

Ameren Illinois Rate Zone II  
Section 285.5120  
Schedule E-7: Load Research Results and Supporting Materials

The load research was based on a new load research sample which was fully implemented in January 2014. The sample was designed for the post 2006 delivery service rates.

**Schedule E-7(a): Load Research Results**

- 1) *Monthly class and Illinois jurisdictional loads at the time of the system coincident peaks, along with the date and time of such peak;*

Please see schedule E-7(a)(1)

- 2) *The monthly maximum non-coincident peak demands for each customer class, along with the date and time of each peak for each customer class.*

Please see schedule E-7(a)(2)

- 3) *Class and Jurisdictional Load Factors; and*

Please see schedule E-7(a)(3)

- 4) *The statistical confidence level achieved for each set of load data developed.*

The original samples were designed for an accuracy of +/- 10% at the 90% confidence level at the time of the annual system peak. Due to over sampling and near census analysis for several classes, the resulting precisions in many classes were well below the accuracy design.

**Schedule E-7(b): Supporting Materials**

- 1) *The time period over which the data was collected:*

The data were collected for calendar year 2014.

- 2) *A full description of the statistical methods used by the Utility to derive load research results, including accuracies and confidence levels its load research samples were designed to achieve; and*

The goal of the load research sample design is to design a sample of customers from each applicable customer class that:

Ameren Illinois Rate Zone II  
Section 285.5120  
Schedule E-7: Load Research Results and Supporting Materials

- 1) Provides an accurate representation of the load characteristics of each customer class.
- 2) Provide estimated customer loads with a relative accuracy of +/- 10% at a 90% confidence level.

To achieve these goals, the following sample design steps are followed for each applicable customer class:

- 1) Selection of stratification variable(s)
- 2) Determination of number of strata required for each class
- 3) Computation of strata boundaries
- 4) Calculation of sample size

#### Step 1- Selection of Stratification variable

Stratified sampling is a technique used to reduce variance when two or more different subgroups of a population exhibit different characteristics. The population is separated into non-overlapping groups called strata. The first step in the stratification procedure involves selection of stratification variable on which to divide the population. The stratification variable must be one which shows a high correlation to the variable of interest (usually system or class peak demand).

The most common stratification variables in use include either non-coincident demands or energy usage for a selected historic time period, usually ranging from one month to a year.

#### Step 2 – Determination of number of strata required for each class

The number of strata is determined by calculating the coefficient of variation of the sampling distribution for test designs with different number of strata. The coefficient of variation is equal to the standard error of the estimate divided by the mean. The coefficient of variation declines as the number of strata increases, but at a diminishing rate. The point at which the coefficient of variation decreases very little as another stratum is added indicates the number of strata needed.

#### Step 3 – Computation of Stratum Boundaries

Ameren Illinois Rate Zone II  
Section 285.5120  
Schedule E-7: Load Research Results and Supporting Materials

Strata boundaries are designed such that the overall population weighted variance is minimized. The strata boundaries are calculated using a statistical technique called Dalenius-Hodges.

Step 4 – Calculation of sample size

The accuracy of a sample result depends upon the sample size and the degree of variability of in the population itself. Sample size is:

1. Directly proportional to an estimate of the variance of the population,
2. Inversely proportional to the tolerable error (e.g. 10% relative accuracy at the annual system peak), and
3. Directly proportional to the square of the degree of confidence desired.

In most cases Ameren's sample sizes were calculated to yield a relative accuracy of +/- 10% at confidence level of 90%. As previously mentioned the samples are primarily stratified random samples based on the Dalenius-Hodges variance procedure and the Neyman allocation was used to distribute the meters among the strata.

- 3) *A full explanation of the usage strata into which customers in the utility's load research sample is distributed. For each of these usage stratum, the utility must provide the following:*

A combined ratio estimator was used to expand the sample data to the population. The combined ratio estimator utilizes the strata weights as defined in the sample design in conjunction with the kw/kwh ratio to calculate total parameter estimates. This technique produces demand estimates for the class; it does not produce stratum-level demand estimates. However, the total demands are calculated based on the weighed strata kw/kwh ratio and the total energy for the month.

Residential Delivery Service (DS1):

The residential delivery service sample is a stratified two dimensional random sample based on Summer kWh and Winter/Shoulder Ratio. The sample has four strata as follows:

- Strata 1: 0-1300 kwh summer\*, 0-1.8 winter/shoulder ratio\*
- Strata 2: 0-1300 kwh summer\*, over 1.8 winter/shoulder ratio\*
- Strata 3: over 1300 kwh summer\*, 0-1.8 winter/shoulder ratio\*
- Strata 4: over 1300 kwh summer\*, over 1.8 winter/shoulder ratio\*

Ameren Illinois Rate Zone II  
Section 285.5120

Schedule E-7: Load Research Results and Supporting Materials

- \*Summer = Average Monthly Usage (June 05, July 05, August 05, September 05)
- \*Winter/Shoulder Ratio = (Winter\* Use Per Day)/(Shoulder\* Use Per Day)
- \*Winter = December 05, January 06, February 06
- \*Shoulder = April 05, May 05, October 05, November 05

Small General Delivery Service (DS2):

The small general delivery service sample is a two dimensional random sample based on Summer and Winter kWh. The sample contains four strata as follows:

- Strata 1: 0-5200 kwh summer\*, 0-4300 kwh winter\*
- Strata 2: 0-5200 kwh summer\*, over 4300 kwh winter\*
- Strata 3: over 5200 kwh summer\*, 0-4300 kwh winter\*
- Strata 4: over 5200 kwh summer\*, over 4300 kwh winter\*

- \*Summer = Average Monthly Usage (June 05, July 05, August 05, September 05)
- \*Winter = December 05, January 06, February 06

General Delivery Service (DS3) < 400 kW:

The general delivery service sample is a stratified one dimensional random sample based on load factor. The sample has three strata as follows:

- Strata 1: 0-0.4 Load Factor\*
- Strata 2: 0.4-0.6 Load Factor\*
- Strata 3: over 0.6 Load Factor\*

- \*Load Factor = Average of Monthly Load Factors for March 05-February 06

General Delivery Service (DS3) >= 400 kW:

This sample is nearly 100% stratified by supply voltage:

- Strata 1 - Primary
- Strata 2 - Sub-Transmission
- Strata 3 – Transmission

Ameren Illinois Rate Zone II  
Section 285.5120  
Schedule E-7: Load Research Results and Supporting Materials

Large General Delivery Service (DS4):

This sample is nearly 100% stratified by supply voltage:

Strata 1 - Primary  
Strata 2 - Sub-Transmission  
Strata 3 – Transmission

*A) Identify the number of customers and the customer types (by class) in that particular stratum;*

Please see schedule E-7(b)(3)(A)

*B) Average monthly usage;*

Please see schedule E-7(b)(3)(B)

*C) Average demand in kW at the time of system peak; and*

Please see schedule E-7(b)(3)(C)

*D) Average non-coincident peak demand.*

Please see schedule E-7(b)(3)(D)

*4. An explanation of how the load research sample was derived and justification provided for the appropriateness of the sample used.*

The sample design was derived based on standard load research procedure using stratified random sample which minimizes estimation error and reduces sampling cost.

Ameren Illinois Rate Zone II  
 Section 285.5120  
 Schedule E-7: Load Research Results and Supporting Materials

Ameren Illinois Rate Zone II								
Section 285.5120								
Schedule E-7(a)(1): Load Research								
Class Coincident Peak								
Including Distribution Losses								
Hour Beginning	DS1	DS2	DS3	DS3S	DS4	DS4S	DS5	System
1/6/14 6:00 PM	486,746	124,631	97,129	1,456	271,562	617	7,744	989,885
2/11/14 8:00 AM	350,944	146,033	133,376	1,991	320,155	592	-	953,090
3/2/14 7:00 PM	444,336	119,161	85,782	1,144	259,906	246	7,744	918,320
4/14/14 8:00 PM	271,346	97,875	86,180	1,488	324,938	581	7,744	790,153
5/30/14 2:00 PM	336,769	176,433	143,877	1,164	371,027	328	-	1,029,599
6/19/14 4:00 PM	459,615	202,627	144,911	746	341,085	73	-	1,149,058
7/22/14 4:00 PM	523,545	167,160	139,455	875	332,295	96	-	1,163,425
8/25/14 3:00 PM	552,738	226,794	169,651	1,172	294,157	256	-	1,244,768
9/5/14 2:00 PM	451,088	207,531	163,313	2,082	305,372	99	-	1,129,486
10/1/14 7:00 PM	279,217	145,170	105,670	14,004	285,552	3,975	7,744	841,333
11/17/14 6:00 PM	382,270	135,771	93,961	11,404	290,407	3,428	7,744	924,985
12/1/14 6:00 PM	374,565	131,450	100,849	6,987	249,798	360	7,744	871,754

Ameren Illinois Rate Zone II  
Section 285.5120  
Schedule E-7: Load Research Results and Supporting Materials

Ameren Illinois Rate Zone II												
Section 285.5120												
Schedule E-7(a)(2): Load Research												
Class Non-Coincident Peak												
Including Distribution Losses												
Hour Beginning	DS1	Hour Beginning	DS2	Hour Beginning	DS3	Hour Beginning	DS3S	Hour Beginning	DS4	Hour Beginning	DS4S	DS5
1/6/14 5:00 PM	496,457	1/24/14 10:00 AM	165,136	1/23/14 10:00 AM	130,985	1/29/14 3:00 PM	4,044	1/29/14 10:00 AM	344,035	1/9/14 1:00 PM	1,799	7,744
2/10/14 8:00 PM	398,014	2/11/14 10:00 AM	156,827	2/11/14 8:00 AM	133,376	2/28/14 12:00 PM	3,602	2/6/14 9:00 AM	344,956	2/24/14 1:00 PM	2,040	7,744
3/9/14 2:00 AM	483,354	3/3/14 10:00 AM	151,042	3/3/14 9:00 AM	128,749	3/6/14 9:00 AM	3,021	3/28/14 8:00 AM	337,351	3/25/14 2:00 PM	1,594	7,744
4/15/14 7:00 AM	332,685	4/25/14 3:00 PM	134,080	4/24/14 1:00 PM	123,683	4/15/14 8:00 AM	3,059	4/21/14 11:00 AM	342,947	4/23/14 2:00 PM	1,095	7,744
5/31/14 2:00 PM	476,497	5/21/14 2:00 PM	188,094	5/28/14 1:00 PM	152,911	5/1/14 9:00 AM	2,103	5/21/14 10:00 AM	356,246	5/5/14 10:00 AM	1,153	7,744
6/28/14 3:00 PM	509,234	6/19/14 2:00 PM	213,837	6/17/14 1:00 PM	164,490	6/3/14 2:00 PM	2,138	6/25/14 10:00 AM	364,464	6/3/14 2:00 PM	1,044	7,744
7/12/14 4:00 PM	572,459	7/22/14 12:00 PM	181,713	7/22/14 1:00 PM	158,138	7/15/14 1:00 PM	2,079	7/31/14 10:00 AM	362,361	7/29/14 1:00 PM	1,247	7,744
8/24/14 4:00 PM	610,576	8/25/14 1:00 PM	231,679	8/25/14 1:00 PM	179,321	8/25/14 1:00 PM	1,531	8/29/14 10:00 AM	375,379	8/4/14 11:00 AM	692	7,744
9/4/14 5:00 PM	513,667	9/5/14 1:00 PM	208,814	9/4/14 1:00 PM	171,424	9/27/14 11:00 AM	15,484	9/29/14 11:00 AM	364,063	9/25/14 3:00 PM	4,165	7,744
10/31/14 5:00 PM	288,206	10/2/14 1:00 PM	158,708	10/1/14 1:00 PM	146,699	10/11/14 11:00 AM	21,082	10/2/14 8:00 AM	364,916	10/11/14 7:00 PM	6,001	7,744
11/18/14 6:00 PM	388,917	11/18/14 11:00 AM	152,997	11/3/14 12:00 PM	129,697	11/1/14 12:00 PM	17,926	11/5/14 12:00 PM	334,266	11/7/14 10:00 AM	4,400	7,744
12/1/14 8:00 PM	380,003	12/17/14 11:00 AM	149,741	12/4/14 10:00 AM	136,132	12/19/14 10:00 AM	8,839	12/12/14 10:00 AM	320,012	12/17/14 1:00 PM	2,333	7,744

Ameren Illinois Rate Zone II  
 Section 285.5120  
 Schedule E-7: Load Research Results and Supporting Materials

Ameren Illinois Rate Zone II								
Section 285.5120								
Schedule E-7(a)(3): Load Research								
Class Load Factors								
Month	DS1	DS2	DS3	DS3S	DS4	DS4S	DS5	System
January-14	63%	69%	69%	63%	73%	31%	11%	78%
February-14	73%	72%	70%	52%	74%	18%	10%	79%
March-14	51%	67%	68%	38%	75%	29%	9%	76%
April-14	56%	67%	67%	33%	72%	33%	8%	77%
May-14	45%	54%	58%	38%	75%	21%	7%	66%
June-14	55%	57%	62%	28%	76%	21%	7%	68%
July-14	48%	56%	61%	30%	73%	13%	7%	64%
August-14	46%	54%	58%	40%	75%	28%	8%	64%
September-14	42%	50%	55%	4%	71%	2%	9%	60%
October-14	63%	59%	56%	37%	69%	29%	10%	74%
November-14	69%	67%	54%	66%	72%	63%	11%	76%
December-14	69%	69%	61%	75%	68%	58%	11%	78%

Ameren Illinois Rate Zone II								
Section 285.5120								
Schedule E-7(a)(3)(A): Load Research								
Customers								
Month	DS1	DS2	DS3	DS3S	DS4	DS4S	DS5	System
January-14	189,262	25,009	734	44	80	5	6,752	221,886
February-14	186,841	24,782	727	45	79	5	6,599	219,078
March-14	193,245	25,698	754	44	79	5	6,959	226,784
April-14	188,836	25,009	729	44	79	5	6,720	221,422
May-14	188,308	24,975	767	45	79	5	6,700	220,879
June-14	189,687	25,024	759	48	84	6	6,770	222,378
July-14	188,461	24,906	723	49	79	5	6,696	220,919
August-14	188,570	25,128	740	49	81	5	6,712	221,285
September-14	190,316	25,164	731	46	87	5	6,778	223,127
October-14	188,464	25,009	732	52	79	5	6,699	221,040
November-14	188,204	25,026	720	50	80	5	6,648	220,733
December-14	189,726	25,368	749	49	80	5	6,717	222,694

Ameren Illinois Rate Zone II  
 Section 285.5120  
 Schedule E-7: Load Research Results and Supporting Materials

Ameren Illinois Rate Zone II							
Section 285.5120							
Schedule E-7(b)(3)(B): Load Research							
Average Usage per Customer							
Including Distribution Losses							
Month	DS1	DS2	DS3	DS3S	DS4	DS4S	DS5
January-14	1,223	3,382	91,866	43,327	2,326,115	83,956	42,151
February-14	1,041	3,060	86,080	27,979	2,175,712	49,443	36,077
March-14	952	2,947	86,426	19,327	2,380,256	68,575	36,298
April-14	710	2,589	81,835	16,318	2,256,424	52,448	31,407
May-14	843	3,046	86,090	13,254	2,528,035	36,461	29,269
June-14	1,066	3,500	96,792	8,882	2,367,897	26,061	25,195
July-14	1,082	3,041	99,165	9,313	2,485,509	23,642	28,368
August-14	1,118	3,717	104,127	9,245	2,584,271	28,474	30,281
September-14	822	2,961	92,883	9,810	2,152,019	14,564	30,466
October-14	722	2,800	83,925	112,815	2,383,499	257,141	38,500
November-14	1,030	2,943	70,337	170,267	2,154,098	397,563	39,938
December-14	1,034	3,015	82,339	100,864	2,021,241	201,426	42,940

Ameren Illinois Rate Zone II							
Section 285.5120							
Schedule E-7(b)(3)(C): Load Research							
Average Demand per Customer: Class Coincident Peak							
Including Distribution Losses							
Hour Beginning	DS1	DS2	DS3	DS3S	DS4	DS4S	DS5
1/24/14 8:00 AM	2.6	5.0	132	33	3,395	123	1.1
2/7/14 7:00 AM	1.9	5.9	183	44	4,053	118	-
3/2/14 6:00 PM	2.3	4.6	114	26	3,290	49	1.1
4/3/14 7:00 AM	1.4	3.9	118	34	4,113	116	1.2
5/31/14 1:00 PM	1.8	7.1	188	26	4,697	66	-
6/25/14 3:00 PM	2.4	8.1	191	16	4,061	12	-
7/7/14 2:00 PM	2.8	6.7	193	18	4,206	19	-
8/25/14 2:00 PM	2.9	9.0	229	24	3,632	51	-
9/4/14 3:00 PM	2.4	8.2	223	45	3,510	20	-
10/2/14 9:00 AM	1.5	5.8	144	269	3,615	795	1.2
11/17/14 6:00 PM	2.0	5.4	131	228	3,630	686	1.2
12/1/14 8:00 PM	2.0	5.2	135	143	3,122	72	1.2

Ameren Illinois Rate Zone II  
Section 285.5120  
Schedule E-7: Load Research Results and Supporting Materials

Ameren Illinois Rate Zone II												
Section 285.5120												
Schedule E-7(b)(3)(D): Load Research												
Average Demand per Customer: Class Non-Coincident Peak												
Including Distribution Losses												
Hour Beginning	DS1	Hour Beginning	DS2	Hour Beginning	DS3	Hour Beginning	DS3S	Hour Beginning	DS4	Hour Beginning	DS4S	DS5
1/6/14 5:00 PM	2.6	1/24/14 10:00 AM	6.6	1/23/14 10:00 AM	178.5	1/29/14 3:00 PM	91.9	1/29/14 10:00 AM	4,300.4	1/9/14 1:00 PM	359.8	520.9
2/10/14 8:00 PM	2.1	2/11/14 10:00 AM	6.3	2/11/14 8:00 AM	183.5	2/28/14 12:00 PM	80.0	2/6/14 9:00 AM	4,366.5	2/24/14 1:00 PM	408.0	527.5
3/9/14 2:00 AM	2.5	3/3/14 10:00 AM	5.9	3/3/14 9:00 AM	170.8	3/6/14 9:00 AM	68.7	3/28/14 8:00 AM	4,270.3	3/25/14 2:00 PM	318.8	528.2
4/15/14 7:00 AM	1.8	4/25/14 3:00 PM	5.4	4/24/14 1:00 PM	169.7	4/15/14 8:00 AM	69.5	4/21/14 11:00 AM	4,341.1	4/23/14 2:00 PM	219.0	528.5
5/31/14 2:00 PM	2.5	5/21/14 2:00 PM	7.5	5/28/14 1:00 PM	199.4	5/1/14 9:00 AM	46.7	5/21/14 10:00 AM	4,509.4	5/5/14 10:00 AM	230.5	528.9
6/28/14 3:00 PM	2.7	6/19/14 2:00 PM	8.5	6/17/14 1:00 PM	216.7	6/3/14 2:00 PM	44.5	6/25/14 10:00 AM	4,338.9	6/3/14 2:00 PM	174.0	497.8
7/12/14 4:00 PM	3.0	7/22/14 12:00 PM	7.3	7/22/14 1:00 PM	218.7	7/15/14 1:00 PM	42.4	7/31/14 10:00 AM	4,586.9	7/29/14 1:00 PM	249.4	529.8
8/24/14 4:00 PM	3.2	8/25/14 1:00 PM	9.2	8/25/14 1:00 PM	242.3	8/25/14 1:00 PM	31.3	8/29/14 10:00 AM	4,634.3	8/4/14 11:00 AM	138.5	517.0
9/4/14 5:00 PM	2.7	9/5/14 1:00 PM	8.3	9/4/14 1:00 PM	234.5	9/27/14 11:00 AM	336.6	9/29/14 11:00 AM	4,184.6	9/25/14 3:00 PM	832.9	481.7
10/31/14 5:00 PM	1.5	10/2/14 1:00 PM	6.3	10/1/14 1:00 PM	200.4	10/11/14 11:00 AM	405.4	10/2/14 8:00 AM	4,619.2	10/11/14 7:00 PM	1,200.1	530.6
11/18/14 6:00 PM	2.1	11/18/14 11:00 AM	6.1	11/3/14 12:00 PM	180.1	11/1/14 12:00 PM	358.5	11/5/14 12:00 PM	4,178.3	11/7/14 10:00 AM	879.9	524.4
12/1/14 8:00 PM	2.0	12/17/14 11:00 AM	5.9	12/4/14 10:00 AM	181.8	12/19/14 10:00 AM	180.4	12/12/14 10:00 AM	4,000.1	12/17/14 1:00 PM	466.5	524.8

Ameren Illinois Rate Zone II  
Section 285.5120  
Schedule E-7: Load Research Results and Supporting Materials