normal. The economy stabilizes late that year.

The Higher Energy Price Scenario is in the 25% percentile of the distribution of possible economic outcomes. There is thus a 75% probability that economic conditions will be better, broadly speaking, and a 25% probability that conditions will be worse.

Assumptions for High Growth (Low Energy Price) Scenario (May 2005) scenario:

In the *High Growth Scenario*, oil and other energy prices falls more quickly than expected in the baseline, and remain somewhat lower throughout the forecast horizon. The decline is due to a stronger than anticipated increase in global energy supplies and fading geopolitical concerns.

Somewhat stronger productivity growth is also assumed in the near-term in this scenario. This constrains the growth in labor costs, lifts business profit margins, and induces businesses to invest more aggressively. Inflationary pressures are also held in check.

Moderately stronger near-term global economic is also assumed in this scenario.

Stronger productivity growth and lower inflation allow the Federal Reserve to tighten a bit less aggressively than in the baseline. Long-term interest rates also rise more moderately.

The High Growth Scenario is thought to be in the upper 25% percentile of the distribution of possible economic outcomes. There is thus a 25% probability that economic conditions will be better, broadly speaking, and a 75% probability that conditions will be worse.

2004 Residential
Statistically Adjusted End-use (SAE) Spreadsheets

The 2004 residential SAE spreadsheets are updated using information from Energy Information Administration's 2004 Annual Energy Outlook (AEO) database. Data is supplied to the Energy Forecasting Group by Mr. John Cymbalsky (jcymbals@eia.doe.gov).

The following updates have been made to the 2004 residential SAE spreadsheets:

1. Average equipment efficiency trends
2. Equipment and appliance saturation trends
3. Electricity prices
4. Equipment indices calculations

A summary of these changes is presented below. The stock and energy data for heat pumps, water heaters, and clothes washer are taken from the 2003 AEO database due to the problems associated with these data in the 2004 AEO database.

1.1 Equipment Efficiency Trends

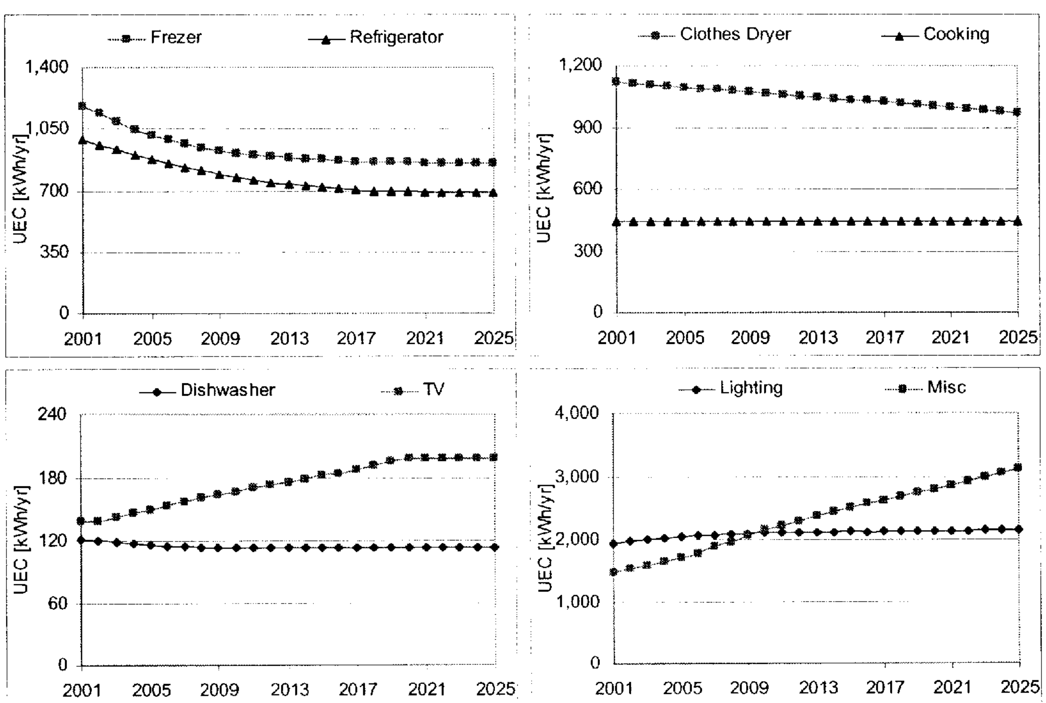
HVAC and electric water heating equipment efficiency trends have been updated based on the 2004 AEO database. Table 1 compares primary HVAC efficiency trends from the 2004 spreadsheet with the 2003 spreadsheet. There has been little change in expected efficiency trends.

Efficiency trends of the remaining appliances are captured by projected appliance average annual energy use [kWh] or unit energy consumption (UEC). Annual UECs are calculated from the 2004 AEO database by dividing annual end-use consumption by the appliance stock, and smoothing out the year-to-year variations. Using changes in UECs as a proxy for efficiency improvements allows us to reflect regional differences in appliance stock age distribution and the long-term price impact on efficiency choices. Average US appliance efficiency trends are presented in Figure 1.

Table 1: Primary HVAC and Electric Water Heater Efficiency Trends

	2004 Residential SAE			% Change in Efficiencies Between		
	2001	2013	2025	2001-2013	2013-2025	2001-2025
Sp Heating HP [HSPF]	7.2	7.7	8.0	7.1%	3.9%	11.2%
Sp Cooling HP [SEER]	10.5	12.1	13.1	14.5%	8.4%	24.1%
Central AC [SEER]	10.4	12.2	13.1	17.6%	7.8%	26.7%
Room AC [EER]	9.0	9.7	10.0	8.4%	2.4%	10.9%
Elec. Water Heater [EF]	0.87	0.90	0.91	2.9%	1.3%	4.2%
	2003 Residential SAE			% Change in Efficiencies Between		
	2001	2013	2025	2001-2013	2013-2025	2001-2025
Sp Heating HP [HSPF]	7.0	7.6	7.9	8.3%	4.1%	12.8%
Sp Cooling HP [SEER]	10.4	11.9	12.9	14.7%	7.8%	23.6%
Central AC [SEER]	10.2	11.8	12.7	14.8%	8.1%	24.2%
Room AC [EER]	9.0	9.8	10.0	8.4%	2.2%	10.7%
Elec. Water Heater [EF]	0.87	0.90	0.91	3.2%	1.4%	4.6%

Figure 1: Residential Appliance Efficiency Trends (U.S. Average)



1.2 Equipment Saturation Trends

Appliance saturation trends are updated for each census region. Saturation trends are calculated by dividing the 2004 AEO appliance stock projections by the number of households. Figure 2 shows the average U.S. appliance saturation trends.

Figure 2: Residential Appliance Saturation Trends (U.S. Average)

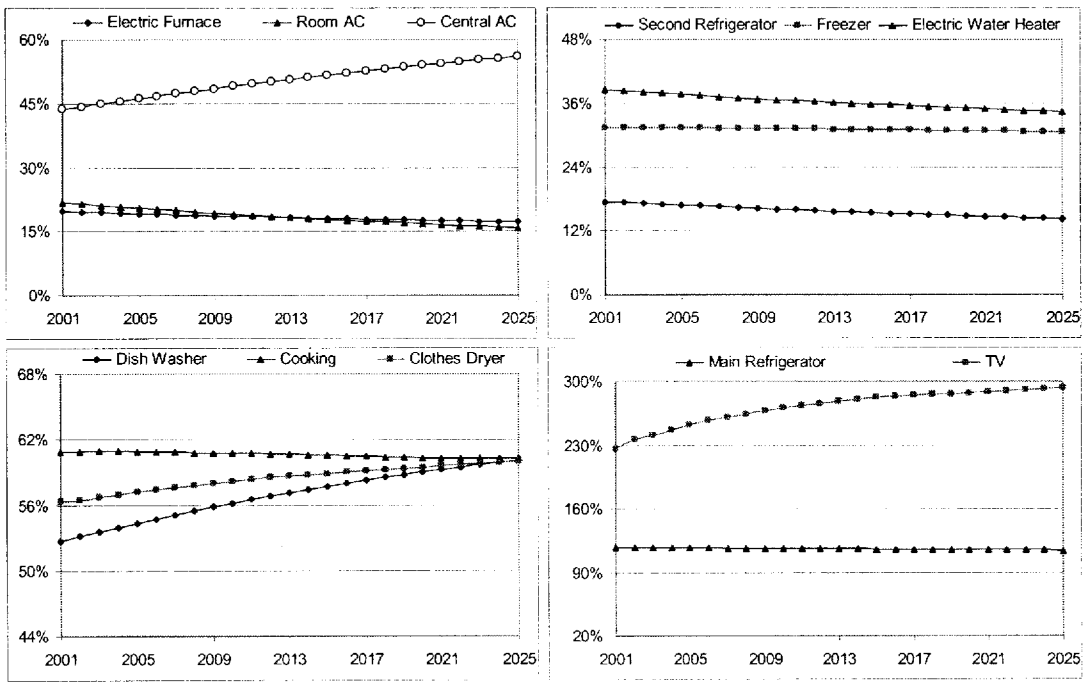


Table 2 compares central AC share trends in 2001, 2013, and 2025 from the 2003 and 2004 residential SAE spreadsheets. The 2004 residential SAE data exhibit more aggressive penetration of central AC share trends for most of the regions, especially for East North Central, Mountain, Pacific, and East South Central, than the 2002 residential SAE. The increase in shares is higher between 2001 and 2013 than in the next decade. As seen from the 2004 residential SAE data, the major increase in central AC shares is expected to occur in East North Central, from 53% in 2001 to 75% in 2025. This trend is followed by Mountain, Middle Atlantic, and East South Central regions.

Table 2: Central AC Share Trends in 2003 and 2004 Residential SAE Spreadsheets

	2004 Residential SAE			Change in Shares Between		
	2001	2013	2025	2001-2013	2013-2025	2001-2025
New England	14%	20%	26%	6%	5%	12%
Middle Atlantic	30%	38%	45%	8%	7%	14%
East North Central	53%	65%	75%	13%	10%	23%
West North Central	60%	67%	72%	7%	5%	12%
South Atlantic	49%	51%	52%	2%	2%	4%
East South Central	53%	60%	66%	8%	6%	14%
West South Central	73%	76%	79%	3%	3%	6%
Mountain	27%	38%	46%	11%	7%	18%
Pacific	24%	31%	36%	7%	5%	12%
	2003 Residential SAE			Change in Shares Between		
	2001	2013	2025	2001-2013	2013-2025	2001-2025
New England	9%	18%	26%	9%	8%	17%
Middle Atlantic	27%	34%	40%	7%	6%	14%
East North Central	48%	56%	62%	8%	5%	14%
West North Central	62%	70%	76%	9%	6%	15%
South Atlantic	40%	44%	46%	4%	2%	7%
East South Central	48%	52%	55%	4%	3%	7%
West South Central	62%	66%	69%	4%	3%	8%
Mountain	29%	37%	41%	8%	4%	12%
Pacific	22%	25%	28%	4%	3%	6%

1.3 Electricity Price Trends

One of the primary inputs into the efficiency and saturation trend calculations is electricity price assumptions. Electricity prices are also used in the default regional SAE models to capture short-term price impacts on end-use utilization. On real basis, average national electricity prices are projected to decline from 8.7 cents/kWh in 2001 to 8.0 cents/kWh by 2007. After 2008 real prices are projected to increase 0.1 % per year. Figure 3 and Table 3 compares price projections between 2003 and 2004 SAE updates. There is a very small difference between 2003 and 2004 price forecast trends for most of the regions.

Figure 3. Residential Electricity Price Projections (2004 and 2003 SAE Updates)

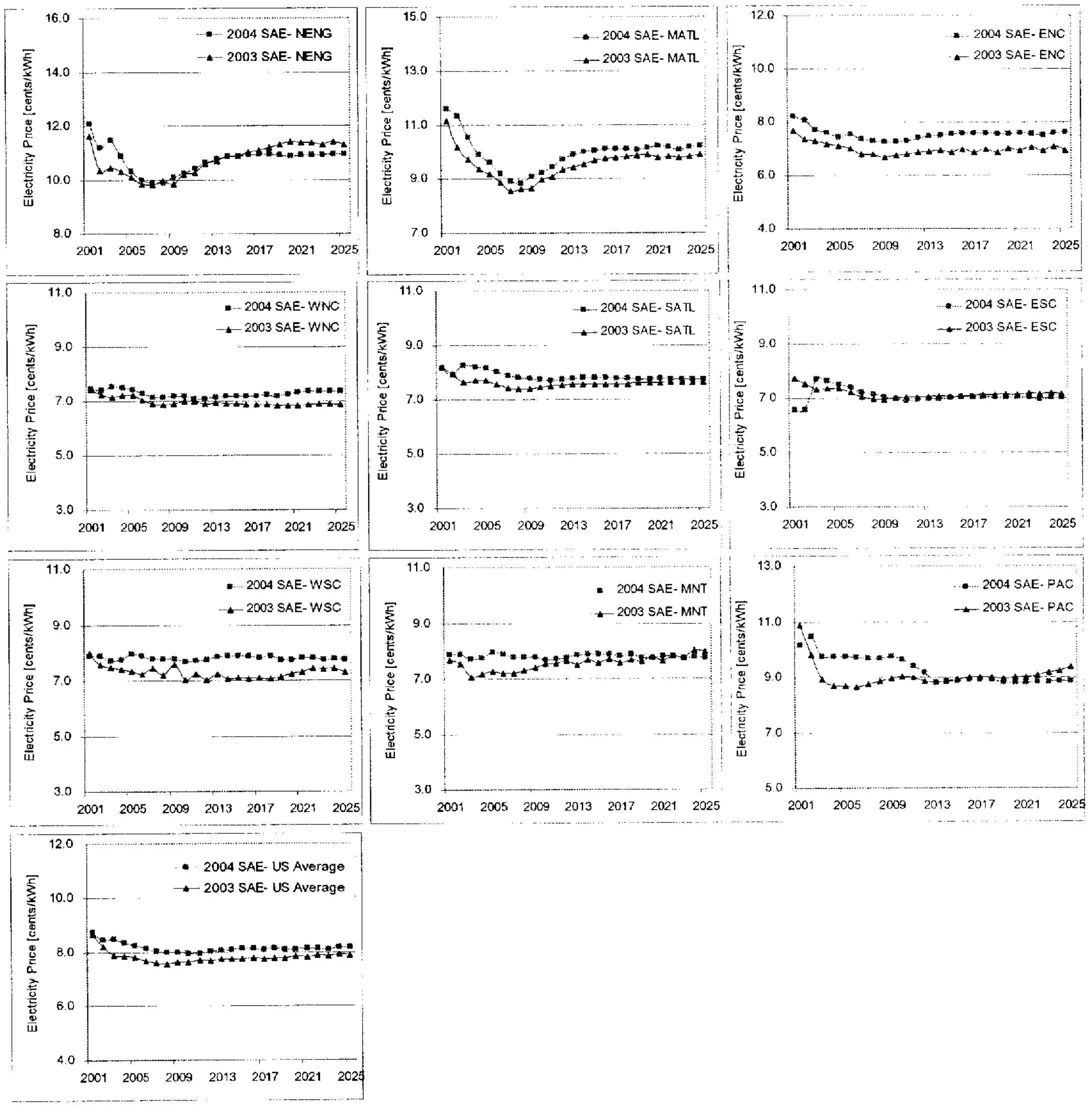


Table 3: Electricity Price Trends in 2003 and 2004 Residential SAE Spreadsheets

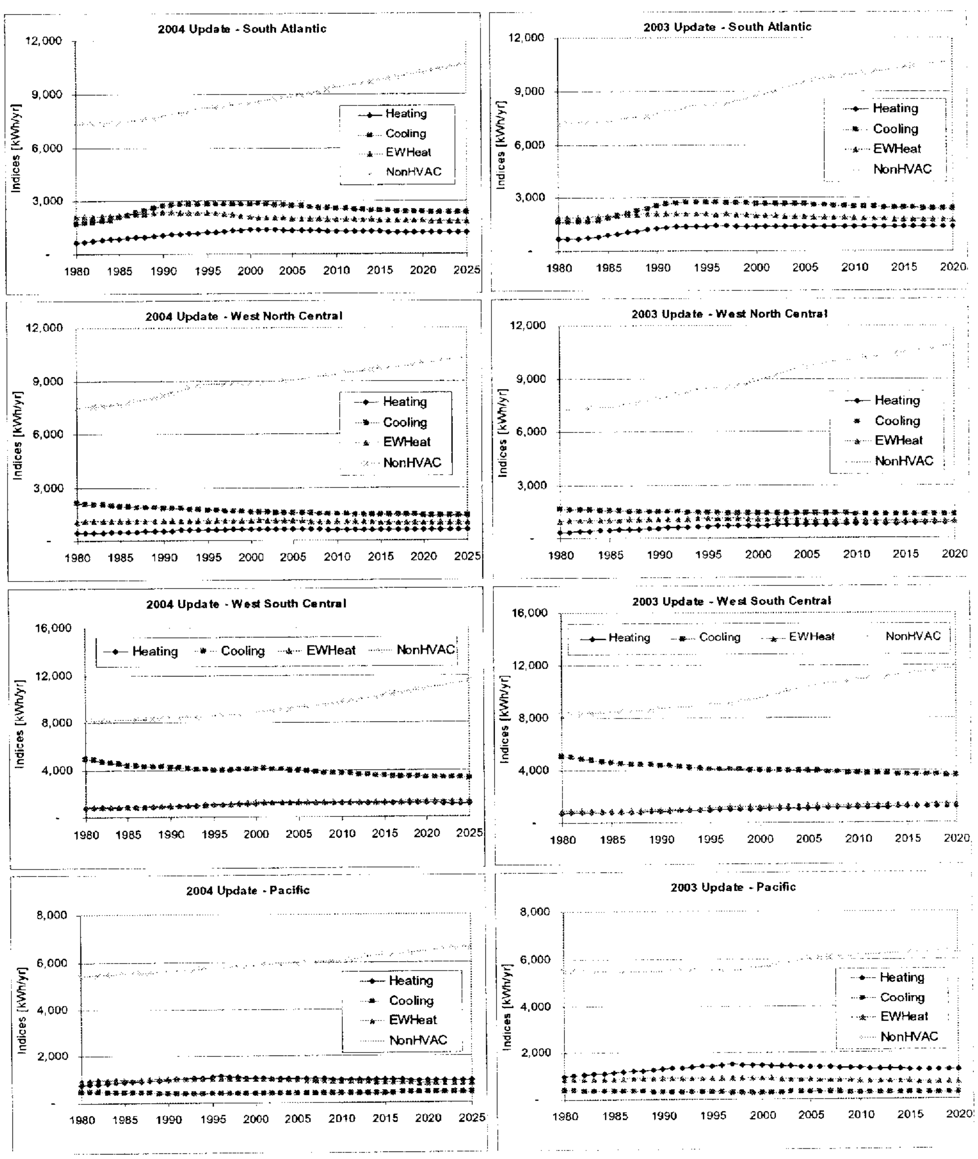
	2004 (cents per kWh)*			Change		
	2001	2013	2025	2001-2013	2013-2025	2001-2025
New England	11.6	10.7	11.3	-8%	6%	-3%
Middle Atlantic	11.2	9.4	9.9	-15%	5%	-11%
East North Central	7.7	6.9	6.9	-11%	1%	-10%
West North Central	7.4	6.9	6.9	-7%	-1%	-8%
South Atlantic	8.2	7.5	7.6	-8%	1%	-7%
East South Central	7.7	7.0	7.1	-9%	1%	-8%
West South Central	8.0	7.2	7.3	-10%	1%	-9%
Mountain	7.7	7.5	8.0	-2%	7%	4%
Pacific	10.9	8.8	9.4	-19%	6%	-14%
US Average	8.7	7.7	7.9	-11%	2%	-9%
	2003 (cents per kWh)+			Change		
	2001	2013	2025	2001-2013	2013-2025	2001-2025
New England	12.1	10.8	10.9	-11%	1%	-10%
Middle Atlantic	11.6	9.9	10.2	-15%	3%	-12%
East North Central	8.2	7.5	7.6	-9%	2%	-8%
West North Central	7.5	7.1	7.4	-4%	3%	-1%
South Atlantic	8.2	7.8	7.7	-5%	-1%	-5%
East South Central	6.6	7.0	7.0	6%	1%	6%
West South Central	8.6	7.9	8.4	-7%	6%	-2%
Mountain	7.9	7.8	7.7	-1%	-1%	-2%
Pacific	10.2	8.8	8.9	-13%	0%	-13%
US Average	8.7	8.0	8.1	-8%	1%	-6%

* Electricity prices are based on 2001 cents per kWh
\+ Electricity prices are based on 2002 cents per kWh

1.4 Equipment Index Calculations

The 2004 equipment indices are calculated by taking the 2001 as the base year, which was 1998 in the 2003 SAE update. The 2003 and 2004 heating, cooling, water heating, and other end-use indices calculated for South Atlantic, West North and South Central, and Pacific regions are given in Figure 4. The 2004 indices are constructed based on the index equations and incorporate the updates in efficiencies and saturations. As seen in Figure 4, there is not a significant difference between the indices trends between 2004 and 2003 SAE updates.

Figure 4: Heating, Cooling, Water Heating, and Other End-Use Indices Trends



2004 Commercial
Statistically Adjusted End-use (SAE) Spreadsheets

The 2004 commercial SAE spreadsheets are updated using information from Energy Information Administration's 2004 Annual Energy Outlook (AEO) database. Data is supplied to the Energy Forecasting Group by Mr. John Cymbalsky (jcymbals@eia.doe.gov).

The following updates and additions have been made to the 2004 commercial SAE spreadsheets:

1. Average equipment efficiency trends
2. Electricity prices
3. Base year energy intensity calculations

Summary of these changes is presented below.

1.1 Equipment Efficiency Trends

HVAC, water heating, cooking, refrigeration, and lighting equipment efficiency trends have been updated based on the 2004 AEO database. Table 1 compares the efficiency trends from the 2004 spreadsheet with the 2003 spreadsheet. The equipment efficiencies are measured by the ratio of BTU output per BTU energy input, unless noted.

There is not a significant change between the 2003 and 2004 update results. Standards have their largest impacts through the first ten years. The rate of efficiency improvement declines significantly after 2013.

Table 1. Equipment Efficiency Trends in 2003 and 2004 SAE Spreadsheets

	2004 Commercial SAE			% Change in Efficiencies Between		
	2001	2013	2025	2001-2013	2013-2025	2001-2025
Sp Heating	1.06	1.12	1.13	5.4%	1.0%	6.5%
Sp Cooling	2.73	3.08	3.29	12.8%	7.0%	20.7%
Ventilation*	0.34	0.40	0.45	18.1%	10.4%	30.5%
Water Heating	0.98	1.00	1.00	1.5%	0.4%	1.9%
Cooking	0.71	0.74	0.75	4.4%	0.9%	5.3%
Refrigeration	1.38	1.43	1.43	3.0%	0.3%	2.8%
Lighting+	48.76	49.96	53.98	2.4%	8.1%	10.7%
	2003 Commercial SAE			% Change in Efficiencies Between		
	2001	2013	2025	2001-2013	2013-2025	2001-2025
Sp Heating	1.07	1.12	1.13	4.8%	0.7%	5.5%
Sp Cooling	2.74	3.12	3.37	13.9%	8.0%	23.0%
Ventilation*	0.34	0.40	0.45	18.0%	10.5%	30.5%
Water Heating	0.98	0.99	1.00	1.1%	0.2%	1.3%
Cooking	0.71	0.74	0.75	4.1%	1.0%	5.1%
Refrigeration	1.35	1.40	1.40	3.2%	0.3%	3.5%
Lighting+	47.41	48.80	52.58	2.9%	7.7%	10.9%

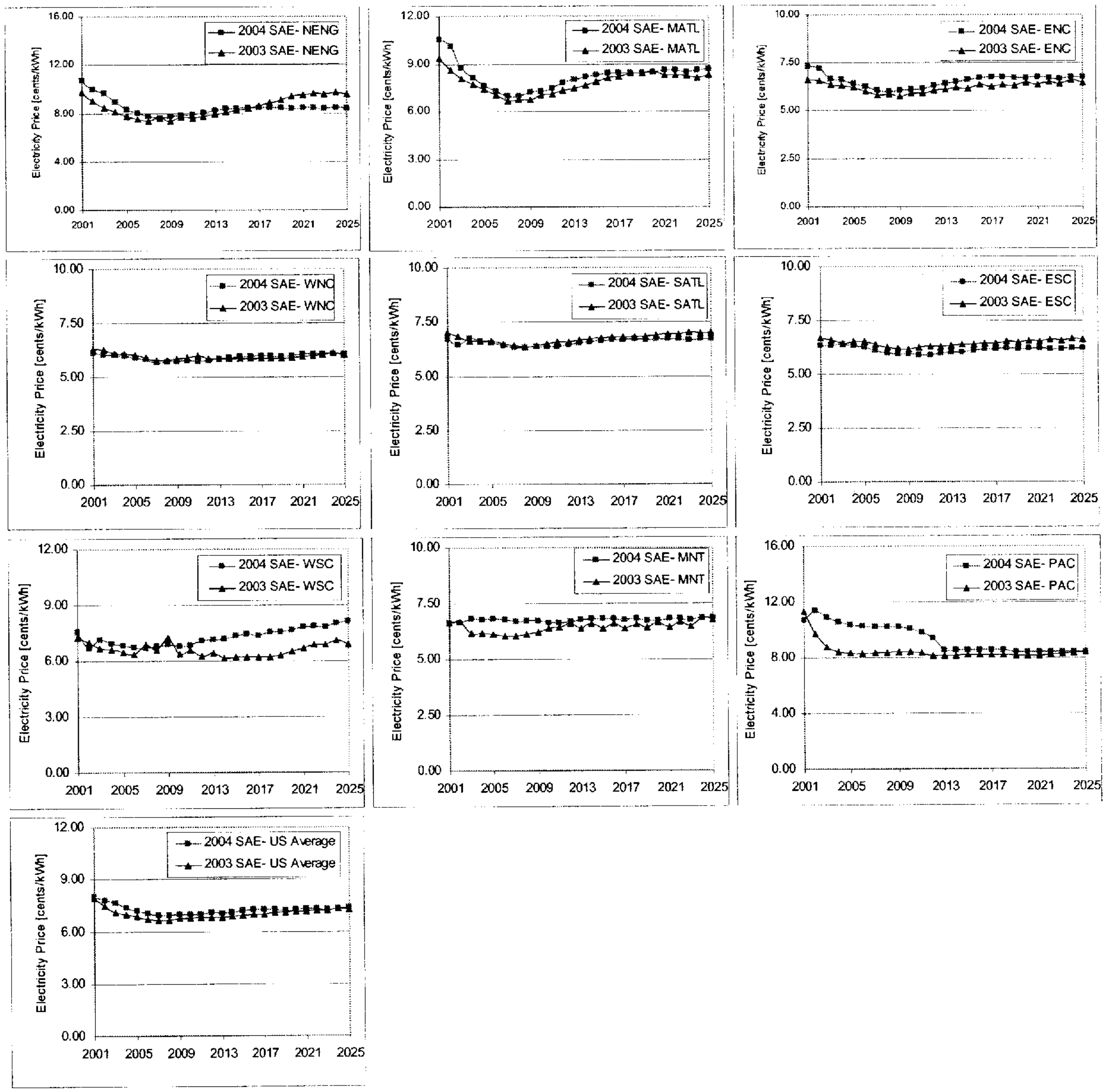
* Cubic feet per minute of ventilation air delivered by BTU of energy input

+ Measure of the ratio of light produces by a light source to the electric power used to produce that quality of light, expressed in lumens per watt

1.2 Electricity Price Trends

Through 2007 prices will have no positive impact on efficiency gains and little impact after 2008. On a real basis, average national electricity prices are projected to decline from 8.0 cents/kWh in 2001 to 6.9 cents/kWh by 2007. After 2008 it is projected to increase by 0.3 % per year. Figure 1 shows the 2003 and 2004 price projections in each region. Through 2007 prices will have a positive contribution to electricity sales as declining prices contribute to stronger short-term utilization. There is a very small difference between 2003 and 2004 price forecast trends for most of the regions.

Figure 1: 2003 and 2004 Electricity Price Trends



1.3 Base Year Energy Intensity Calculations

The 2004 AEO database gives regional floor space and energy consumption estimates for each end-use. Energy intensities are calculated using Equation 1. The intensity values are updated to reflect the most recent floor space and end-use consumption estimates. Initial intensity estimates are then scaled by utility commercial sales data and used in the equipment index calculations.

$$\text{Intensity}[\text{kWh}/\text{SqFt}] = \frac{\text{EnergyConsumption}[\text{BTU}] \times \frac{1}{3{,}413[\text{BTU}/\text{kWh}]}}{\text{FloorSpace}[\text{SqFt}]} \tag{1}$$