Missouri IRP Document No. 5 Updates

The updates reflect a mistake in documenting the Wholesale class forecast methodology and results. Each of the six current Wholesale customers was forecasted with separate econometric models as opposed to one forecasting model for the entire class. The following documentation illustrates the Wholesale forecast methodology and results as used in the AmerenUE Integrated Resource Plan filing of December 2005.

1. The Wholesale Sales Model Specification section on Page 40 of Document No. 5 was replaced with the following text:

Wholesale Sales Model Specification

AmerenUE-Missouri has six active wholesale customers. Each customer was modeled separately on a calendar month basis. Below are the model specifications for each wholesale customer.

Centralia

$$Use_{y,m} = b_1 \times HDD_{y,m} + b_2 \times CDD_{y,m} + b_3 \times GDP + b_4 \times Feb + b_5 \times Apr$$
$$+ b_6 \times May + b_7 \times Jun + b_8 \times Sep + b_9 \times MA(1) + \varepsilon_{y,m}$$

where *HDD* is the number of heating degree days in any given revenue month and year
CDD is the number of cooling degree days in any given revenue month and year
GDP is the GDP for the AmerenUE service territory
Feb is a binary variable equal to 1 only for February
Apr is a binary variable equal to 1 only for April
May is a binary variable equal to 1 only for May
Jun is a binary variable equal to 1 only for June
Sep is a binary variable equal to 1 only for September
MA(1) is a first order moving average variable for the error term

The results are as follows:
$R^2 = 0.942$
Adjusted $R^2 = 0.937$

Variable	Coefficient	StdErr	T-Stat	P-Value
CalWthrVars.HDD	0.690	0.060	11.436	0.00%
CalWthrVars.CDD	3.087	0.123	24.995	0.00%
Economics.GDP	0.017	0.000	38.192	0.00%
BinaryVars.Feb	-91.213	35.814	-2.547	1.24%
BinaryVars.Apr	-149.583	44.796	-3.339	0.12%
BinaryVars.May	-179.412	51.358	-3.493	0.07%
BinaryVars.Jun	-223.456	44.196	-5.056	0.00%
BinaryVars.Sep	-112.422	39.414	-2.852	0.53%
MA(1)	0.416	0.093	4.472	0.00%

Hannibal

$$Use_{y,m} = a + b_1 \times XHeat_{y,m} + b_2 \times XCool_{y,m} + b_3 \times XOther + b_4 \times Aug + b_5 \times May00 + b_6 \times AR(1) + \varepsilon_{y,m}$$

where *Aug* is a binary variable equal to 1 only for August
May00 is a binary variable equal to 1 only for May 2000
AR(1) is a first order autoregressive variable for the error term

The results are as follows:

$R^2 = 0.956$

Adjusted $R^2 = 0.951$

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	4875.511	1533.909	3.178	0.24%
CalVars.XHeat	0.360	0.038	9.410	0.00%
CalVars.XCool	0.057	0.002	25.016	0.00%
CalVars.XOther	0.024	0.003	7.955	0.00%
BinaryVars.Aug	546.479	283.523	1.927	5.90%
BinaryVars.May00	-7580.614	593.903	-12.764	0.00%
AR(1)	0.705	0.095	7.405	0.00%

Kahoka

$$Use_{y,m} = a + b_1 \times XHeat_{y,m} + b_2 \times XCool_{y,m} + b_3 \times XOther + b_4 \times Apr + b_5 \times Jul + b_6 \times Mar99 + b_7 \times MA(1) + \varepsilon_{y,m}$$

where *Apr* is a binary variable equal to 1 only for August
Jul is a binary variable equal to 1 only for July
Mar99 is a binary variable equal to 1 only for March 1999
MA(1) is a first order moving average variable for the error term

The results are as follows:

$R^2 = 0.960$

Adjusted $R^2 = 0.955$

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	411.016	105.925	3.880	0.03%
CalVars.XHeat	0.055	0.003	18.765	0.00%
CalVars.XCool	0.004	0.000	22.887	0.00%
CalVars.XOther	0.002	0.000	8.499	0.00%
BinaryVars.Apr	-59.457	21.196	-2.805	0.69%
BinaryVars.Jul	110.863	24.733	4.482	0.00%
BinaryVars.Mar99	-103.855	50.528	-2.055	4.46%
MA(1)	0.462	0.127	3.631	0.06%

Kirkwood

$$Use_{y,m} = b_1 \times HDD_{y,m} + b_2 \times CDD_{y,m} + b_3 \times Feb + b_4 \times Jun\_02 + b_5 \times Jul02 + b_6 \times GDP + b_7 \times AR(1) + \varepsilon_{y,m}$$

where *HDD* is the number of heating degree days in any given revenue month and year
CDD is the number of cooling degree days in any given revenue month and year
Feb is a binary variable equal to 1 only for February
Jun_02 is a binary variable equal to 1 only for June 2002
Jul02 is a binary variable equal to 1 only for July 2002
GDP is the GDP for the AmerenUE service territory
AR(1) is a first order autoregressive variable for the error term

The results are as follows:
$R^2 = 0.976$
Adjusted $R^2 = 0.975$

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	-548.131	1736.250	-0.316	75.29%
CalWthrVars.HDD	3.863	0.275	14.062	0.00%
CalWthrVars.CDD	26.726	0.571	46.799	0.00%
BinaryVars.Feb	-1343.397	176.955	-7.592	0.00%
BinaryVars.Jun_02	-3133.594	618.694	-5.065	0.00%
BinaryVars.Jul02	-2924.235	623.867	-4.687	0.00%
Economics.GDP	0.128	0.016	7.812	0.00%
AR(1)	0.539	0.087	6.182	0.00%

Perry

$$Use_{y,m} = b_1 \times XHeat_{y,m} + b_2 \times XCool_{y,m} + b_3 \times XOther + b_4 \times Jul + b_5 \times Aug + b_6 \times After\_May\_02 + b_7 \times May\_01 + b_8 \times May\_02 + b_9 \times May03 + b_{10} \times Mar03 + b_{11} \times AR(1) + \varepsilon_{y,m}$$

where *Jul* is a binary variable equal to 1 only for July
Aug is a binary variable equal to 1 only for August
After_May_02 is a binary variable equal to 1 only for months after May 2002
May_01 is a binary variable equal to 1 only for May 2001
May_02 is a binary variable equal to 1 only for May 2002
May03 is a binary variable equal to 1 only for May 2003
Mar03 is a binary variable equal to 1 only for March 2003
AR(1) is a first order autoregressive variable for the error term

The results are as follows:
$R^2 = 0.918$
Adjusted $R^2 = 0.903$

Variable	Coefficient	StdErr	T-Stat	P-Value
CalVars.XHeat	0.012	0.002	5.359	0.00%
CalVars.XCool	0.002	0.000	8.168	0.00%
CalVars.XOther	0.001	0.000	27.224	0.00%
BinaryVars.Jul	62.368	28.552	2.184	3.35%
BinaryVars.Aug	74.857	28.014	2.672	1.00%

BinaryVars.After_May_02	91.857	19.643	4.676	0.00%
BinaryVars.May_01	-82.908	39.192	-2.115	3.92%
BinaryVars.May_02	-130.910	42.110	-3.109	0.30%
BinaryVars.May03	-101.768	40.729	-2.499	1.57%
BinaryVars.Mar03	-77.936	39.477	-1.974	5.37%
AR(1)	0.440	0.142	3.093	0.32%

Marceline

$$Use_{y,m} = b_1 \times HDD_{y,m} + b_2 \times CDD_{y,m} + b_3 \times GDP + b_4 \times May\_02 + b_5 \times May03$$
$$+ b_6 \times Jun98 + b_7 \times Jul\_99\_and\_on + b_8 \times Mar01 + b_9 \times Mar + b_{10} \times AR(1) + \varepsilon_{y,m}$$

where *HDD* is the number of heating degree days in any given revenue month and year
CDD is the number of cooling degree days in any given revenue month and year
GDP is the GDP for the AmerenUE service territory
May_02 is a binary variable equal to 1 only for May 2002
May03 is a binary variable equal to 1 only for May 2003
Jun98 is a binary variable equal to 1 only for June 1998
Jul_99_and_on is a binary variable equal to 1 only for the months of July 1999 and after
Mar01 is a binary variable equal to 1 only for March 2001
Mar is a binary variable equal to 1 only for March

The results are as follows:
$R^2 = 0.957$
Adjusted $R^2 = 0.952$

Variable	Coefficient	StdErr	T-Stat	P-Value
CalWthrVars.HDD	0.855	0.033	25.652	0.00%
CalWthrVars.CDD	2.731	0.084	32.531	0.00%
Economics.GDP	0.017	0.000	80.546	0.00%
BinaryVars.May_02	249.388	82.050	3.039	0.32%
BinaryVars.May03	251.155	82.455	3.046	0.32%
BinaryVars.Jun98	-233.263	82.065	-2.842	0.57%
BinaryVars.Jul_99_and_on	120.279	44.160	2.724	0.80%
BinaryVars.Mar01	-245.569	86.020	-2.855	0.55%
BinaryVars.Mar	117.208	32.507	3.606	0.05%

2. The table on page 63 – **Total System Energy Use (GWh) by Sector** has been replaced with the following:

Total System (GWh)				
Year	Residential	Commercial	Industrial	Total
1995	N.A.	11,152.4	6,056.5	N.A.
1996	N.A.	11,577.0	6,409.0	N.A.
1997	10,938.5	11,674.4	6,365.3	28,978.1
1998	11,443.0	12,368.5	6,137.9	29,949.3
1999	11,329.4	13,407.3	6,616.6	31,353.3
2000	11,669.1	13,501.8	6,511.3	31,682.3
2001	12,147.6	13,669.0	6,248.9	32,065.5
2002	12,811.7	14,045.9	5,730.7	32,588.3
2003	12,300.3	14,102.4	5,864.1	32,266.8

[redacted]

Commercial Wholesale data begins in 1999, consisting of the current 6 customers.

3. The table on page 64 – **Total System Energy Use (GWh) – Revenue Month** has been replaced with the following:

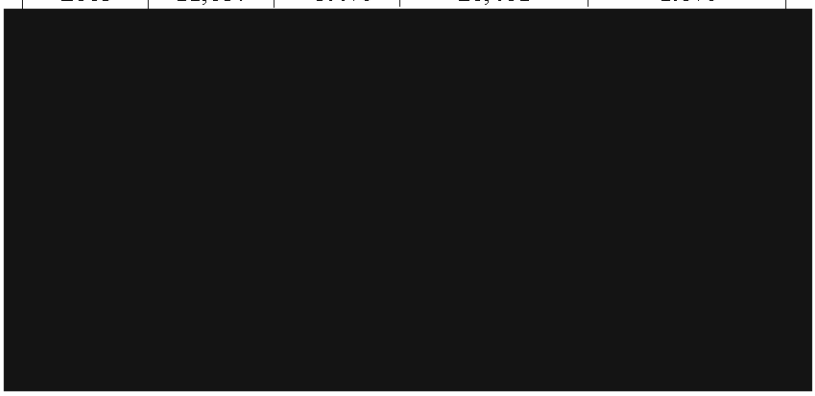
Year	January	February	March	April	May	June	July	August	September	October	November	December	Year-to-Year Growth
1995	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
1996	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1997	2,707	2,519	2,266	2,104	1,917	2,147	2,807	2,955	2,677	2,263	2,181	2,436	N.A.
1998	2,677	2,419	2,343	2,131	2,069	2,621	3,048	2,910	2,864	2,385	2,126	1,807	*1.5%*
1999	2,618	2,668	2,419	2,411	2,309	2,623	3,071	3,370	2,912	2,294	2,121	2,516	*6.6%*
2000	2,939	2,813	2,271	2,212	2,144	2,640	3,002	3,072	3,118	2,395	2,318	2,774	*1.2%*
2001	3,270	2,852	2,416	2,290	2,255	2,567	3,093	3,348	3,063	2,287	2,157	2,456	*1.1%*
2002	2,873	2,680	2,578	2,260	2,286	2,570	3,294	3,488	3,177	2,566	2,427	2,367	*1.6%*
2003	2,880	2,867	2,698	2,252	2,208	2,387	3,120	3,222	3,128	2,393	2,370	2,733	*-0.9%*

[redacted]

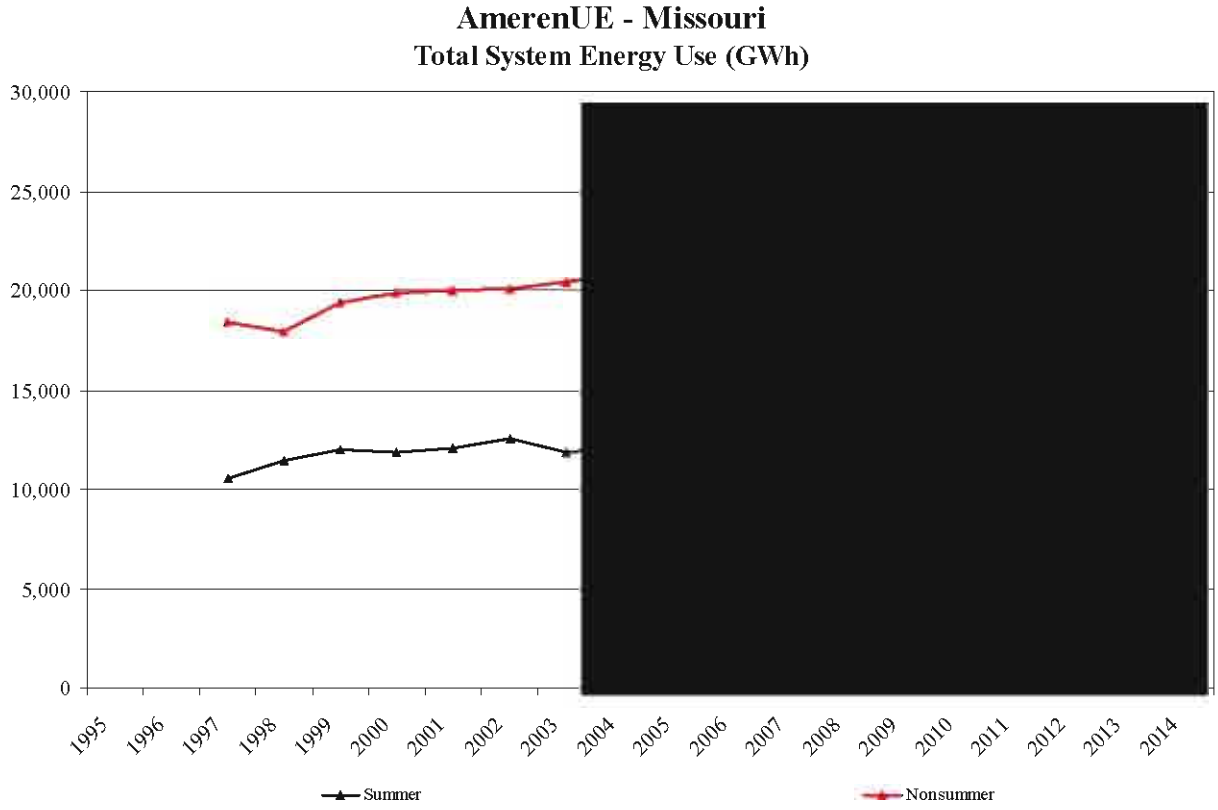
Commercial Wholesale data begins in 1999, consisting of the current 6 customers.

4. The table on page 65 – **Total System Summer/Nonsummer Energy Use (GWh)** has been replaced with the following:

	Summer Months (June-September)		Nonsummer Months (Jan.-May and Oct.-December)	
1995				
1996		N.A		N.A
1997	10,585	N.A.	18,393	N.A.
1998	11,443	8.1%	17,957	-2.4%
1999	11,977	4.7%	19,355	7.8%
2000	11,832	-1.2%	19,864	2.6%
2001	12,071	2.0%	19,984	0.6%
2002	12,529	3.8%	20,037	0.3%
2003	11,857	-5.4%	20,401	1.8%



5. The chart on page 66 – **Total System Energy Use (GWh)** has been replaced with the following:



6. The table on page 76 – **Total System Customers by Sector** has been replaced with the following:

Total System				
Year	Residential	Commercial	Industrial	Total
1995	933,589	123,019	5,937	1,062,545
1996	939,004	125,500	5,864	1,070,367
1997	945,607	128,627	5,827	1,080,061
1998	953,120	137,566	5,668	1,096,354
1999	961,048	175,199	5,368	1,141,614
2000	969,485	181,232	5,318	1,156,035
2001	975,924	184,057	5,183	1,165,164
2002	983,792	146,894	5,216	1,135,902
2003	994,669	169,337	5,123	1,169,130

[redacted]

7. The table on page 77 – **Total System Customers** has been replaced with the following:

Year	January	February	March	April	May	June	July	August	September	October	November	December	Year-to-Year Growth
1995	1,060,750	1,061,142	1,063,082	1,062,557	1,061,359	1,060,883	1,060,718	1,061,049	1,063,332	1,064,325	1,065,020	1,066,321	
1996	1,068,287	1,069,171	1,070,499	1,070,425	1,069,849	1,068,517	1,068,121	1,068,669	1,070,158	1,071,260	1,073,485	1,075,967	*0.7%*
1997	1,077,526	1,078,512	1,079,178	1,079,756	1,079,256	1,078,898	1,079,407	1,080,039	1,081,165	1,079,968	1,081,957	1,085,070	*0.9%*
1998	1,087,229	1,089,030	1,090,707	1,091,095	1,090,168	1,089,482	1,090,448	1,090,960	1,091,989	1,080,530	1,133,104	1,131,506	*1.5%*
1999	1,136,440	1,139,064	1,139,989	1,140,438	1,139,987	1,140,077	1,140,819	1,141,333	1,143,004	1,144,078	1,145,671	1,148,472	*4.1%*
2000	1,151,799	1,154,193	1,155,414	1,155,585	1,154,584	1,153,965	1,154,618	1,155,425	1,156,956	1,158,583	1,159,476	1,161,816	*1.3%*
2001	1,164,072	1,164,578	1,165,253	1,165,482	1,163,975	1,162,960	1,163,205	1,164,228	1,165,801	1,166,312	1,167,343	1,168,758	*0.8%*
2002	1,131,253	1,132,479	1,133,468	1,133,658	1,134,775	1,134,267	1,134,642	1,135,246	1,136,892	1,137,678	1,138,735	1,147,729	*-2.5%*
2003	1,146,283	1,146,328	1,147,139	1,147,865	1,146,436	1,145,930	1,189,076	1,188,017	1,191,084	1,192,610	1,192,317	1,196,476	*2.9%*

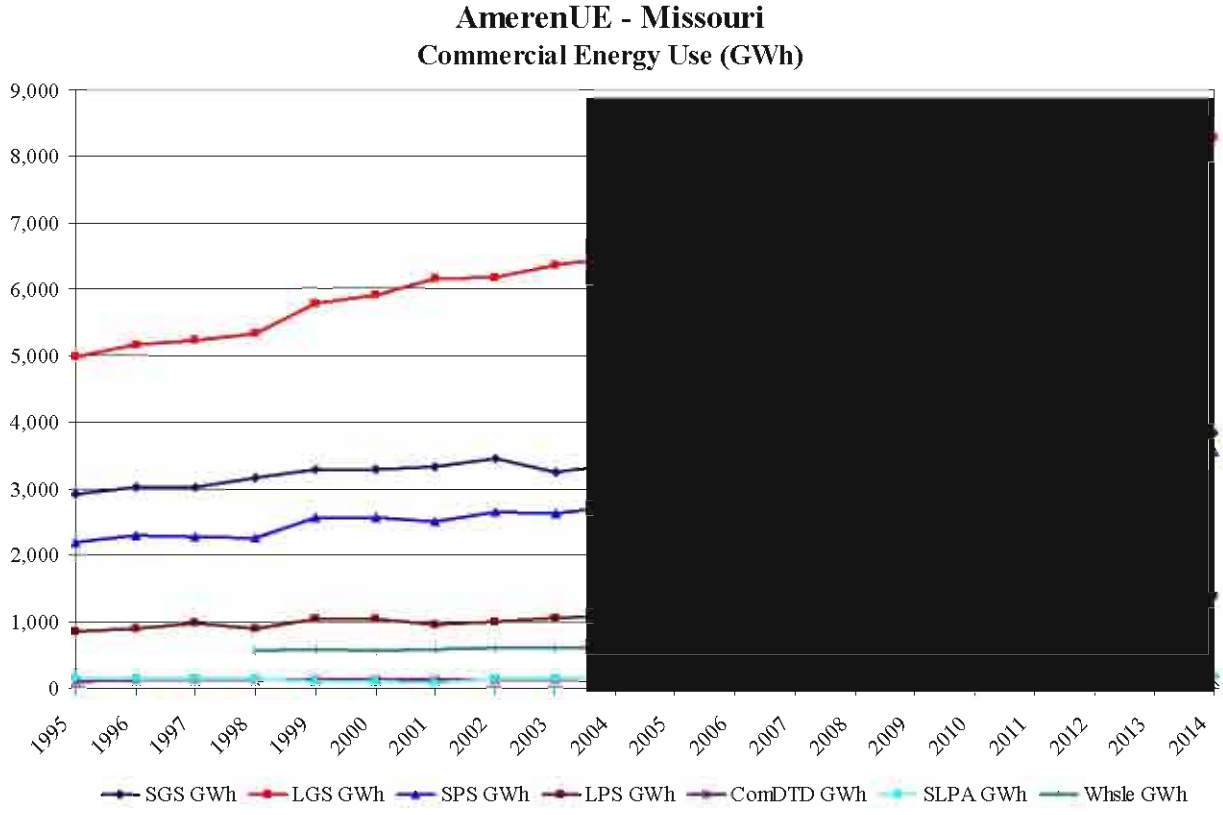
[redacted]

8. The table on page 98 – **Commercial Energy Use (GWh) by Revenue Class** has been replaced with the following:

Year	SGS GWh	LGS GWh	SPS GWh	LPS GWh	ComDTD GWh	SLPA GWh	Whsle GWh	Total GWh
1995	2,916.8	4,978.1	2,193.6	850.4	92.8	120.7		11,152.4
1996	3,022.1	5,166.6	2,292.9	880.7	93.6	121.2		11,577.0
1997	3,004.3	5,226.3	2,264.3	961.1	95.0	123.5		11,674.4
1998	3,149.5	5,325.3	2,243.3	885.9	95.8	118.9	549.8	12,368.5
1999	3,277.3	5,778.8	2,568.0	1,029.6	94.5	88.0	571.2	13,407.3
2000	3,289.4	5,896.1	2,558.1	1,027.4	95.7	77.9	557.2	13,501.8
2001	3,318.0	6,154.5	2,506.6	953.8	96.0	72.2	567.9	13,669.0
2002	3,447.3	6,163.4	2,638.7	987.3	97.5	121.4	590.4	14,045.9
2003	3,238.3	6,356.9	2,620.4	1,058.2	99.2	130.3	599.0	14,102.4

[redacted]

9. The chart on page 99 – **Commercial Energy Use (GWh)** has been replaced with the following:

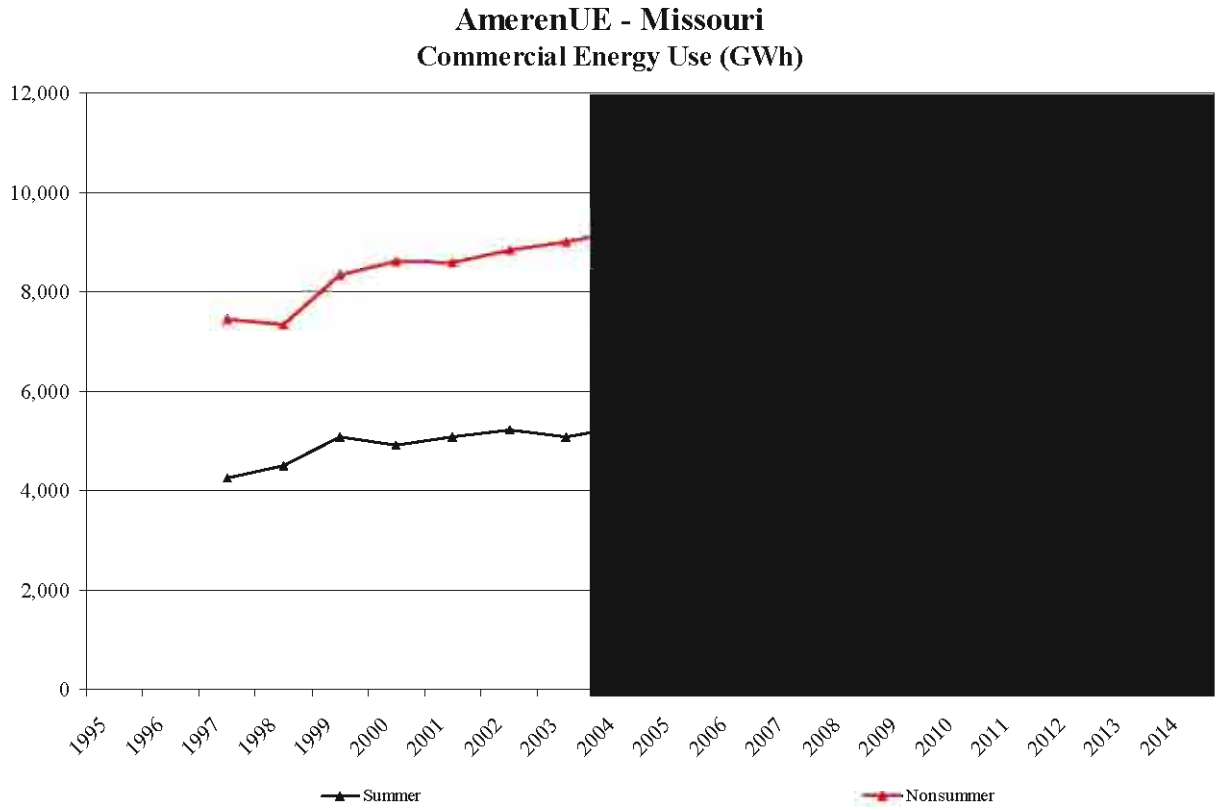


10. The table on page 100 – **Commercial Total System Summer/Nonsummer Energy Use (GWh)** has been replaced with the following:

	Summer Months (June-September)		Nonsummer Months (Jan.-May and Oct.-December)	
1995				
1996		N.A		N.A
1997	4,235,904	N.A.	7,438,463	N.A.
1998	4,483,295	5.8%	7,335,391	-1.4%
1999	5,062,470	12.9%	8,323,430	13.5%
2000	4,900,651	-3.2%	8,615,126	3.5%
2001	5,087,850	3.8%	8,570,426	-0.5%
2002	5,201,718	2.2%	8,821,760	2.9%
2003	5,086,953	-2.2%	9,006,858	2.1%

[redacted]

11. The chart on page 101 – **Commercial Energy Use (GWh)** has been replaced with the following:



12. The table on page 102 – **Commercial Customers by Revenue Class** has been replaced with the following:

Year	SGS Custs	LGS Custs	SPS Custs	LPS Custs	ComDtD Custs	SLPA Custs	Total Custs
1995	102,914	5,597	355	15	12,621	1,517	123,019
1996	105,155	5,905	372	16	12,542	1,511	125,500
1997	108,184	6,112	393	18	12,419	1,501	128,627
1998	111,688	6,135	380	17	17,882	1,464	137,566
1999	115,221	6,306	368	17	51,931	1,350	175,199
2000	120,342	6,815	413	19	52,251	1,386	181,232
2001	122,495	7,191	429	20	52,529	1,388	184,057
2002	124,610	7,566	449	19	12,761	1,484	146,894
2003	127,666	7,791	449	23	31,933	1,470	169,337

13. The table on page 103 – **Commercial Total System Energy Use (GWh) – Revenue Month** has been replaced with the following:

Year	January	February	March	April	May	June	July	August	September	October	November	December	Year-to-Year Growth
1995	965,793	912,896	893,435	810,576	797,759	901,114	1,034,284	1,102,505	1,136,288	887,317	806,630	903,790	
1996	1,012,533	971,264	939,121	862,426	848,699	979,358	1,101,096	1,046,316	1,101,249	891,300	871,696	951,958	*5.8%*
1997	1,042,177	971,666	905,136	874,249	818,680	936,399	1,107,005	1,118,139	1,074,361	968,637	900,173	957,745	*0.8%*
1998	1,038,350	933,260	941,059	898,888	880,100	1,069,187	1,155,736	1,132,180	1,126,192	1,002,768	915,845	725,121	*1.2%*
1999	1,013,541	1,064,212	1,011,401	1,090,886	1,022,340	1,171,889	1,248,673	1,380,182	1,261,725	1,050,970	1,006,340	1,063,741	*13.3%*
2000	1,256,681	1,187,137	969,465	946,067	970,710	1,176,092	1,227,303	1,235,368	1,261,888	1,078,239	1,065,072	1,141,754	*1.0%*
2001	1,290,834	1,151,479	996,695	1,021,727	1,009,365	1,154,507	1,301,187	1,353,413	1,278,744	1,067,970	977,906	1,054,450	*1.1%*
2002	1,173,601	1,175,743	1,022,030	1,032,603	1,116,732	1,071,580	1,366,397	1,432,899	1,330,842	1,175,396	1,139,935	985,721	*2.7%*
2003	1,178,735	1,148,575	1,153,345	1,017,329	1,034,209	1,110,640	1,307,022	1,336,440	1,332,851	1,178,318	1,094,541	1,201,806	*0.5%*

[redacted]

14. The table on page 188 – **Commercial Wholesale Energy Use (GWh) – Revenue Month** has been replaced with the following:

Year	January	February	March	April	May	June	July	August	September	October	November	December	Year-to-Year Growth
1995	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
1996	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	*N.A.*
1997	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	*N.A.*
1998	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	*N.A.*
1999	47,830	42,711	40,836	39,383	38,813	45,112	57,559	58,482	52,115	42,490	39,591	44,901	*N.A.*
2000	48,921	44,473	43,469	39,620	41,331	47,956	58,610	61,000	56,162	43,886	40,270	45,517	*3.9%*
2001	50,290	45,470	43,219	38,273	38,983	45,643	56,018	57,427	55,316	43,456	39,352	43,782	*-2.4%*
2002	50,504	44,657	43,408	41,434	41,531	46,354	56,544	58,385	54,401	44,154	40,310	46,265	*1.9%*
2003	52,299	45,344	46,136	41,811	42,729	48,279	60,605	59,422	56,620	46,239	42,279	48,655	*4.0%*

[redacted]

15. The table on page 189 – **Commercial Wholesale Summer/Nonsummer Energy Use (GWh)** has been replaced with the following:

	Summer Months (June-September)		Nonsummer Months (Jan.-May and Oct.-December)	
1995				
1996	N.A	N.A	N.A	N.A
1997	N.A.	N.A.	N.A.	N.A.
1998	N.A.	N.A.	N.A.	N.A.
1999	213,269	N.A.	336,554	N.A.
2000	223,728	4.9%	347,488	3.2%
2001	214,403	-4.2%	342,825	-1.3%
2002	215,684	0.6%	352,264	2.8%
2003	224,926	4.3%	365,492	3.8%

[redacted]

16. The table on page 190 – **Wholesale Energy Use (GWh)** has been replaced with the following: