2008-00350

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Kentucky Power
P O Box 5190
101A Enterprise Drive
Frankfort, KY 40602
KentuckyPower.com

Stephanie L. Stumbo, Executive Director
Kentucky Public Service Commi--
P. O. Box 615
211 Sower Boulevard
Frankfort, KY 40602

2009-00350

August 25, 2008

Dear Ms. Stumbo:

Re: Case

In the
to 199
of Ken
Deman
Authori ... a Tariff to Recover Costs,
Net Lost Revenues and Receive Incentives associated
with the Implementation of the Kentucky Power Company
Collaborative Demand-Side Management Programs.

Pursuant to the Commission's Order dated May 22, 1996, enclosed are an original and ten copies of the Joint Applicants' twenty-fifth six-month status report. This report describes the operation and progress of the Demand-Side Management Plan.

Specifically, the Joint Applicants seek authority for Kentucky Power Company, in conjunction with its utility services and pursuant to the 1994 House Bill No. 501, to implement the enclosed revised electric tariff to recover costs associated with the implementation of demand-side management programs, which include net lost revenues and incentives related to those programs.

In this filing, the DSM Collaborative is requesting Commission approval for a three-year extension of Kentucky Power's Targeted Energy Efficiency Program, High Efficiency Heat Pump – Mobile Home Program, Mobile Home New Construction Program and Modified Energy Fitness Program. Evaluation reports for the first two years of the previous three-year extension (2006 – 2007) have been provided to justify the continuation of the programs.

The revised DSM Adjustment clause factor for the residential sector has been agreed upon and is proposed by the DSM Collaborative (see Exhibit C, Column 4, Line 13), except that the Attorney General's representative abstained. The proposed factor for the

residential sector is the midpoint between the ceiling and the floor calculations as demonstrated on Exhibit C. The floor was calculated by taking the Collaborative's projected remaining fourth quarter position (see Exhibit C, Column 4, Line 2) and dividing by the adjusted estimated sector KWH sales for the remaining fourth quarter (see Exhibit C, Column 4, Line 11). The ceiling was calculated by taking the Collaborative's projected remaining fourth quarter position (see Exhibit C, Column 4, Line 4) and dividing by the adjusted estimated sector KWH sales for the remaining fourth quarter (see Exhibit C, Column 4, Line 11).

The Joint Applicants request the Commission to approve the following:

(1) A request for a three-year extension of the Targeted Energy Efficiency Program, the High Efficiency Heat Pump – Mobile Home Program, the Mobile Home New Construction Program and the Modified Energy Fitness Program.

(2) The All-Electric segment of the Targeted Energy Efficiency Program has been deemed cost effective per the enclosed evaluation conducted by RLW Analytics, Inc. The All-Electric segment therefore qualifies for the Efficiency Incentive as described on page 91 of the Joint Application of Kentucky Power's DSM Programs in Case No. 95-427, dated September 27, 1995. In the June 2005 program evaluation, the All-Electric segment was also found to be cost effective, however, the Company failed to ask Commission approval to utlilize the Efficiency Incentive in lieu of the Maximizing Incentive, defined as 5 percent of actual program expenditures. Beginning with this filing, the Efficiency Incentive, defined as 15 percent of the estimated net savings associated with the program, is calculated. The Efficiency Incentive per new participant is $77.22.

(3) The Experimental DSM Electric Tariff to become effective September 27, 2008. This will allow the Company to utilize new factors with the first billing cycle in October 2008.

As is customary, the Company requests the Commission return a stamped copy of the revised tariff sheet upon arrival. If you have any questions, please contact me at (502) 696-7010.

Sincerely,

Errol K. Wagner
Director of Regulatory Services

enclosure

DEMAND-SIDE MANAGEMENT ADJUSTMENT CLAUSE (Cont'd.)
(Tariff D.S.M.C.)

RATE. (Cont'd.)

5. The DSM adjustment shall be filed with the Commission ten (10) days before it is scheduled to go into effect, along with all the necessary supporting data to justify the amount of the adjustments, which shall include data, and information as may be required by the Commission.

6. Copies of all documents required to be filed with the Commission under this regulation shall be open and made available for public inspection at the office of the Public Service Commission pursuant to the provisions of KRS 61.870 to 61.884.

7. The resulting range for each customer sector per KWH during the three-year Experimental Demand-Side Management Plan is as follows:

		CUSTOMER SECTOR			
		RESIDENTIAL ($ Per Kwh)	COMMERCIAL** ($ Per KWH)	INDUSTRIAL* ($ Per KWH)	
Floor Factor	=	0.000444	-0-	- 0 -	(I)
Ceiling Factor	=	0.000843	-0-	- 0 -	(I)

8. The DSM Adjustment Clause factor ($ Per KWH) for each customer sector which fall within the range defined in Item 7 above is as follows:

	CUSTOMER SECTOR			
	RESIDENTIAL	COMMERCIAL **	INDUSTRIAL*	
DSM (c)	393,166	-0-	- 0 -	(I)
S ©	610,905,300	-0-	- 0 -	(D)
Adjustment Factor	$ 0.000644	-0-	- 0 -	(I)

t*The Industrial Sector has been discontinued pursuant to the Commission's Order dated September 28, 1999.

** The Commercial Sector has been discontinued pursuant to the Commission's Order dated November 21, 2005

	KENTUCKY POWER COMPANY	Exhibit C				
	DERIVATION OF 3 SECTOR SURCHARGES FOR 3 YR EXPERIMENT				PAGE 1 of	16
	RESIDENTIAL SECTOR	TOTAL YEARS 1 thru 12	YEAR 13 (2008) 1st HALF	YEAR 13 (2008) 3rd QTR	YEAR 13 (2008) 4th QTR	TOTAL
		(1)	(2)	(3)	(4)	(5)
1	CURRENT PERIOD AMOUNT TO BE RECOVERED	$9,772,025	$614,969	$222,277	$243,397	$10,852,668
2	CUMULATIVE (OVER)/UNDER COLLECTION	0	202,499	171,803	271,467	0
3	18 MOS. RETROACTIVE(OVER)/UNDER ADJUSTMENT	(41,824)	0	0	0	($41,824)
4	TOTAL TO BE RECOVERED	9,730,201	817,468	394,080	514,864	10,810,844
5	TOTAL AMOUNT RECOVERED	9,527,356	645,665	0	0	$10,173,021
6	EXPECTED FUTURE RECOVERIES	0	0	122,613	393,423	$516,036
7	TRANSFER PORTION OF BALANCE FROM INDUSTRIAL	(9,833)	0	0	0	($9,833)
8	TRANSFER PORTION OF BALANCE FROM COMMERCIAL	9,487	0	0	0	$9,487
9	(OVER)/UNDER COLLECTION TO BE REFUNDED	$202,499	$171,803	$271,467	$121,441	$121,441
10	AMOUNT TO BE RECOVERED				**$514,864**	
11	ADJ. ESTIMATED SECTOR KWH - YEAR 13			562,444,300	610,905,300	
	SURCHARGE RANGE ($ PER KWH)					
12	FLOOR (CARRYOVER)	COL. 4, L 2 / COL. 4, L 11			0.000444	
13	MIDPOINT - proposed rate			**0.000218**	**0.000644**	
14	CEILING (TOTAL COST)	COL. 4, L 4 / COL. 4, L 11			0.000843	
	COMMERCIAL SECTOR	TOTAL YEARS 1 thru 12	YEAR 13 (2008) 1st HALF	YEAR 13 (2008) 3rd QTR	YEAR 13 (2008) 4th QTR	TOTAL
		(1)	(2)	(3)	(4)	(5)
15	CURRENT PERIOD AMOUNT TO BE RECOVERED	$2,899,298	$0	$0	$0	$2,899,298
16	CUMULATIVE (OVER)/UNDER COLLECTION	0	0	0	0	0
17	18 MOS. RETROACTIVE(OVER)/UNDER ADJUSTMENT	1,520	0	0	0	$1,520
18	TOTAL TO BE RECOVERED	2,900,818	0	0	0	2,900,818
19	TOTAL AMOUNT RECOVERED	2,888,053	0	0	0	$2,888,053
20	EXPECTED FUTURE RECOVERIES	0	0	0	0	$0
21	TRANSFER PORTION OF BALANCE FROM INDUSTRIAL	(3,278)	0	0	0	($3,278)
22	TRANSFER BALANCE TO RESIDENTIAL	(9,487)	0	0	0	($9,487)
22	(OVER)/UNDER COLLECTION TO BE REFUNDED	$0	$0	$0	$0	$0
23	AMOUNT TO BE RECOVERED				**$0**	
24	ADJ. ESTIMATED SECTOR KWH - YEAR 13			378,630,900	345,365,400	
	SURCHARGE RANGE ($ PER KWH)					
25	FLOOR (CARRYOVER)				0.000000	
26	MIDPOINT - proposed rate			0.000000	0.000000	
27	CEILING (TOTAL COST)				0.000000	
	INDUSTRIAL SECTOR	TOTAL YEARS 1 thru 12	YEAR 13 (2008) 1st HALF	YEAR 13 (2008) 3rd QTR	YEAR 13 (2008) 4th QTR	TOTAL
		(1)	(2)	(3)	(4)	(5)
28	CURRENT PERIOD AMOUNT TO BE RECOVERED	$79,026	$0	$0	$0	$79,026
29	CUMULATIVE (OVER)/UNDER COLLECTION	0	0	0	0	0
30	18 MOS. RETROACTIVE(OVER)/UNDER ADJUSTMENT	0	0	0	0	$0
31	TOTAL TO BE RECOVERED	79,026	0	0	0	79,026
32	TOTAL AMOUNT RECOVERED	92,137	0	0	0	$92,137
33	EXPECTED FUTURE RECOVERIES	0	0	0	0	$0
34	TRANSFER BALANCE TO RESIDENTIAL & COMMERCIAL	13,111	0	0	0	$13,111
35	(OVER)/UNDER COLLECTION TO BE REFUNDED	$0	$0	$0	$0	$0
36	AMOUNT TO BE RECOVERED				**$0**	
37	ADJ. ESTIMATED SECTOR KWH - YEAR 13			331,135,200	357,588,000	
	SURCHARGE RANGE ($ PER KWH)					
38	FLOOR (CARRYOVER)				0.000000	
39	MIDPOINT			0.000000	0.000000	
40	CEILING (TOTAL COST) - proposed rate				0.000000	

1996

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YR PROGRAM

YEAR 1 PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ACT. PROGRAM COSTS (4) (1)X(3)	NET LOST REV/YR (KWH/PARTIC) (5)	TOTAL ENERGY SAVINGS KWH/YR (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG.15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL EST. COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	552	148	$221.65	$122,351	2,690	398,120	$0.03	$12,397	$43,177		$43,177	$177,925
Targeted Energy Efficiency - All Electric	223	101	$1,026.88	$228,994	5,570	562,570	$0.03	$17,513	$0	$11,450	$11,450	$257,957
- Non-All Electric	74	35	$372.19	$27,542	680	23,800	$0.03	$744	$719		$719	$29,005
Compact Fluorescent Bulb	269	73	$56.06	$15,081	62	4,526	$0.03	$140	$425		$425	$15,646
High - Efficiency Heat Pump - Resistance Heat	539	216	$73.49	$39,611	2,275	491,400	$0.03	$15,292	$10,634		$10,634	$65,537
- Non Resistance Heat	527	206	$61.31	$32,310	813	167,478	$0.03	$5,215	$8,796		$8,796	$46,321
High - Efficiency Heat Pump - Mobile Home	356	158	$496.95	$176,914	2,160	341,280	$0.03	$10,617	$13,834		$13,834	$201,365
Mobile Home New Construction	70	22	$292.69	$20,488	0	0				$1,024	$1,024	$21,512
TOTAL RESIDENTIAL PROGRAMS	2,610	959		$663,291		1,989,174		$61,918	$77,585	$12,474	$90,059	$815,268
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	91	19	$1,258.51	$114,524	0	0			$0	$5,726	$5,726	$120,250
- Class 2	5	1	$1,875.40	$9,377	0	0			$0	$469	$469	$9,846
Smart Financing - Existing Building	1	0	$5,794.00	$5,794	22,000	0	$0.04	$0	$506		$506	$6,300
Smart Financing - New Building	0	0		$0	30,600	0	$0.04	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	97	20		$129,695		0		$0	$506	$6,195	$6,701	$136,396
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	15	1	$149.40	$2,241	0	0			$0	$112	$112	$2,353
Smart Audit - Class 2	2	1	$8,980.00	$17,960	0	0			$0	$898	$898	$18,858
Smart Financing - General	0	0		$3,919	28,200	0	$0.04	$0	$0	$196	$196	$4,115
Smart Financing - Compressed Air System	0	0		$0	164,800	0	$0.03	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	17	2		$24,120		0		$0	$0	$1,206	$1,206	$25,326
TOTAL COMPANY	2,724	981		$817,106		1,989,174		$61,918	$78,091	$19,875	$97,966	$976,990

* Lost revenue and efficiency incentives are based on initial values per the settlement agreement.

1997

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 1997

YEAR 2 (1st HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/6 MOS	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/6 MOS	($/KWH)	REVENUES	(EX. C, PG.15B)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				(1)X(3)		(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	273	651	$260.68	$71,167	1,345	875,595	$0.03	$27,266	$21,354	n/a	$21,354	$119,787
Targeted Energy Efficiency - All Electric	118	279	$818.97	$96,638	2,785	777,015	$0.03	$24,188	$0	$4,832	$4,832	$125,658
- Non-All Electric	26	88	$88.23	$2,294	340	29,920	$0.03	$935	$252	n/a	$252	$3,481
Compact Fluorescent Bulb	0	269		$0	31	8,339	$0.03	$258	$0	n/a	$0	$258
High - Efficiency Heat Pump - Resistance Heat	123	590	$2.58	$317	1,138	671,420	$0.03	$20,895	$2,427	n/a	$2,427	$23,639
- Non Resistance Heat	124	581	$2.56	$318	407	236,467	$0.03	$7,364	$2,070	n/a	$2,070	$9,752
High - Efficiency Heat Pump - Mobile Home	109	403	$157.87	$17,208	1,080	435,240	$0.03	$13,540	$4,236	n/a	$4,236	$34,984
Mobile Home New Construction	12	78	$635.17	$7,622	0	0	n/a	n/a	$0	$381	$381	$8,003
TOTAL RESIDENTIAL PROGRAMS	785	2,939		$195,564		3,033,996		$94,446	$30,339	$5,213	$35,552	$325,562
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	243	207	$264.00	$64,152	0	0	n/a	n/a	$0	$3,208	$3,208	$67,360
- Class 2	11	9	$2,705.00	$29,755	0	0	n/a	n/a	$0	$1,488	$1,488	$31,243
Smart Financing - Existing Building	0	1	n/a	$5,629	11,000	11,000	$0.04	$469	$0	$281	$281	$6,379
Smart Financing - New Building	1	0	$4,692.00	$4,692	15,300	0	$0.04	$0	$50	n/a	$50	$4,742
TOTAL COMMERCIAL PROGRAMS	255	217		$104,228		11,000		$469	$50	$4,977	$5,027	$109,724
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	9	20	$279.56	$2,516	0	0	n/a	n/a	$0	$126	$126	$2,642
Smart Audit - Class 2	1	2	$1,133.00	$1,133	0	0	n/a	n/a	$0	$57	$57	$1,190
Smart Financing - General	0	0	n/a	$7,840	14,100	0	$0.04	$0	$0	$392	$392	$8,232
Smart Financing - Compressed Air System	0	0		$0	82,400	0	$0.03	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	10	22		$11,489		0		$0	$0	$575	$575	$12,064
TOTAL COMPANY	1,050	3,178		$311,281		3,044,996		$94,915	$30,389	$10,765	$41,154	$447,350

* Lost revenue and efficiency incentives are based on initial values per the settlement agreement.

1997

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YR PROGRAM

YEAR 2 (3rd QTR)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/QTR	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE (EX. C, PG.15B)	MAXIMIZING INCENTIVE	TOTAL * INCENTIVE	TOTAL EST. COSTS TO BE RECOVERED
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/QTR	($/KWH)	REVENUES		(5% of COSTS)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				(1)X(3)		(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	257	957	$184.99	$47,542	341	326,337	$0.03	$10,156	$5,340	n/a	$5,340	$63,038
Targeted Energy Efficiency - All Electric	51	369	$1,090.08	$55,594	1,392	513,648	$0.03	$15,980	$0	$2,780	$2,780	$74,354
- Non-All Electric	15	108	$193.33	$2,900	170	18,360	$0.03	$574	$25	n/a	$25	$3,499
Compact Fluorescent Bulb	0	269	n/a	$0	16	4,304	$0.03	$133	$0	$0	$0	$133
High - Efficiency Heat Pump - Resistance Heat	109	717	$55.05	$6,000	547	392,199	$0.03	$12,213	$787	n/a	$787	$19,000
- Non Resistance Heat	84	695	$66.18	$5,559	221	153,595	$0.03	$4,786	$2,445	n/a	$2,445	$12,790
High - Efficiency Heat Pump - Mobile Home	77	509	$689.62	$53,101	625	318,125	$0.03	$9,894	$2,503	n/a	$2,503	$65,498
Mobile Home New Construction	0	82	n/a	$6,092	0	0			$0	$305	$305	$6,397
TOTAL RESIDENTIAL PROGRAMS	593	3,706		$176,788		1,726,568		$53,736	$11,100	$3,085	$14,185	$244,709
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	98	383	$413.13	$40,487	0	0			$0	$2,024	$2,024	$42,511
- Class 2	5	19	$2,705.00	$13,525	0	0			$0	$676	$676	$14,201
Smart Financing - Existing Building	2	2	$3,067.00	$6,134	11,100	22,200	$0.04	$940	$1,627	n/a	$1,627	$8,701
Smart Financing - New Building	0	1	n/a	$0	7,650	7,650	$0.04	$327	$0	$0	$0	$327
TOTAL COMMERCIAL PROGRAMS	105	405		$60,146		29,850		$1,267	$1,627	$2,700	$4,327	$65,740
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	3	26	$666.00	$1,998	0	0			$0	$100	$100	$2,098
Smart Audit - Class 2	0	3	n/a	$0	0	0			$0	$0	$0	$0
Smart Financing - General	0	0	n/a	$4,785	14,625	0	$0.04	$0	$0	n/a	$0	$4,785
Smart Financing - Compressed Air System	0	0		$0	41,200	0	$0.04	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	3	29		$6,783		0		$0	$0	$100	$100	$6,883
TOTAL COMPANY	701	4,140		$243,717		1,756,418		$55,003	$12,727	$5,885	$18,612	$317,332

* Lost revenue and efficiency incentives are based on prospective values.

1997

KENTUCKY POWER COMPANY

ESTIMATED SECTOR SURCHARGES FOR 3 YR PROGRAM

YEAR 2 (4th QTR)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/QTR	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/QTR	($/KWH)	REVENUES	(EX. C, PG.15B)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4) (1)X(3)	(5)	(6) (2)X(5)	(7)	(8) (6)X(7)	(9)	(10) (4)X(5%)	(11) (9)+(10)	(12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	432	1,287	$259.53	$112,115	341	438,867	$0.03	$13,658	$8,977	n/a	$8,977	$134,750
Targeted Energy Efficiency - All Electric	124	443	$924.15	$114,595	1,393	617,099	$0.03	$19,198	$0	$5,730	$5,730	$139,523
- Non-All Electric	78	146	$103.55	$8,077	170	24,820	$0.03	$775	$129	n/a	$129	$8,981
Compact Fluorescent Bulb	0	269	n/a	$0	17	4,573	$0.03	$141	$0	$0	$0	$141
High - Efficiency Heat Pump - Resistance Heat	111	823	$106.90	$11,866	547	450,181	$0.03	$14,019	$801	n/a	$801	$26,686
- Non Resistance Heat	102	782	$142.21	$14,505	221	172,822	$0.03	$5,385	$2,969	n/a	$2,969	$22,859
High - Efficiency Heat Pump - Mobile Home	50	565	$406.70	$20,335	625	353,125	$0.03	$10,982	$1,625	n/a	$1,625	$32,942
Mobile Home New Construction	0	82	n/a	($749)	0	0				($37)	($37)	($786)
TOTAL RESIDENTIAL PROGRAMS	897	4,397		$280,744		2,061,487		$64,158	$14,501	$5,693	$20,194	$365,096
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	71	473	$230.92	$16,395	0	0			$0	$820	$820	$17,215
- Class 2	21	33	$2,705.00	$56,805	0	0			$0	$2,840	$2,840	$59,645
Smart Financing - Existing Building	9	8	$2,282.56	$20,543	11,100	88,800	$0.04	$3,761	$7,320	n/a	$7,320	$31,624
Smart Financing - New Building	0	1	n/a	$0	7,650	7,650	$0.04	$327	$0	n/a	$0	$327
TOTAL COMMERCIAL PROGRAMS	101	515		$93,743		96,450		$4,088	$7,320	$3,660	$10,980	$108,811
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	18	37	$524.22	$9,436	0	0			$0	$472	$472	$9,908
Smart Audit - Class 2	0	3	n/a	$1,094	0	0			$0	$55	$55	$1,149
Smart Financing - General	0	0	n/a	$11,802	14,625	0	$0.04	$0	$0	n/a	$0	$11,802
Smart Financing - Compressed Air System	0	0	n/a	$0	41,200	0	$0.04	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	18	40		$22,332		0		$0	$0	$527	$527	$22,859
TOTAL COMPANY	1,016	4,952		$396,819		2,157,937		$68,246	$21,821	$9,880	$31,701	$496,766

* Lost revenue and efficiency incentives are based on prospective values.

1998

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 3(1st HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/6 MOS	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE (EX. C, PG.15B)	MAXIMIZING INCENTIVE	TOTAL *	TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/6 MOS	($/KWH)	REVENUES	(9)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4) (1)X(3)	(5)	(6) (2)X(5)	(7)	(8) (6)X(7)		(10) (4)X(5%)	(11) (9)+(10)	(12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	544	1,768	$184.44	$100,334	682	1,205,776	$0.03	$37,524	$11,304	n/a	$11,304	$149,162
Targeted Energy Efficiency - All Electric	122	565	$1,132.92	$138,216	2,784	1,572,960	$0.03	$48,935	$0	$6,911	$6,911	$194,062
- Non-All Electric	24	203	$112.92	$2,710	340	69,020	$0.03	$2,156	$40	n/a	$40	$4,906
Compact Fluorescent Bulb	0	269	$0.00	$0	32	8,608	$0.03	$266	$0	$0	$0	$266
High - Efficiency Heat Pump - Resistance Heat	21	887	$70.10	$1,472	1,094	970,378	$0.03	$30,218	$152	n/a	$152	$31,842
- Non Resistance Heat	26	848	$70.00	$1,820	442	374,816	$0.03	$11,679	$757	n/a	$757	$14,256
High - Efficiency Heat Pump - Mobile Home	66	616	$535.30	$35,330	1,250	770,000	$0.03	$23,947	$2,145	n/a	$2,145	$61,422
Mobile Home New Construction	0	82	n/a	$0	0	0	n/a		$0	$0	$0	$0
TOTAL RESIDENTIAL PROGRAMS	803	5,238		$279,882		4,971,558		$154,725	$14,398	$6,911	$21,309	$455,916
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	204	597	$194.13	$39,602	0	0	n/a		$0	$1,980	$1,980	$41,582
- Class 2	28	60	$1,600.00	$44,800	0	0	n/a		$0	$2,240	$2,240	$47,040
Smart Financing - Existing Building	8	16	$5,581.50	$44,652	22,200	355,200	$0.04	$15,043	$6,506	n/a	$6,506	$66,201
Smart Financing - New Building	1	1	$4,564.00	$4,564	15,300	15,300	$0.04	$654	$29	$0	$29	$5,247
TOTAL COMMERCIAL PROGRAMS	241	674		$133,618		370,500		$15,697	$6,535	$4,220	$10,755	$160,070
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	12	51	$246.08	$2,953	0	0	n/a		$0	$148	$148	$3,101
Smart Audit - Class 2	1	3	$1,800.00	$1,800	0	0	n/a		$0	$90	$90	$1,890
Smart Financing - General	0	0	$0.00	$1,338	29,250	0	$0.04	$0	$0	$67	$67	$1,405
Smart Financing - Compressed Air System	0	0	$0.00	$0	82,400	0	$0.04	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	13	54		$6,091		0		$0	$0	$305	$305	$6,396
TOTAL COMPANY	1,057	5,966		$419,591		5,342,058		$170,422	$20,933	$11,436	$32,369	$622,382

* Lost revenue and efficiency incentives are based on prospective values.

1998

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

Exhibit C
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YEAR 3(2nd HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/6 MOS	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE (EX. C, PG.15B)	MAXIMIZING INCENTIVE		TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/6 MOS	($/KWH)	REVENUES	(9)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(10)	(11)	(12)
				(1)X(3)		(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	448	2,277	$301.30	$134,982	682	1,552,914	$0.03	$48,327	$9,309	$0	$9,309	$192,618
Targeted Energy Efficiency - All Electric	131	697	$1,187.51	$155,564	2,784	1,940,448	$0.03	$60,367	$0	$7,778	$7,778	$223,709
- Non-All Electric	42	238	$139.62	$5,864	340	80,920	$0.03	$2,528	$70	$0	$70	$8,462
Compact Fluorescent Bulb	0	269	$0.00	$0	32	8,608	$0.03	$266	$0	$0	$0	$266
High - Efficiency Heat Pump - Resistance Heat	108	940	$147.45	$15,925	1,094	1,028,360	$0.03	$32,023	$780	$0	$780	$48,728
- Non Resistance Heat	64	894	$72.27	$4,625	442	395,148	$0.03	$12,313	$1,863	$0	$1,863	$18,801
High - Efficiency Heat Pump - Mobile Home	173	764	$514.50	$89,009	1,250	955,000	$0.03	$29,701	$5,623	$0	$5,623	$124,333
Mobile Home New Construction	33	11	$549.45	$18,132	0	0	n/a		$0	$907	$907	$19,039
TOTAL RESIDENTIAL PROGRAMS	999	6,090		$424,101		5,961,398		$185,525	$17,645	$8,685	$26,330	$635,956
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	178	795	$534.85	$95,203	0	0	n/a		$0	$4,760	$4,760	$99,963
- Class 2	9	73	$2,800.00	$25,200	0	0	n/a		$0	$1,260	$1,260	$26,460
Smart Financing - Existing Building	29	32	$1,878.86	$54,487	22,200	710,400	$0.04	$30,085	$23,585	$0	$23,585	$108,157
Smart Financing - New Building	5	6	$1,529.20	$7,646	15,300	91,800	$0.04	$3,926	$144	$0	$144	$11,716
TOTAL COMMERCIAL PROGRAMS	221	906		$182,536		802,200		$34,011	$23,729	$6,020	$29,749	$246,296
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	3	59	$852.33	$2,557	0	0	n/a		$0	$128	$128	$2,685
Smart Audit - Class 2	0	4	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	1	0	$0.00	$2,430	29,250	0	$0.04	$0	$383	$0	$383	$2,813
Smart Financing - Compressed Air System	0	0	$0.00	$0	82,400	0	$0.04	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	4	63		$4,987		0		$0	$383	$128	$511	$5,498
TOTAL COMPANY	1,224	7,059		$611,624		6,763,598		$219,536	$41,757	$14,833	$56,590	$887,750

* Lost revenue and efficiency incentives are based on prospective values.

1999												
KENTUCKY POWER COMPANY											Exhibit C	
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											PAGE 5A of	16
YEAR 4 (1st HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/HALF	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER **	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/HALF	($/KWH)	REVENUES	(EX. C, PG.15B)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				(1)X(3)		(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	306	2,694	$312.58	$95,650	707	1,904,658	$0.03	$59,273	$10,370	$0	$10,370	$165,293
Targeted Energy Efficiency - All Electric	75	773	$1,907.41	$143,056	630	486,990	$0.03	$15,150	$0	$7,153	$7,153	$165,359
- Non-All Electric	12	249	$112.00	$1,344	306	76,194	$0.03	$2,380	$60	$0	$60	$3,784
Compact Fluorescent Bulb	0	269	$0.00	$0	31	8,339	$0.03	$258	$0	$0	$0	$258
High - Efficiency Heat Pump - Resistance Heat	99	1,002	$273.74	$27,100	1,200	1,202,400	$0.03	$37,443	$4,375	$0	$4,375	$68,918
- Non Resistance Heat	2	853	$50.00	$100	442	377,026	$0.03	$11,748	$0	$5	$5	$11,853
High - Efficiency Heat Pump - Mobile Home	101	826	$545.99	$55,145	1,475	1,218,350	$0.03	$37,891	$8,505	$0	$8,505	$101,541
Mobile Home New Construction ***	98	45	$587.20	$57,546	1,756	79,020	$0.03	$2,458	$4,353	$0	$4,353	$64,357
TOTAL RESIDENTIAL PROGRAMS	693	6,711		$379,941		5,352,977		$166,601	$27,663	$7,158	$34,821	$581,363
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	186	964	$204.71	$38,076	0	0	n/a		$0	$1,904	$1,904	$39,980
- Class 2	16	87	$2,705.00	$43,280	0	0	n/a		$0	$2,164	$2,164	$45,444
Smart Financing - Existing Building	6	51	$5,109.67	$30,658	13,282	677,382	$0.04	$28,687	$1,395	$0	$1,395	$60,740
Smart Financing - New Building	3	9	$0.00	$2,350	14,101	126,909	$0.04	$5,428	$787	$0	$787	$8,565
TOTAL COMMERCIAL PROGRAMS	211	1,111		$114,364		804,291		$34,115	$2,182	$4,068	$6,250	$154,729
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	60	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	4	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	1	$0.00	$0	0	0	$0.04	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.04	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	65		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	904	7,920		$494,305		6,215,216		$200,716	$29,845	$11,226	$41,071	$736,092

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 06/30/96.

*** Participants since 09/01/98.

1999

KENTUCKY POWER COMPANY

ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 4 (2nd HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/HALF	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER **	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/HALF	($/KWH)	REVENUES	(EX. C, PG.15B)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				(1)X(3)		(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	2,519	$0.00	$972	707	1,780,933	$0.03	$55,423	$0	$0	$0	$56,395
Targeted Energy Efficiency - All Electric	66	700	$1,222.76	$80,702	630	441,000	$0.03	$13,720	$0	$4,035	$4,035	$98,457
- Non-All Electric	8	220	$67.50	$540	306	67,320	$0.03	$2,103	$40	$0	$40	$2,683
Compact Fluorescent Bulb	0	123	$0.00	$0	31	3,813	$0.03	$118	$0	$0	$0	$118
High - Efficiency Heat Pump - Resistance Heat	140	810	$211.14	$29,560	1,200	972,000	$0.03	$30,268	$6,187	$0	$6,187	$66,015
- Non Resistance Heat	0	593	$0.00	$0	447	265,071	$0.03	$8,260	$0	$0	$0	$8,260
High - Efficiency Heat Pump - Mobile Home	134	739	$539.07	$72,236	1,475	1,090,025	$0.03	$33,900	$11,284	$0	$11,284	$117,420
Mobile Home New Construction ***	123	196	$581.42	$71,515	1,755	343,980	$0.03	$10,698	$5,464	$0	$5,464	$87,677
TOTAL RESIDENTIAL PROGRAMS	471	5,900		$255,525		4,964,142		$154,490	$22,975	$4,035	$27,010	$437,025
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	188	1,129	$356.11	$66,948	0	0	n/a		$0	$3,347	$3,347	$70,295
- Class 2	21	103	$2,705.00	$56,805	0	0	n/a		$0	$2,840	$2,840	$59,645
Smart Financing - Existing Building	25	66	$2,726.04	$68,151	13,282	876,612	$0.04	$37,125	$5,814	$0	$5,814	$111,090
Smart Financing - New Building	8	13	$3,087.00	$24,696	14,101	183,313	$0.04	$7,840	$2,099	$0	$2,099	$34,635
TOTAL COMMERCIAL PROGRAMS	242	1,311		$216,600		1,059,925		$44,965	$7,913	$6,187	$14,100	$275,665
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	57	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	4	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	1	$0.00	$0	0	0	$0.04	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.04	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	62		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	713	7,273		$472,125		6,024,067		$199,455	$30,888	$10,222	$41,110	$712,690

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 12/31/96.

*** Participants since 09/01/98.

Year 2000

KENTUCKY POWER COMPANY

ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 5 (1st half)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/HALF	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE (EX. C, PG.15B)	MAXIMIZING INCENTIVE	TOTAL *	TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER **	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/HALF	($/KWH)	REVENUES	(9)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4) (1)X(3)	(5)	(6) (2)X(5)	(7)	(8) (6)X(7)		(10) (4)X(.5%)	(11) (9)+(10)	(12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	2,161	$0.00	$0	707	1,527,827	$0.03	$47,546	$0	$0	$0	$47,546
Targeted Energy Efficiency - All Electric	66	659	$1,272.61	$83,992	630	415,170	$0.03	$12,916	$0	$4,200	$4,200	$101,108
- Non-All Electric	28	202	$90.82	$2,543	306	61,812	$0.03	$1,931	$141	$0	$141	$4,615
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00	$0	$0	$0	$0	$0
High - Efficiency Heat Pump - Resistance Heat	38	683	$200.00	$7,600	1,200	819,600	$0.03	$25,522	$1,679	$0	$1,679	$34,801
- Non Resistance Heat	0	348	$0.00	$0	447	155,556	$0.03	$4,847	$0	$0	$0	$4,847
High - Efficiency Heat Pump - Mobile Home	45	683	$500.00	$22,500	1,475	1,007,425	$0.03	$31,331	$3,789	$0	$3,789	$57,620
Mobile Home New Construction ***	101	302	$530.20	$53,550	1,755	530,010	$0.03	$16,483	$4,486	$0	$4,486	$74,519
TOTAL RESIDENTIAL PROGRAMS	278	5,038		$170,185		4,517,400		$140,576	$10,095	$4,200	$14,295	$325,056
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	144	1,126	$397.19	$57,195	0	0	n/a		$0	$2,860	$2,860	$60,055
- Class 2	8	112	$2,705.00	$21,640	0	0	n/a		$0	$1,082	$1,082	$22,722
Smart Financing - Existing Building	16	86	$1,307.31	$20,917	13,282	1,142,252	$0.04	$48,374	$3,721	$0	$3,721	$73,012
Smart Financing - New Building	4	20	$6,298.75	$25,195	14,101	282,020	$0.04	$12,062	$1,049	$0	$1,049	$38,306
TOTAL COMMERCIAL PROGRAMS	172	1,344		$124,947		1,424,272		$60,436	$4,770	$3,942	$8,712	$194,095
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	450	6,382		$295,132		5,941,672		$201,012	$14,865	$8,142	$23,007	$519,151

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 06/30/97.

*** Participants since 09/01/98

Year 2000

KENTUCKY POWER COMPANY

ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 5 (2nd half)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/HALF	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3)	COSTS (4) (1)X(3)	(KWH/PARTIC) (5)	KWH/HALF (6) (2)X(5)	($/KWH) (7)	REVENUES (8) (6)X(7)	(EX. C, PG.15B) (9)	(5% of COSTS) (10) (4)X(5%)	INCENTIVE (11) (9)+(10)	RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	1,525	$0.00	$0	706	1,076,650	$0.03	$33,505	$0	$0	$0	$33,505
Targeted Energy Efficiency - All Electric	99	583	$1,115.41	$110,426	630	367,290	$0.03	$11,426	$0	$5,521	$5,521	$127,373
- Non-All Electric	21	170	$94.67	$1,988	306	52,020	$0.03	$1,625	$105	$0	$105	$3,718
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00	$0	$0	$0	$0	$0
High - Efficiency Heat Pump - Resistance Heat	25	481	$200.00	$5,000	1,200	577,200	$0.03	$17,974	$1,105	$0	$1,105	$24,079
- Non Resistance Heat	0	147	$0.00	$0	446	65,562	$0.03	$2,043	$0	$0	$0	$2,043
High - Efficiency Heat Pump - Mobile Home	43	572	$495.35	$21,300	1,476	844,272	$0.03	$26,257	$3,621	$0	$3,621	$51,178
Mobile Home New Construction ***	94	403	$575.00	$54,050	1,755	707,265	$0.03	$21,996	$4,175	$0	$4,175	$80,221
TOTAL RESIDENTIAL PROGRAMS	282	3,881		$192,764		3,690,259		$114,826	$9,008	$5,521	$14,527	$322,117
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	159	1,026	$165.24	$26,273	0	0	n/a		$0	$1,314	$1,314	$27,587
- Class 2	29	98	$2,705.00	$78,445	0	0	n/a		$0	$3,922	$3,922	$82,367
Smart Financing - Existing Building	24	97	$914.54	$21,949	13,282	1,288,354	$0.04	$54,562	$5,581	$0	$5,581	$82,092
Smart Financing - New Building	0	21	$0.00	$7,269	14,102	296,142	$0.04	$12,666	$0	$0	$0	$19,935
TOTAL COMMERCIAL PROGRAMS	212	1,242		$133,936		1,584,496		$67,228	$5,581	$5,236	$10,817	$211,981
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		0	$0	0	0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	0	$0	0	0
TOTAL COMPANY	494	5,123		$326,700		5,274,755		$182,054	$14,587	$10,757	$25,344	$534,098

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 12/31/97

*** Participants since 09/01/98.

Year 2001

KENTUCKY POWER COMPANY

ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 6 (1st Half) PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER ** (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ACT. PROGRAM COSTS (4) (1)X(3)	NET LOST REV/QTR (KWH/PARTIC) (5)	TOTAL ENERGY SAVINGS KWH/HALF (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG.15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL EST. COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	1,044	$0.00	$0	707	738,108	$0.03112	$22,970	$0	$0	$0	$22,970
Targeted Energy Efficiency - All Electric	62	535	$1,276.94	$79,170	630	337,050	$0.03111	$10,486	$0	$3,959	$3,959	$93,615
- Non-All Electric	18	137	$87.89	$1,582	306	41,922	$0.03124	$1,310	$90	$0	$90	$2,982
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump - Resistance Heat	23	438	$201.04	$4,624	1200	525,600	$0.03114	$16,367	$1,016	$0	$1,016	$22,007
- Non Resistance Heat	0	81	$0.00	$0	447	36,207	$0.03116	$1,128	$0	$0	$0	$1,128
High - Efficiency Heat Pump - Mobile Home	53	558	$472.15	$25,024	1475	823,050	$0.03110	$25,597	$4,463	$0	$4,463	$55,084
Mobile Home New Construction ***	83	488	$537.04	$44,574	1755	856,440	$0.03110	$26,635	$3,687	$0	$3,687	$74,896
TOTAL RESIDENTIAL PROGRAMS	239	3,281		$154,974		3,358,377		$104,493	$9,256	$3,959	$13,215	$272,682
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	134	1,017	$321.82	$43,124	0	0	n/a	$0	$0	$2,156	$2,156	$45,280
- Class 2	28	105	$1,510.00	$42,280	0	0	n/a	$0	$0	$2,114	$2,114	$44,394
Smart Financing - Existing Building	15	112	$2,309.00	$34,635	13,282	1,487,584	$0.04235	$62,999	$3,488	$0	$3,488	$101,122
Smart Financing - New Building	8	25	$4,016.13	$32,129	14,101	352,525	$0.04277	$15,077	$2,099	$0	$2,099	$49,305
TOTAL COMMERCIAL PROGRAMS	185	1,259		$152,168		1,840,109		$78,076	$5,587	$4,270	$9,857	$240,101
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	424	4,540		$307,142		5,198,486		$182,569	$14,843	$8,229	$23,072	$512,783

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 06/30/98.

*** Participants since 01/01/98.

Year 2001

KENTUCKY POWER COMPANY

ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 6 (2nd Half) PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER ** (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ACT. PROGRAM COSTS (4) (1)X(3)	NET LOST REV/QTR (KWH/PARTIC) (5)	TOTAL ENERGY SAVINGS KWH/HALF (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG.15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL EST. COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	535	$0.00	$0	706	377,710	$0.03112	$11,754	$0	$0	$0	$11,754
Targeted Energy Efficiency - All Electric	88	486	$1,018.86	$89,660	630	306,180	$0.03111	$9,525	$0	$4,483	$4,483	$103,668
- Non-All Electric	46	122	$81.46	$3,747	306	37,332	$0.03124	$1,166	$231	$0	$231	$5,144
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump - Resistance Heat	30	412	$173.33	$5,200	1,200	494,400	$0.03114	$15,396	$1,326	$0	$1,326	$21,922
- Non Resistance Heat	0	35	$0.00	$0	446	15,610	$0.03116	$486	$0	$0	$0	$486
High - Efficiency Heat Pump - Mobile Home	47	469	$510.64	$24,000	1,476	692,244	$0.03110	$21,529	$3,958	$0	$3,958	$49,487
Mobile Home New Construction ***	92	568	$555.43	$51,100	1,755	996,840	$0.03110	$31,002	$4,087	$0	$4,087	$86,189
TOTAL RESIDENTIAL PROGRAMS	303	2,627		$173,707		2,920,316		$90,858	$9,602	$4,483	$14,085	$278,650
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	131	966	$454.04	$59,479	0	0	n/a	$0	$0	$2,974	$2,974	$62,453
- Class 2	5	111	$9,817.20	$49,086	0	0	n/a	$0	$0	$2,454	$2,454	$51,540
Smart Financing - Existing Building	15	109	$1,664.27	$24,964	13,282	1,447,738	$0.04235	$61,312	$3,488	$0	$3,488	$89,764
Smart Financing - New Building	18	34	$1,799.28	$32,387	14,102	479,468	$0.04277	$20,507	$4,722	$0	$4,722	$57,616
TOTAL COMMERCIAL PROGRAMS	169	1,220		$165,916		1,927,206		$81,819	$8,210	$5,428	$13,638	$261,373
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	472	3,847		$339,623		4,847,522		$172,677	$17,812	$9,911	$27,723	$540,023

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 12/31/98

*** Participants since 07/01/98.

Year 2002

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES
FOR 3 YEAR PROGRAM

Exhibit C

YEAR 7 (1st Half)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT	TOTAL ACTUAL PROGRAM	NET LOST REV/HALF	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL ACTUAL COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER **	PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/HALF	($/KWH)	REVENUES	(EX. C, PG.15B)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				(1)X(3)		(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	116	$0.00	$0	707	82,012	$0.03112	$2,552	$0	$0	$0	$2,552
Targeted Energy Efficiency - All Electric	63	442	$1,752.40	$110,401	1,028	454,376	$0.03111	$14,136	$0	$5,520	$5,520	$130,057
- Non-All Electric	32	135	$65.47	$2,095	315	42,525	$0.03124	$1,328	$137	$0	$137	$3,560
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump - Resistance Heat	1	314	$1,152.00	$1,152	1,200	376,800	$0.03114	$11,734	$44	$0	$44	$12,930
- Non Resistance Heat	0	0	$0.00	$0	447	0	$0.03116	$0	$0	$0	$0	$0
High - Efficiency Heat Pump - Mobile Home	43	414	$619.77	$26,650	1,144	473,616	$0.03110	$14,729	$1,244	$0	$1,244	$42,623
Mobile Home New Construction ***	57	568	$641.77	$36,581	1,809	1,027,512	$0.03110	$31,956	$231	$0	$231	$68,768
TOTAL RESIDENTIAL PROGRAMS	196	1,989		$176,879		2,456,841		$76,435	$1,656	$5,520	$7,176	$260,490
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	125	923	$432.92	$54,115	0	0	n/a	$0	$0	$2,706	$2,706	$56,821
- Class 2	8	104	$3,711.00	$29,688	0	0	n/a	$0	$0	$1,484	$1,484	$31,172
Smart Financing - Existing Building	7	101	$2,552.71	$17,869	13,282	1,341,482	$0.04235	$56,812	$1,628	$0	$1,628	$76,309
Smart Financing - New Building	5	42	$1,394.60	$6,973	14,101	592,242	$0.04277	$25,330	$1,312	$0	$1,312	$33,615
TOTAL COMMERCIAL PROGRAMS	145	1,170		$108,645		1,933,724		$82,142	$2,940	$4,190	$7,130	$197,917
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	341	3,159		$285,524		4,390,565		$158,577	$4,596	$9,710	$14,306	$458,407

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 06/30/1999.

*** Participants since 01/01/1999.

Year 2002

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES
FOR 3 YEAR PROGRAM

YEAR 7 (2nd Half)

PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER ** (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ACTUAL PROGRAM COSTS (4) (1)X(3)	NET LOST REV/QTR (KWH/PARTIC) (5)	TOTAL ENERGY SAVINGS KWH/HALF (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG.15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL ACTUAL COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	706	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency - All Electric	76	457	$1,039.33	$78,989	1,028	469,796	$0.03111	$14,615	$0	$3,949	$3,949	$97,553
- Non-All Electric	13	156	$85.92	$1,117	315	49,140	$0.03124	$1,535	$56	$0	$56	$2,708
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump - Resistance Heat	0	177	$0.00	($352)	1,200	212,400	$0.03114	$6,614	$0	$0	$0	$6,262
- Non Resistance Heat	0	0	$0.00	$0	446	0	$0.03116	$0	$0	$0	$0	$0
High - Efficiency Heat Pump - Mobile Home	43	308	$603.84	$25,965	1,144	352,352	$0.03110	$10,958	$1,244	$0	$1,244	$38,167
Mobile Home New Construction ***	61	519	$644.46	$39,312	1,809	938,871	$0.03110	$29,199	$248	$0	$248	$68,759
TOTAL RESIDENTIAL PROGRAMS	193	1,617		$145,031		2,022,559		$82,921	$1,548	$3,949	$5,497	$213,449
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	786	$0.00	$74,422	0	0	n/a	$0	$0	$3,721	$3,721	$78,143
- Class 2	0	90	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	25	97	$909.76	$22,744	13,282	1,288,354	$0.04235	$54,562	$5,814	$0	$5,814	$83,120
Smart Financing - New Building	16	44	$2,424.94	$38,799	14,102	620,488	$0.04277	$26,538	$4,197	$0	$4,197	$69,534
TOTAL COMMERCIAL PROGRAMS	41	1,017		$135,965		1,908,842		$81,100	$10,011	$3,721	$13,732	$230,797
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	234	2,634		$280,996		3,931,401		$144,021	$11,559	$7,670	$19,229	$444,246

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of **12/31/1999.**
*** Participants since **07/01/1999.**

Year 2003

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

Exhibit C
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YEAR 8 (1st HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL PROGRAM	NET LOST REV/HALF	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL ACTUAL COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3)	COSTS (4) (1)X(3)	(KWH/ PARTICIPANT) (5)	KWH/HALF (6) (2)X(5)	($/KWH) (7)	REVENUES (8) (6)X(7)	(EX. C, PG.15B) (9)	(5% of COSTS) (10) (4)X(5%)	INCENTIVE (11) (9)+(10)	RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	707	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency	100	467	$849.84	$84,984	1,028	480,076	$0.03111	$14,935	$0	$4,249	$4,249	$104,168
- All Electric	7	151	$79.29	$555	314	47,414	$0.03124	$1,481	$30	$0	$30	$2,066
- Non-All Electric	0	0	$0.00		0	0	$0.00000	$0	$0	$0	$0	$0
Compact Fluorescent Bulb	0	94	$0.00	$0	1,200	112,800	$0.03114	$3,513	$0	$0	$0	$3,513
High - Efficiency Heat Pump	0	0	$0.00	$0	447	0	$0.03116	$0	$0	$0	$0	$0
- Resistance Heat												
- Non Resistance Heat	34	268	$379.41	$12,900	1,144	306,592	$0.03110	$9,535	$983	$0	$983	$23,418
High - Efficiency Heat Pump												
- Mobile Home	46	460	$482.61	$22,200	1,808	831,680	$0.03110	$25,865	$187	$0	$187	$48,252
Mobile Home New Construction ***	0	0	$0.00	$0	157	0	$0.03124	$0	$0	$0	$0	$0
- Heat Pump												
- Air Conditioner	101	23	$142.72	$14,415	1,194	27,462	$0.03116	$856	$2,127	$0	$2,127	$17,398
Modified Energy Fitness	288	1,463		$135,054		1,806,024		$56,185	$3,327	$4,249	$7,576	$198,815
TOTAL RESIDENTIAL PROGRAMS												
COMMERCIAL PROGRAMS	0	620	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 1	0	73	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	110	$0.00	$0	13,282	1,461,020	$0.04235	$61,874	$0	$0	$0	$61,874
Smart Financing - Existing Building	0	49	$0.00	$0	14,101	690,949	$0.04277	$29,552	$0	$0	$0	$29,552
Smart Financing - New Building	0	852		$0		2,151,969		$91,426	$0	$0	$0	$91,426
TOTAL COMMERCIAL PROGRAMS												
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS												
TOTAL COMPANY	288	2,315		$135,054		3,957,993		$147,811	$3,327	$4,249	$7,576	$290,241

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of 06/30/2000.
*** Participants since 01/01/2000.

Year 2003												
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KENTUCKY POWER COMPANY											PAGE	
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											9B of	16
YEAR 8 (2nd HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL PROGRAM	NET LOST REV/HALF	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL ACTUAL COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3)	COSTS (4) (1)X(3)	(KWH/ PARTICIPANT) (5)	KWH/HALF (6) (2)X(5)	($/KWH) (7)	REVENUES (8) (6)X(7)	(EX. C, PG.15B) (9)	(5% of COSTS) (10) (4)X(5%)	INCENTIVE (11) (9)+(10)	RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	706	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency	69	473	$974.94	$67,271	1,028	486,244	$0.03111	$15,127	$0	$3,364	$3,364	$85,762
- All Electric	69	167	$76.10	$5,251	316	52,772	$0.03124	$1,649	$295	$0	$295	$7,195
- Non-All Electric												
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump	0	63	$0.00	$0	1,200	75,600	$0.03114	$2,354	$0	$0	$0	$2,354
- Resistance Heat	0	0	$0.00	$0	446	0	$0.03116	$0	$0	$0	$0	$0
- Non Resistance Heat												
High - Efficiency Heat Pump												
- Mobile Home	29	256	$453.45	$13,150	1,144	292,864	$0.03110	$9,108	$839	$0	$839	$23,097
Mobile Home New Construction ***	64	419	$649.59	$41,574	1,810	758,390	$0.03110	$23,586	$260	$0	$260	$65,420
- Heat Pump	1	0	$150.00	$150	158	0	$0.03124	$0	$0	$0	$0	$150
- Air Conditioner												
Modified Energy Fitness	441	324	$431.43	$190,262	1,194	386,856	$0.03116	$12,054	$9,287	$0	$9,287	$211,603
TOTAL RESIDENTIAL PROGRAMS	673	1,702		$317,658		2,052,726		$63,878	$10,681	$3,364	$14,045	$395,581
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	453	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	63	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	77	$0.00	$0	13,282	1,022,714	$0.04235	$43,312	$0	$0	$0	$43,312
Smart Financing - New Building	0	47	$0.00	$0	14,102	662,794	$0.04277	$28,348	$0	$0	$0	$28,348
TOTAL COMMERCIAL PROGRAMS	0	640		$0		1,685,508		$71,660	$0	$0	$0	$71,660
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	673	2,342		$317,658		3,738,234		$135,538	$10,681	$3,364	$14,045	$467,241

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of **12/31/2000.**

*** Participants since **07/01/2000.**

Year 2004											Exhibit C	
KENTUCKY POWER COMPANY												
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											PAGE 10A of	16
YEAR 9 (1st HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL PROGRAM	NET LOST REV/QTR	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL ACTUAL COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3)	COSTS (4) (1)X(3)	(KWH/PARTIC) (5)	KWH/ HALF (6) (2)X(5)	($/KWH) (7)	REVENUES (8) (6)X(7)	(EX. C, PG.15B) (9)	(5% of COSTS) (10) (4)X(5%)	INCENTIVE (11) (9)+(10)	RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	707	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency												
- All Electric	72	463	$751.54	$54,111	1,028	475,964	$0.03111	$14,807	$0	$2,706	$2,706	$71,624
- Non-All Electric	10	179	$78.60	$786	314	56,206	$0.03124	$1,756	$43	$0	$43	$2,585
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Resistance Heat	0	42	$0.00	$0	1,200	50,400	$0.03114	$1,569	$0	$0	$0	$1,569
- Non Resistance Heat	0	0	$0.00	$0	447	0	$0.03116	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Mobile Home	41	247	$428.05	$17,550	1,144	282,568	$0.03110	$8,798	$1,186	$0	$1,186	$27,524
Mobile Home New Construction ***												
- Heat Pump	68	394	$503.68	$34,250	1,808	712,352	$0.03110	$22,154	$276	$0	$276	$56,680
- Air Conditioner	1	1	$150.00	$150	157	157	$0.03124	$5	$0	$0	$0	$155
Modified Energy Fitness	334	735	$417.76	$139,531	1,194	877,590	$0.03116	$27,346	$7,034	$0	$7,034	$173,911
TOTAL RESIDENTIAL PROGRAMS	526	2,061		$246,378		2,455,237		$76,425	$8,539	$2,706	$11,245	$334,048
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	338	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	30	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	54	$0.00	$0	13,282	717,228	$0.04235	$30,375	$0	$0	$0	$30,375
Smart Financing - New Building	0	43	$0.00	$0	14,101	606,343	$0.04277	$25,933	$0	$0	$0	$25,933
TOTAL COMMERCIAL PROGRAMS	0	465		$0		1,323,571		$56,308	$0	$0	$0	$56,308
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System												
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	526	2,526		$246,378		3,778,808		$132,733	$8,539	$2,706	$11,245	$390,356

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of **06/30/2001.**

*** Participants since **01/01/2001.**

Year 2004

Exhibit C

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

PAGE 10B of 16

YEAR 9 (2nd HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL PROGRAM	NET LOST REV/QTR	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL ACTUAL COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3)	COSTS (4) (1)X(3)	(KWH/PARTIC) (5)	KWH/ HALF (6) (2)X(5)	($/KWH) (7)	REVENUES (8) (6)X(7)	(EX. C, PG.15B) (9)	(5% of COSTS) (10) (4)X(.5%)	INCENTIVE (11) (9)+(10)	RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	706	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency												
- All Electric	89	462	$1,118.43	$99,540	1,028	474,936	$0.03111	$14,775	$0	$4,977	$4,977	$119,292
- Non-All Electric	72	205	$60.60	$4,363	316	64,780	$0.03124	$2,024	$308	$0	$308	$6,695
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Resistance Heat	0	15	$0.00	$0	1,200	18,000	$0.03114	$561	$0	$0	$0	$561
- Non Resistance Heat	0	0	$0.00	$0	446	0	$0.03116	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Mobile Home	46	239	$469.57	$21,600	1,144	273,416	$0.03110	$8,503	$1,330	$0	$1,330	$31,433
Mobile Home New Construction ***												
- Heat Pump	70	379	$597.14	$41,800	1,810	685,990	$0.03110	$21,334	$284	$0	$284	$63,418
- Air Conditioner	0	2	#DIV/0!	$0	158	316	$0.03124	$10	$0	$0	$0	$10
Modified Energy Fitness	391	1,070	$347.20	$135,756	1,194	1,277,580	$0.03116	$39,809	$8,234	$0	$8,234	$183,799
TOTAL RESIDENTIAL PROGRAMS	668	2,372		$303,059		2,795,018		$87,016	$10,156	$4,977	$15,133	$405,208
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	191	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	10	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	41	$0.00	$0	13,282	544,562	$0.04235	$23,062	$0	$0	$0	$23,062
Smart Financing - New Building	0	30	$0.00	$0	14,102	423,060	$0.04277	$18,094	$0	$0	$0	$18,094
TOTAL COMMERCIAL PROGRAMS	0	272		$0		967,622		$41,156	$0	$0	$0	$41,156
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	668	2,644		$303,059		3,762,640		$128,172	$10,156	$4,977	$15,133	$446,364

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of 12/31/2001.
*** Participants since 07/01/2001.

Year 2005

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 10 (1st Half)

PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER ** (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ACTUAL PROGRAM COSTS (4) (1)X(3)	NET LOST REV/QTR (KWH/ PARTICIPANT) (5)	TOTAL ENERGY SAVINGS KWH/ HALF (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG.15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL ACTUAL COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	707	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency												
- All Electric	88	477	$1,109.22	$97,611	896	427,392	$0.03111	$13,296	$0	$4,881	$4,881	$115,788
- Non-All Electric	57	218	$62.47	$3,561	267	58,206	$0.03124	$1,818	$1,125	$0	$1,125	$6,504
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Resistance Heat	0	0	$0.00	$0	1,200	0	$0.03114	$0	$0	$0	$0	$0
- Non Resistance Heat	0	0	$0.00	$0	447	0	$0.03116	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Mobile Home	34	231	$560.21	$19,047	1,145	264,495	$0.03110	$8,226	$2,693	$0	$2,693	$29,966
Mobile Home New Construction ***												
- Heat Pump	67	371	$614.85	$41,195	1,808	670,768	$0.03110	$20,861	$8,372	$0	$8,372	$70,428
- Air Conditioner	0	2	$0.00	$0	157	314	$0.03124	$10	$0	$0	$0	$10
Modified Energy Fitness	371	1,479	$400.87	$148,723	613	906,627	$0.03116	$28,250	$15,612	$0	$15,612	$192,585
TOTAL RESIDENTIAL PROGRAMS	617	2,778		$310,137		2,327,802		$72,461	$27,802	$4,881	$32,683	$415,281
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	64	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	3	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	29	$0.00	$0	13,282	385,178	$0.04235	$16,312	$0	$0	$0	$16,312
Smart Financing - New Building	0	18	$0.00	$0	14,101	253,818	$0.04277	$10,856	$0	$0	$0	$10,856
TOTAL COMMERCIAL PROGRAMS	0	114		$0		638,996		$27,168	$0	$0	$0	$27,168
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	617	2,892		$310,137		2,966,798		$99,629	$27,802	$4,881	$32,683	$442,449

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of **06/30/2002.**
*** Participants since **01/01/2002.**

Year 2005

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 10 (2nd HALF) PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER ** (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ACTUAL PROGRAM COSTS (4) (1)X(3)	NET LOST REV/QTRS (KWH/ PARTICIPANT) (5)	TOTAL ENERGY SAVINGS KWH/ HALF (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG.15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(.5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL ACTUAL COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	706	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency												
- All Electric	85	492	$1,207.52	$102,639	896	440,832	$0.03111	$13,714	$0	$5,132	$5,132	$121,485
- Non-All Electric	26	233	$65.85	$1,712	266	61,978	$0.03124	$1,936	$513	$0	$513	$4,161
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Resistance Heat	0	0	$0.00	$0	1,200	0	$0.03114	$0	$0	$0	$0	$0
- Non Resistance Heat	0	0	$0.00	$0	446	0	$0.03116	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Mobile Home	40	225	$476.78	$19,071	1,144	257,400	$0.03110	$8,005	$3,168	$0	$3,168	$30,244
Mobile Home New Construction ***												
- Heat Pump	83	385	$544.23	$45,171	1,810	696,850	$0.03110	$21,672	$10,372	$0	$10,372	$77,215
- Air Conditioner	0	2	$0.00	$0	158	316	$0.03124	$10	$0	$0	$0	$10
Modified Energy Fitness	351	1,826	$373.12	$130,965	612	1,117,512	$0.03116	$34,822	$14,770	$0	$14,770	$180,557
TOTAL RESIDENTIAL PROGRAMS	585	3,163		$299,558		2,574,888		$80,159	$28,823	$5,132	$33,955	$413,672
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	20	$0.00	$0	13,282	265,640	$0.04235	$11,250	$0	$0	$0	$11,250
Smart Financing - New Building	0	11	$0.00	$0	14,102	155,122	$0.04277	$6,635	$0	$0	$0	$6,635
TOTAL COMMERCIAL PROGRAMS	0	31		$0		420,762		$17,885	$0	$0	$0	$17,885
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	585	3,194		$299,558		2,995,650		$98,044	$28,823	$5,132	$33,955	$431,557

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of 12/31/2002.
*** Participants since 07/01/2002.

Year 2006

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 11 (1st HALF)

Exhibit C
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PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER ** (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ACTUAL PROGRAM COSTS (4) (1)X(3)	NET LOST REV/QTRS (KWH/ PARTICIPANT) (5)	TOTAL ENERGY SAVINGS KWH/ HALF (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG.15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL ACTUAL COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	707	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency	75	496	$974.31	$73,073	896	444,416	$0.03111	$13,826	$0	$3,654	$3,654	$90,553
- All Electric	34	249	$84.56	$2,875	267	66,483	$0.03124	$2,077	$671	$0	$671	$5,623
- Non-All Electric	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Compact Fluorescent Bulb	0	0	$0.00	$0	1,200	0	$0.03114	$0	$0	$0	$0	$0
High - Efficiency Heat Pump	0	0	$0.00	$0	447	0	$0.03116	$0	$0	$0	$0	$0
- Resistance Heat	0	0	$0.00	$0								
- Non Resistance Heat												
High - Efficiency Heat Pump	48	230	$446.06	$21,411	1,145	263,350	$0.03110	$8,190	$3,802	$0	$3,802	$33,403
- Mobile Home												
Mobile Home New Construction ***	90	425	$561.21	$50,509	1,810	769,250	$0.03110	$23,924	$11,246	$0	$11,246	$85,679
- Heat Pump	0	2	$0.00	$0	157	314	$0.03124	$10	$0	$0	$0	$10
- Air Conditioner												
Modified Energy Fitness	440	2,185	$275.33	$121,144	613	1,339,405	$0.03116	$41,738	$18,515	$0	$18,515	$181,395
TOTAL RESIDENTIAL PROGRAMS	687	3,587		$269,012		2,883,218		$89,763	$34,234	$3,654	$37,888	$396,663
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - New Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System												
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	687	3,587		$269,012		2,883,218		$89,763	$34,234	$3,654	$37,888	$396,663

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 06/30/2003.

*** Participants since 01/01/2003.

Year 2006												
											Exhibit C	
KENTUCKY POWER COMPANY											PAGE	
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											12B of	16
YEAR 11 (2nd HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL PROGRAM	NET LOST REV/QTRS	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL *	TOTAL ACTUAL COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3)	COSTS (4) (1)X(3)	(KWH/ PARTICIPANT) (5)	KWH/ HALF (6) (2)X(5)	($/KWH) (7)	REVENUES (8) (6)X(7)	(EX. C, PG.15B) (9)	(5% of COSTS) (10) (4)X(5%)	INCENTIVE (11) (9)+(10)	RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	706	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency												
- All Electric	87	481	$1,147.46	$99,829	896	430,976	$0.03111	$13,408	$0	$4,991	$4,991	$118,226
- Non-All Electric	46	254	$84.00	$3,864	266	67,564	$0.03124	$2,111	$908	$0	$908	$6,883
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Resistance Heat	0	0	$0.00	$0	1,200	0	$0.03114	$0	$0	$0	$0	$0
- Non Resistance Heat	0	0	$0.00	$0	446	0	$0.03116	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Mobile Home	45	245	$460.00	$20,700	1,144	280,280	$0.03110	$8,717	$3,564	$0	$3,564	$32,981
Mobile Home New Construction ***												
- Heat Pump	94	460	$544.15	$51,150	1,808	831,680	$0.03110	$25,865	$11,746	$0	$11,746	$88,761
- Air Conditioner	0	2	$0.00	$0	158	316	$0.03124	$10	$0	$0	$0	$10
Modified Energy Fitness	560	2,391	$427.85	$239,596	612	1,463,292	$0.03116	$45,596	$23,565	$0	$23,565	$308,757
TOTAL RESIDENTIAL PROGRAMS	832	3,833		$415,139		3,074,108		$95,707	$39,783	$4,991	$44,774	$555,620
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - New Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	832	3,833		$415,139		3,074,108		$95,707	$39,783	$4,991	$44,774	$555,620

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 12/31/2003.

*** Participants since 07/01/2003.

Year 2007											Exhibit C PAGE 13A of	16
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM YEAR 12 (1st HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT	TOTAL ACTUAL PROGRAM COSTS	NET LOST REV/QTRS (KWH/ PARTICIPANT)	TOTAL ENERGY SAVINGS KWH/ Half	NET LOST REVENUE ($/KWH)	TOTAL NET * LOST REVENUES	EFFICIENCY INCENTIVE (EX. C, PG.15B)	MAXIMIZING INCENTIVE (5% of COSTS)	TOTAL * INCENTIVE	TOTAL ACTUAL COSTS TO BE RECOVERED
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	(3)	(4) (1)X(3)	(5)	(6) (2)X(5)	(7)	(8) (6)X(7)	(9)	(10) (4)X(5%)	(11) (9)+(10)	(12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	707	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency	128	295	$1,022.27	$130,851	899	264,320	$0.04346	$11,487	$0	$6,543	$6,543	$148,881
- All Electric	29	115	$86.48	$2,508	277	31,855	$0.04362	$1,390	$572	$0	$572	$4,470
- Non-All Electric												
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump	0	0	$0.00	$0	1,200	0	$0.03114	$0	$0	$0	$0	$0
- Resistance Heat	0	0	$0.00	$0	447	0	$0.03116	$0	$0	$0	$0	$0
- Non Resistance Heat												
High - Efficiency Heat Pump	50	153	$450.00	$22,500	1,145	175,185	$0.04346	$7,614	$3,960	$0	$3,960	$34,074
- Mobile Home												
Mobile Home New Construction ***	84	304	$563.10	$47,300	1,810	550,240	$0.04348	$23,924	$10,497	$0	$10,497	$81,721
- Heat Pump	0	0	$0.00	$0	157	0	$0.04343	$0	$0	$0	$0	$0
- Air Conditioner												
Modified Energy Fitness	515	1,605	$381.00	$196,214	613	983,865	$0.04349	$42,788	$21,671	$0	$21,671	$260,673
Case No 2006 - 00373, Dated December 14, 2006:												
- HEAP - Kentucky Power Company's Information Technology Implementation Costs				$58,968								$58,968
- HEAP - KACA's Information Technology Implementation Costs				$15,700								$15,700
TOTAL RESIDENTIAL PROGRAMS	806	2,472		$474,041		2,005,465		$87,203	$36,700	$6,543	$43,243	$604,487
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - New Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a		$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	806	2,472		$474,041		2,005,465		$87,203	$36,700	$6,543	$43,243	$604,487

* Lost revenue and efficiency incentives are based on prospective values.

** Cumulative participants include a reduction for the cumulative participants as of 06/30/2005.

*** Participants since 07/01/2005.

Year 2007

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 12 (2nd Half)

PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER ** (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ACTUAL PROGRAM COSTS (4) (1)X(3)	NET LOST REV/QTRS (KWH/ PARTICIPANT) (5)	TOTAL ENERGY SAVINGS KWH/ Half (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG.15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL ACTUAL COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	706	0	$0.03112	$0	$0	$0	$0	$0
Targeted Energy Efficiency	100	421	$879.82	$87,982	896	377,216	$0.04346	$16,394	$0	$4,399	$4,399	$108,775
- All Electric	50	151	$89.58	$4,479	276	41,676	$0.04362	$1,818	$987	$0	$987	$7,284
- Non-All Electric												
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump	0	0	$0.00	$0	1,200	0	$0.03114	$0	$0	$0	$0	$0
- Resistance Heat	0	0	$0.00	$0	446	0	$0.03116	$0	$0	$0	$0	$0
- Non Resistance Heat												
High - Efficiency Heat Pump	45	209	$450.00	$20,250	1,144	239,096	$0.04346	$10,391	$3,564	$0	$3,564	$34,205
- Mobile Home												
Mobile Home New Construction ***	129	426	$551.94	$71,200	1,808	770,208	$0.04348	$33,489	$16,120	$0	$16,120	$120,809
- Heat Pump	0	0	$0.00	$0	158	0	$0.04343	$0	$0	$0	$0	$0
- Air Conditioner												
Modified Energy Fitness	485	2,113	$353.79	$171,590	612	1,293,156	$0.04349	$56,239	$20,409	$0	$20,409	$248,238
TOTAL RESIDENTIAL PROGRAMS	809	3,320		$355,501		2,721,352		$118,331	$41,080	$4,399	$45,479	$519,311
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - New Building					0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System						0		$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	809	3,320		$355,501		2,721,352		$118,331	$41,080	$4,399	$45,479	$519,311

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of 06/30/2005.
*** Participants since 07/01/2005.

Year 2008

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 13 (1st HALF)	NEW	CUMULATIVE	TOTAL ACTUAL	TOTAL ESTIMATED	NET LOST	TOTAL	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ACTUAL
	PARTICIPANT	PARTICIPANT	PROGRAM COSTS	PROGRAM	REV/QTRS	ENERGY SAVINGS	REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER **	PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/ QTR	($/KWH)	REVENUES	(EX. C, PG.15B)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4) (1)X(3)	(5)	(6) (2)X(5)	(7)	(8) (6)X(7)	(9)	(10) (4)X(5%)	(11) (9)+(10)	(12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Targeted Energy Efficiency												
- All Electric	119	521	$1,358.15	$161,620	1,016	529,336	$0.04346	$23,005	$9,189	$0	$9,189	$193,814
- Non-All Electric	56	196	$83.11	$4,654	568	111,328	$0.04345	$4,837	$3,454	$0	$3,454	$12,945
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Resistance Heat	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
- Non Resistance Heat	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump												
- Mobile Home	61	252	$457.38	$27,900	875	220,500	$0.04346	$9,583	$8,539	$0	$8,539	$46,022
Mobile Home New Construction ***												
- Heat Pump	95	520	$552.63	$52,500	861	447,720	$0.04348	$19,467	$10,597	$0	$10,597	$82,564
- Air Conditioner	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Modified Energy Fitness	560	2,612	$361.32	$202,339	435	1,136,220	$0.04349	$49,414	$27,871	$0	$27,871	$279,624
TOTAL RESIDENTIAL PROGRAMS	891	4,101		$449,013		2,445,104		$106,306	$59,650	$0	$59,650	$614,969
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - New Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	891	4,101		$449,013		2,445,104		$106,306	$59,650	$0	$59,650	$614,969

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of 06/30/2005.
*** Participants since 07/01/2005.

Year 2008

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

Exhibit C
PAGE 14B of 16

YEAR 13 (3rd QTR)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ESTIMATED PROGRAM	NET LOST REV/QTRS	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE	MAXIMIZING INCENTIVE	TOTAL * INCENTIVE	TOTAL ESTIMATED COSTS TO BE RECOVERED
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3)	COSTS (4) (1)X(3)	(KWH/ PARTICIPANT) (5)	KWH/ QTR (6) (2)X(5)	($/KWH) (7)	REVENUES (8) (6)X(7)	(EX. C, PG.15B) (9)	(5% of COSTS) (10) (4)X(5%)	INCENTIVE (11) (9)+(10)	(12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Targeted Energy Efficiency	37	575	$1,022.00	$37,814	508	292,100	$0.04346	$12,695	$2,857	$0	$2,857	$53,366
- All Electric	8	230	$125.00	$1,000	284	65,320	$0.04345	$2,838	$493	$0	$493	$4,331
- Non-All Electric												
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
- Resistance Heat	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
- Non Resistance Heat												
High - Efficiency Heat Pump	21	277	$450.00	$9,450	437	121,049	$0.04346	$5,261	$2,940	$0	$2,940	$17,651
- Mobile Home												
Mobile Home New Construction ***	28	547	$550.00	$15,400	430	235,210	$0.04348	$10,227	$3,123	$0	$3,123	$28,750
- Heat Pump	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
- Air Conditioner												
Modified Energy Fitness	219	2,861	$366.00	$80,154	218	623,698	$0.04349	$27,125	$10,900	$0	$10,900	$118,179
TOTAL RESIDENTIAL PROGRAMS	313	4,490		$143,818		1,337,377		$58,146	$20,313	$0	$20,313	$222,277
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - New Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	313	4,490		$143,818		1,337,377		$58,146	$20,313	$0	$20,313	$222,277

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of 06/30/2005.
*** Participants since 07/01/2005.

Year 2008

KENTUCKY POWER COMPANY
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM

YEAR 13 (4th QTR) PROGRAM DESCRIPTIONS	NEW PARTICIPANT NUMBER (1)	CUMULATIVE PARTICIPANT NUMBER ** (2)	TOTAL ESTIMATED PROGRAM COSTS PER PARTICIPANT (3)	TOTAL ESTIMATED PROGRAM COSTS (4) (1)X(3)	NET LOST REV/QTRS (KWH/ PARTICIPANT) (5)	TOTAL ENERGY SAVINGS KWH/ QTR (6) (2)X(5)	NET LOST REVENUE ($/KWH) (7)	TOTAL NET * LOST REVENUES (8) (6)X(7)	EFFICIENCY INCENTIVE (EX. C, PG,15B) (9)	MAXIMIZING INCENTIVE (5% of COSTS) (10) (4)X(5%)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL ESTIMATED COSTS TO BE RECOVERED (12) (4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Targeted Energy Efficiency	57	578	$1,022.00	$58,254	508	293,624	$0.04346	$12,761	$4,402	$0	$4,402	$75,417
- All Electric	12	229	$125.00	$1,500	284	65,036	$0.04345	$2,826	$740	$0	$740	$5,066
- Non-All Electric												
Compact Fluorescent Bulb	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
High - Efficiency Heat Pump	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
- Resistance Heat	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
- Non Resistance Heat												
High - Efficiency Heat Pump												
- Mobile Home	18	279	$450.00	$8,100	437	121,923	$0.04346	$5,299	$2,520	$0	$2,520	$15,919
Mobile Home New Construction ***												
- Heat Pump	27	534	$550.00	$14,850	430	229,620	$0.04348	$9,984	$3,012	$0	$3,012	$27,846
- Air Conditioner	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Modified Energy Fitness	221	2,889	$366.00	$80,886	217	626,913	$0.04349	$27,264	$10,999	$0	$10,999	$119,149
TOTAL RESIDENTIAL PROGRAMS	335	4,509		$163,590		1,337,116		$58,134	$21,673	$0	$21,673	$243,397
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
- Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - Existing Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - New Building	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)												
Smart Audit - Class 1	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Audit - Class 2	0	0	$0.00	$0	0	0	n/a	$0	$0	$0	$0	$0
Smart Financing - General	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	0	0	$0.00	$0	0	0	$0.00000	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	0	0		$0		0		$0	$0	$0	$0	$0
TOTAL COMPANY	335	4,509		$163,590		1,337,116		$58,134	$21,673	$0	$21,673	$243,397

* Lost revenue and efficiency incentives are based on prospective values.
** Cumulative participants include a reduction for the cumulative participants as of 06/30/2005.
*** Participants since 07/01/2005.

KENTUCKY POWER COMPANY
DERIVATION FOR 3 YEAR DSM EXPERIMENT

CALCULATION OF EFFICIENCY INCENTIVE

PROGRAM DESCRIPTIONS	EFFICIENCY INCENTIVE $/ PARTICIPANT						NUMBER OF NEW PARTICIPANTS																													
							YEAR 1	YEAR 2		YEAR 3		YEAR 4		YEAR 5		YEAR 6		YEAR 7		YEAR 8		YEAR 9		YEAR 10		YEAR 11		YEAR 12		YEAR 13			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)				
				2002/																																
	INITIAL	PROSP	1999	2003	2005	2008		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	3rd	4th
	VALUES	VALUES	VALUES	VALUES	VALUES	VALUES		half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	half	qtr	qtr
RESIDENTIAL PROGRAMS																																				
Energy Fitness	$76.22	$20.78	$33.89	$33.89	$33.89	n/a	552	273	689	544	448	308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Targeted Energy Efficiency																																				
- All Electric	$0.00	$0.00	$0.00	$0.00	$0.00	$77.22	223	118	175	122	131	75	66	55	99	62	88	63	76	100	69	72	89	88	85	75	87	128	100	119	37	57				
- Non-All Electric	$9.71	$1.68	$5.02	$4.28	$19.73	$81.68	74	29	93	24	42	12	8	28	21	18	46	32	13	7	69	10	72	57	26	34	46	29	50	58	8	12				
Compact Fluorescent Bulb	$1.58	n/a	n/a	n/a	n/a	n/a	269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
High - Efficiency Heat Pump																																				
- Resistance Heat	$19.73	$7.22	$44.19	$44.19	$44.19	n/a	539	123	220	21	108	99	140	38	25	23	30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
- Non Resistance Heat	$16.69	$29.11	n/a	n/a	n/a	n/a	527	124	186	26	64	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
High - Efficiency Heat Pump																																				
- Mobile Home	$38.66	$32.50	$84.21	$28.92	$79.20	$139.89	356	109	127	66	173	101	134	45	43	53	47	43	43	34	29	41	46	34	40	48	45	59	45	61	21	18				
Mobile Home New Construction ***																																				
- Heat Pump	n/a	n/a	$44.42	$4.00	$124.96	$111.55	0	0	0	0	33	88	123	101	94	83	92	57	61	46	64	68	70	67	83	90	94	84	129	95	28	27				
- Air Conditioner				$0.41	$0.41	n/a														0	1	1	0	0	0	0	0	0	0	0	0	0	0				
Modified Energy Fitness				$21.06	$42.08	$49.77														101	441	334	391	371	351	440	560	515	485	560	219	221				
TOTAL RESIDENTIAL PROGRAMS																																				
*** Participants since 03/01/98																																				
COMMERCIAL PROGRAMS																																				
Smart Audit - Class 1	$0.00	n/a	n/a	n/a	n/a	n/a	91	243	159	204	178	188	188	144	159	134	131	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
- Class 2	$0.00	n/a	n/a	n/a	n/a	n/a	5	11	28	28	9	19	21	9	29	28	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Smart Financing - Existing Building	$508.34	$813.28	$232.54	$232.54	$232.54	$232.54	1	0	11	8	29	6	25	16	24	15	15	7	25	0	0	0	0	0	0	0	0	0	0	0	0	0				
Smart Financing - New Building	$50.33	$28.76	$262.33	$262.33	$262.33	$262.33	0	1	0	1	5	3	8	4	0	8	18	5	16	0	0	0	0	0	0	0	0	0	0	0	0	0				
TOTAL COMMERCIAL PROGRAMS																																				
INDUSTRIAL PROGRAMS - (w/Est. Opt-Outs Removed)																																				
Smart Audit - Class 1	$0.00	n/a	n/a	n/a	n/a	n/a	15	9	21	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Smart Audit - Class 2	$0.00	n/a	n/a	n/a	n/a	n/a	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Smart Financing - General	$178.65	$362.80	n/a	n/a	n/a	n/a	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Smart Financing - Compressed Air System	$4,850.21	$4,048.80	n/a	n/a	n/a	n/a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
TOTAL INDUSTRIAL PROGRAMS																																				
ANNUAL SHARED SAVINGS ($)																																				

KENTUCKY POWER COMPANY
DERIVATION FOR 3 YEAR DSM EXPERIME

CALCULATION OF EFFICIENCY INCENTIVE

Exhibit C
PAGE
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ANNUAL SHARED SAVINGS ($)

PROGRAM DESCRIPTIONS	YEAR 1 (39) (1)X(7)	YEAR 2 (34) (1)X(8)		YEAR 3 (36) (2)X(10)		YEAR 4 (38) (3)X(12)		YEAR 5 (40) (3)X(14)		YEAR 6 (42) (3)X(16)		YEAR 7 (44) (4)X(18)		YEAR 8 (46) (4)X(20)		YEAR 9 (48) (4)X(22)		YEAR 10 (50) (5)X(24)		YEAR 11 (52) (6)X(26)		YEAR 12 (54) (5)X(28)		YEAR 13 (56) (6)X(30)	(57) (6)X(31)	(58) (6)X(32)
		1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	3rd qtr	4th qtr
RESIDENTIAL PROGRAMS																										
Energy Fitness	$43,177	$21,354	$14,317	$11,304	$9,309	$10,370	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Targeted Energy Efficiency																										
- All Electric	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,189	$2,857	$4,402
- Non-All Electric	$719	$252	$164	$40	$70	$60	$40	$141	$105	$90	$231	$137	$59	$30	$295	$43	$308	$1,125	$513	$671	$908	$572	$987	$3,454	$493	$740
Compact Fluorescent Bulb	$425	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
High - Efficiency Heat Pump																										
- Resistance Heat	$10,634	$2,427	$1,588	$152	$760	$4,375	$6,187	$1,679	$1,105	$1,016	$1,328	$44	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Non Resistance Heat	$9,798	$2,070	$5,414	$757	$1,883	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
High - Efficiency Heat Pump																										
- Mobile Home	$13,834	$4,236	$4,128	$2,145	$5,623	$8,505	$11,284	$3,789	$3,621	$4,463	$3,858	$1,244	$1,244	$983	$839	$1,186	$1,330	$2,693	$3,168	$3,802	$3,564	$3,880	$3,864	$8,639	$2,940	$2,820
Mobile Home New Construction ***																										
- Heat Pump	$0	$0	$0	$0	$0	$4,353	$5,464	$4,488	$4,175	$3,687	$4,087	$231	$248	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Air Conditioner																										
														$2,127	$9,287	$7,034	$9,234	$15,612	$14,770	$18,515	$23,565	$21,871	$20,409	$27,871	$10,900	$10,999
Modified Energy Fitness																										
TOTAL RESIDENTIAL PROGRAMS	$77,585	$30,339	$25,601	$14,398	$17,645	$27,663	$22,975	$10,095	$9,009	$9,256	$9,602	$1,656	$1,548	$3,327	$10,681	$8,539	$10,156	$27,802	$28,823	$34,234	$39,783	$38,700	$41,080	$59,650	$20,313	$21,873
*** Participants since 09/01/98																										
COMMERCIAL PROGRAMS																										
Smart Audit - Class 1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Class 2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Smart Financing - Existing Building	$506	$0	$8,946	$6,506	$23,585	$1,395	$5,814	$3,721	$5,581	$3,486	$3,488	$1,528	$5,614	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Smart Financing - New Building	$0	$50	$0	$29	$144	$787	$2,099	$1,049	$0	$2,099	$4,722	$1,312	$4,197	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL COMMERCIAL PROGRAMS	$506	$50	$8,946	$6,535	$23,729	$2,182	$7,913	$4,770	$5,581	$5,587	$8,210	$2,840	$10,011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
INDUSTRIAL PROGRAMS -																										
(w/Est. Opt-Outs Removed)																										
Smart Audit - Class 1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Smart Audit - Class 2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Smart Financing - General	$0	$0	$0	$0	$383	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Smart Financing - Compressed Air System	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL INDUSTRIAL PROGRAMS	$0	$0	$0	$0	$383	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ANNUAL SHARED SAVINGS ($)	$78,091	$30,389	$34,547	$20,933	$41,757	$29,845	$30,888	$14,865	$14,587	$14,843	$17,812	$4,496	$11,559	$3,327	$10,681	$8,539	$10,156	$27,802	$28,823	$34,234	$39,783	$38,700	$41,080	$59,650	$20,313	$21,873

	KENTUCKY POWER COMPANY		Exhibit C	
	FORECAST OF 2008 KENTUCKY RETAIL ENERGY SALES IN KWH		PAGE 16 of	16
	FOR RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS			
	PROGRAM YR 13 - 2008			
LINE		RESIDENTIAL	COMMERCIAL	INDUSTRIAL
NO.	YEAR	SECTOR	SECTOR	SECTOR
1	TOTAL ULTIMATE SALES (KWH)*	2,531,000,000	1,459,400,000	3,443,800,000
2	LESS NON-METERED **	15,186,000	8,756,400	20,662,800
3	TOTAL ESTIMATED RETAIL KWH SALES	2,515,814,000	1,450,643,600	3,423,137,200
4	LESS OPT - OUT CUSTOMERS KWH	0	0	2,059,689,192
5	KWH BEFORE LOST REVENUE IMPACTS	2,515,814,000	1,450,643,600	1,363,448,008
6	LESS LOST REVENUE IMPACTS	11,420,681	1,496,550	0
7	ADJUSTED KWH BY SECTOR	2,504,393,319	1,449,147,050	1,363,448,008
8	LINE 7/LINE 1	98.9%	99.3%	39.6%
LINE		RESIDENTIAL	COMMERCIAL	INDUSTRIAL
NO.	PROGRAM YR 13 (3rd QTR)	SECTOR	SECTOR	SECTOR
9	TOTAL ULTIMATE SALES (KWH)*	568,700,000	381,300,000	836,200,000
10	LINE 8	98.9%	99.3%	39.6%
11	ADJUSTED KWH BY SECTOR	562,444,300	378,630,900	331,135,200
LINE		RESIDENTIAL	COMMERCIAL	INDUSTRIAL
NO.	PROGRAM YR 13 (4th QTR)	SECTOR	SECTOR	SECTOR
12	TOTAL ULTIMATE SALES (KWH)*	617,700,000	347,800,000	903,000,000
13	LINE 8	98.9%	99.3%	39.6%
14	ADJUSTED KWH BY SECTOR	610,905,300	345,365,400	357,588,000
*	SOURCE: 2008 LOAD FORECAST COMPILED BY			
	AEP CORPORATE PLANNING AND BUDGETING DEPT.			
**	.60% ESTIMATED TO BE NON-METERED (OL) DETERMINED			
	FROM BILLED JURISDICTIONAL TARIFF SUMMARY FOR			
	12 MOS. ENDED DECEMBER 2007.			

KENTUCKY POWER COMPANY
Demand Side Management
Status Report
As of June 30, 2008

INDEX

DEFINITIONS

1) YTD Costs	- Year-to-Date costs recorded January 1, 2008 through June 30, 2008.
2) YTD Impacts	- Estimated in place load impacts for Year-to-Date participants.
3) PTD Costs	- Costs recorded from the inception of the program through June 30, 2008.
4) PTD Impacts	- Estimated in place load impacts for Program-to-Date participants.

COMMENTS

Our calculations are based on actual participants and costs as of June 30, 2008. The Residential DSM costs in this status report do not agree with the total costs in the Financial Report due to a one month lag in reporting.

The estimated actual in-place energy (kWh) savings is the summation of the monthly average net energy savings associated with participating customers of each DSM program (including T&D losses). The average monthly net energy savings is the product of 1/12 of the annual kWh per participant (shown in Exhibit E) and 1/2 of the new participants for the current month, plus the cumulative participants from the previous months. The average monthly net energy savings is then increased by 10% to include T&D losses. The estimated actual in-place energy (kWh) savings are calculated in accordance with the Sunset Provision contained in the joint application, filed September 27, 1995.

The estimated anticipated peak demand (kW) reduction is a product of the number of net participating customers (excluding free riders) and projected winter/summer demand reductions filed for each program (refer to Section III to V of the joint application). The anticipated peak demand (kW) reductions includes 11% T&D loss savings.

The calculation of YTD and PTD estimated in place energy (kWh) savings and anticipated peak demand (kW) reductions contained in this status report reflect, wherever applicable, the program evaluation results of each individual program as described in the August 16, 1999, June 30, 2002, June 30, 2005 and June 30, 2008 DSM collaborative report.

The individual DSM lost revenue, efficiency incentive and maximizing incentives as of June 30, 1997 are calculated based on the initial values from Exhibit E in the joint application, filed September 27, 1995. A retroactive adjustment of the initial values of the efficiency incentives and net lost revenue KWH impacts was used for each program for the first eighteen months (1/196 to 6/30/97). The lost revenue, efficiency incentive and maximizing incentive for the period 1/1/08 to 06/30/08 are calculated using the revised values contained in Schedule C of this status report.

The program lost revenue is the product of the number of participating customers, the average net energy savings (kWh) per customer and the net lost revenue ($/kWh). The number of participating customers is equal to 1/2 of the new participants for the current month, plus the cumulative participants from the previous months. The program-to-date lost revenues are calculated in accordance with the Sunset Provision contained in the joint application, filed September 27, 1995.

The efficiency incentive is the product of the number of participants for the month and the efficiency rate ($/participant). The maximizing incentive is calculated as 5% of actual program cost for the month.

KENTUCKY POWER COMPANY
SUMMARY INFORMATION (ALL PROGRAMS)
As of June 30, 2008

DESCRIPTION	YTD	PTD
Total Revenue Collected	$645,665	$13,153,211
Total Program Costs	449,013	9,101,567
Total Lost Revenues	106,306	3,338,798
Total Efficiency / Maximizing Incentive	59,650	809,981
HEAP - Kentucky Power's Information Technology Implementation Costs (Case No 2006 - 00373, Dated December 14, 2006)	0	58,968
HEAP - KACA's Information Technology Implementation Costs	0	15,700
Total DSM Costs As of June 30, 2008	$614,969	$13,325,014

DESCRIPTION	YTD		PTD	
Actual In-Place Energy Savings:	249,828	kWh	419,130,668	kWh
w/ T&D Line Losses:	274,811	kWh	461,043,735	kWh
Total kW Reductions:				
Winter	547		18,440	
w/ T&D Line Losses:	607		20,468	
Summer	186		4,087	
w/ T&D Line Losses:	207		4,537	

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Energy Fitness
PARTICIPANT DEFINITION:	Number of Households
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January - June 2008

2008														
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
New Participants	0	0	0	0	0	0							0	2,812

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
0	44,764,331	0	0	441	1,932

KENTUCKY POWER COMPANY

Energy Fitness	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	18,189.00
Equipment/Vendor:	0.00	0.00	665,964.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	0.00
Other Costs:	0.00	0.00	960.00
Total Program Costs	0.00	0.00	685,113.00
Lost Revenues:	0.00	(19,322.00)	363,029.00
Efficiency Incentive:	0.00	(46,349.00)	63,482.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	0.00	(65,671.00)	1,111,624.00

COMMENTS:

This program was discontinued May 14, 1999.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Targeted Energy Fitness
PARTICIPANT DEFINITION:	Number of Households
CUSTOMER SECTOR:	Residential - Low Income
REPORTING PERIOD:	January - June 2008

2008														
Participant	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
All Electric	6	17	17	20	27	32							119	2,376
Non All Electric	1	0	5	3	10	37							56	893

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
69,307	65,994,844	15	62	574	2,579

KENTUCKY POWER COMPANY

Targeted Energy Efficiency	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	33,880.00	0.00	253,327.00
Equipment/Vendor:	132,394.00	0.00	2,461,803.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	0.00
Other Costs:	0.00	0.00	9,329.00
Total Program Costs	166,274.00	0.00	2,724,459.00
Lost Revenues:	27,842.00	1,944.00	498,860.00
Efficiency Incentive:	12,643.00	184.00	20,374.00
Maximizing Incentive:	0.00	0.00	123,197.00
Total Costs	206,759.00	2,128.00	3,366,890.00

KENTUCKY POWER COMPANY

COMMENTS:

The Targeted Energy Efficiency Program provides a variety of services, including a home energy audit, weatherization and seal-up to targeted low income customers.

The Equipment / Vendor cost categories includes the cost of labor and materials of measures installed, participant energy education costs and vendor administration costs. The YTD costs are $127,740 for all-electric and $4,654 for non-all-electric homes.

The YTD Estimated in Place Energy (kWh) Savings for all-electric participants and non-all-electric participants is 58,581 and 10,726 respectively.

The YTD Anticipated Peak Demand (kW) Reduction summer/winter for all-electric and non-all-electric participants is 11/56 and 4/6 respectively.

The YTD Lost Revenue for all-electric participants and non-all-electric participants is $23,005 and $4,837 respectively.

The YTD Efficiency Incentive for all-electric and non-all-electric participants is $9,189 and $3,454 respectively.

The projected participant and budgetary level for 2009 is 150 all-electric homes, 75 non-all-electric homes and $190,000 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Compact Fluorescent Bulb
PARTICIPANT DEFINITION:	Number of Bulbs Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January - June 2008

2008													
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
New Participants	0	0	0	0	0	0							0	269

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
0	231,296	0	0	3	3

KENTUCKY POWER COMPANY

Compact Fluorescent Bulb	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	60.00
Equipment/Vendor:	0.00	0.00	15,021.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	0.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	0.00	0.00	15,081.00
Lost Revenues:	0.00	25.00	1,605.00
Efficiency Incentive:	0.00	8.00	433.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	0.00	33.00	17,119.00

COMMENTS:

This program was discontinued December 31, 1996.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	High Efficiency Heat Pumps - Retrofit
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January - June 2008

2008														
Participant	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
Resistance	0	0	0	0	0	0							0	1,367
Non Resistance	0	0	0	0	0	0							0	929

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
0	55,489,679	0	0	851	2,995

KENTUCKY POWER COMPANY

	High Efficiency Heat Pumps - Retrofit
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	12,885.00
Equipment/Vendor:	0.00	0.00	129,767.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	70,500.00
Other Costs:	0.00	0.00	1,160.00
Total Program Costs	0.00	0.00	214,312.00
Lost Revenues:	0.00	(269.00)	368,960.00
Efficiency Incentive:	0.00	(2,196.00)	48,017.00
Maximizing Incentive:	0.00	0.00	5.00
Total Costs	0.00	(2,465.00)	631,294.00

KENTUCKY POWER COMPANY

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COMMENTS:

This program was discontinued December 31, 2001.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	High Efficiency Heat Pump - Mobile Home
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January - June 2008

2008													
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
New Participants	9	4	7	11	12	18							61	1,813

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
25,412	62,329,860	25	49	244	3,260

KENTUCKY POWER COMPANY

High Efficiency Heat Pump - Mobile Home	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	46,374.00
Equipment/Vendor:	3,100.00	0.00	32,555.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	24,800.00	0.00	800,700.00
Other Costs:	0.00	0.00	1,167.00
Total Program Costs	27,900.00	0.00	880,796.00
Lost Revenues:	9,583.00	5,820.00	403,353.00
Efficiency Incentive:	8,539.00	18,331.00	120,033.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	46,022.00	24,151.00	1,404,182.00

KENTUCKY POWER COMPANY

COMMENTS:

The High Efficiency Heat Pump - Mobile Home program provides incentives to customers, encouraging them to install the highest efficiency equipment practical.

The projected participant and budgetary level for 2009 is 100 and $50,000 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Mobile Home New Construction
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January - June 2008

2008														
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
Heat Pump	19	6	12	7	25	26							95	1,632
Air Conditioner	0	0	0	0	0	0							0	2

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
41,885	85,440,123	61	140	261	4,301

KENTUCKY POWER COMPANY

Mobile Home New Construction	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	30,294.00
Equipment/Vendor:	8,350.00	0.00	103,663.00
Promotional:	0.00	0.00	3,939.00
Customer Incentives:	43,900.00	0.00	816,950.00
Other Costs:	250.00	0.00	4,116.00
Total Program Costs	52,500.00	0.00	958,962.00
Lost Revenues:	19,467.00	0.00	432,623.00
Efficiency Incentive:	10,597.00	0.00	106,688.00
Maximizing Incentive:	0.00	0.00	2,580.00
Total Costs	82,564.00	0.00	1,500,853.00

COMMENTS:

The Collaborative has devised and implemented a plan in conjunction with trade allies to offer a financial incentive to new mobile home buyers and trade allies to encourage the installation of high efficiency heat pumps and upgraded insulation packages in new mobile homes.

The projected participant and budgetary level for 2009 is 150 heat pumps and $87,500 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Modified Energy Fitness
PARTICIPANT DEFINITION:	Number of Audits
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January - June 2008

2008														
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
New Participants	85	79	88	87	109	112							560	4,549

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
YTD	PTD	YTD		PTD	
		Summer	Winter	Summer	Winter
138,207	46,540,166	106	356	638	2,752

KENTUCKY POWER COMPANY

Modified Energy Fitness	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	27,106.00
Equipment/Vendor:	202,339.00	0.00	1,663,429.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	0.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	202,339.00	0.00	1,690,535.00
Lost Revenues:	49,414.00	0.00	378,910.00
Efficiency Incentive:	27,871.00	0.00	169,095.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	279,624.00	0.00	2,238,540.00

KENTUCKY POWER COMPANY

COMMENTS:

The Modified Energy Fitness program provides energy audits, blower door testing, duct sealing and direct installation of low cost conservation measures to residential customers with electric space heating and electric water heating.

The equipment / vendor cost category includes the cost of labor and materials of measures installed, the cost of promotion by the vendor and vendor administration costs.

The projected participant and budgetary level for 2009 is 1000 and $405,000 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Smart Audit - Commercial
PARTICIPANT DEFINITION:	Number of Audits
CUSTOMER SECTOR:	Commercial
REPORTING PERIOD:	January - June 2008

2008														
Participant	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
Class I	0	0	0	0	0	0							0	1,952
Class II	0	0	0	0	0	0							0	194

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
n/a	n/a	n/a	n/a	n/a	n/a

KENTUCKY POWER COMPANY

Smart Audit - Commercial	
Reporting Period:	January - June 2008

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	30,661.00
Equipment/Vendor:	0.00	0.00	1,268,176.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	0.00
Other Costs:	0.00	0.00	(8,156.00)
Total Program Costs	0.00	0.00	1,290,681.00
Lost Revenues:	0.00	0.00	0.00
Efficiency Incentive:	0.00	0.00	0.00
Maximizing Incentive:	0.00	0.00	64,533.00
Total Costs	0.00	0.00	1,355,214.00

KENTUCKY POWER COMPANY

COMMENTS:

This program was discontinued December 31, 2002.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Smart Incentive - Commercial
PARTICIPANT DEFINITION:	Number of Incentives
CUSTOMER SECTOR:	Commercial
REPORTING PERIOD:	January - June 2008

2008														
Participant	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
Existing Building	0	0	0	0	0	0							0	182
New Building	0	0	0	0	0	0							0	69

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
0	100,112,434	0	0	1,519	2,640

KENTUCKY POWER COMPANY

Smart Incentive - Commercial	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	144,039.00
Equipment/Vendor:	0.00	0.00	21,504.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	399,592.00
Other Costs:	0.00	0.00	691.00
Total Program Costs	0.00	0.00	565,826.00
Lost Revenues:	0.00	442.00	891,458.00
Efficiency Incentive:	0.00	1,078.00	88,039.00
Maximizing Incentive:	0.00	0.00	281.00
Total Costs	0.00	1,520.00	1,545,604.00

COMMENTS:

This program was discontinued December 31, 2002.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Smart Audit - Industrial
PARTICIPANT DEFINITION:	Number of Audits
CUSTOMER SECTOR:	Industrial
REPORTING PERIOD:	January - June 2008

2008														
Participant	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
Class I	0	0	0	0	0	0							0	60
Class II	0	0	0	0	0	0							0	4

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
n/a	n/a	n/a	n/a	n/a	n/a

KENTUCKY POWER COMPANY

Smart Audit - Industrial	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	5,741.00
Equipment/Vendor:	0.00	0.00	37,786.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	0.00
Other Costs:	0.00	0.00	161.00
Total Program Costs	0.00	0.00	43,688.00
Lost Revenues:	0.00	0.00	0.00
Efficiency Incentive:	0.00	0.00	0.00
Maximizing Incentive:	0.00	0.00	2,186.00
Total Costs	0.00	0.00	45,874.00

KENTUCKY POWER COMPANY

COMMENTS:

This program was discontinued December 31, 1998.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Smart Incentive - Industrial
PARTICIPANT DEFINITION:	Number of Incentives
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January - June 2008

2008														
Participant	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	YTD	PTD
General	0	0	0	0	0	0							0	1
Compressed Air	0	0	0	0	0	0							0	0

Impacts					
Estimated in Place Energy (kWh) Savings		Anticipated Peak Demand (kW) Reduction			
		YTD		PTD	
YTD	PTD	Summer	Winter	Summer	Winter
0	141,002	0	0	6	6

KENTUCKY POWER COMPANY

Smart Incentive - Industrial	
Reporting Period:	January - June 2008

Costs

Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	28,385.00
Equipment/Vendor:	0.00	0.00	3,288.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	441.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	0.00	0.00	32,114.00
Lost Revenues:	0.00	0.00	0.00
Efficiency Incentive:	0.00	0.00	383.00
Maximizing Incentive:	0.00	0.00	655.00
Total Costs	0.00	0.00	33,152.00

KENTUCKY POWER COMPANY

COMMENTS:

This program was discontinued December 31, 1998.

KENTUCKY POWER COMPANY
TARGETED ENERGY EFFICIENCY PROGRAM
2006-2007 LOAD IMPACT EVALUATION REPORT

Final Report

June 27, 2008

Prepared for:

American Electric Power
1701 Central Avenue
P.O. Box 1428
Ashland, KY 41105-1428

Prepared By:

RLW Analytics, Inc.
2 Hyde Road
Clark Lake, MI 49234
(517) 529-6277

KENTUCKY POWER COMPANY
TARGETED ENERGY EFFICIENCY PROGRAM
2006-2007 LOAD IMPACT EVALUATION REPORT

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KENTUCKY POWER COMPANY
TARGETED ENERGY EFFICIENCY PROGRAM
2006-2007 LOAD IMPACT EVALUATION REPORT

E Executive Summary

This report presents the Kentucky Power Company ('KPCo') Targeted Energy Efficiency Program ('TEE Program'). The TEE Program is designed to perform energy audits, provide energy education to all households, perform blower door tests and install extensive weatherization and energy conservation measures to low income customers living within the KPCo service territory. The TEE Program is a "piggyback" program leveraging the resources of five not-for-profit agencies that provide weatherization services to low-income customers via the existing Weatherization Assistance Program. This program is offered to electric heat and non-electric heat customers. The load impact evaluation method examined the changes in customer bills to determine the program's impact.

The primary objective of this evaluation was to quantify the savings for the 2006-2007 program years. Two critical components to the success of meeting the evaluation objective are the research design and the evaluation methodology. The research design allows the results from the evaluation to meet its evaluation objectives i.e., allowing the results of the program to be determined and applicable to the improvement of the TEE Program. The evaluation methodology operationalizes the research design. The research design contributes to the development of valid conclusions. In turn, the results may be generalized for use in other applications.

This evaluation quantified the change in electric consumption that is a result of the program. In the case of heating system replacements, it was found that some participant's energy consumption actually increased for those participants where the existing heating system was inoperative or its operation was severely restricted. When this condition exists, customers often turn to alternative fuels (i.e., kerosene, space heaters, wood, etc.) to maintain comfort, these alternative fuels can sometimes pose a safety hazard. When a heating system was not in operation or not economically feasible to repair, that heating system was replaced. Accordingly, this replacement would cause an increase in electric consumption, while increasing the participant's comfort and safety. To illustrate this effect, an additional analysis was performed to quantify the savings of customers that did not have their heating system replaced.

Based on this analysis **it can be concluded that the TEE program significantly reduced electric consumption.** The best estimates of savings, by program component, are:

- For the all-electric participants, the average savings were 1,483 kWh/year per participant. This is an 7% reduction from the pre-installation NAC.

- For the all-electric participants who had their heating system replaced, the average savings was 3,130 kWh/year per participant. This is a 15% reduction from the pre-installation NAC.
- For the all-electric participants who did not have their heating system replaced, the average savings were 1,109 kWh/year per participant. This is a 6% reduction from the pre-installation NAC.
- For the base load participants, the average savings were 1,131 kWh/year per participant. This is a 8% reduction from the pre-installation NAC.

The total program annual energy savings, based on 242 participants, was estimated to be 331 MWH.

KENTUCKY POWER COMPANY
TARGETED ENERGY EFFICIENCY PROGRAM
2006-2007 LOAD IMPACT EVALUATION REPORT

1 Introduction

This report presents the Kentucky Power Company ('KPCo') Targeted Energy Efficiency Program ('TEE Program'). The TEE Program is designed to perform energy audits, provide energy education to all households, perform blower door tests and install extensive weatherization and energy conservation measures to low income customers living within the KPCo service territory. The TEE Program is a "piggyback" program leveraging the resources of five not-for-profit agencies that provide weatherization services to low-income customers via the existing Weatherization Assistance Program. This program is offered to electric heat and non-electric heat customers. The load impact evaluation method examined the changes in customer bills to determine the program's impact.

The primary objective of this evaluation was to quantify the savings for the 2006-2007 program year. Two critical components to the success of meeting the evaluation objective are the research design and the evaluation methodology. The research design allows the results from the evaluation to meet its evaluation objectives i.e., allowing the results of the program to be determined and applicable to the improvement of the TEE Program. The evaluation methodology operationalizes the research design. The research design contributes to the development of valid conclusions. In turn, the results may be generalized for use in other applications.

1.1 Research Design

The evaluation's research design was chosen to serve as a foundation for the continued monitoring of the program. In addition to quantifying program impacts, the initial research design enables KPCo to continue to build the capability to perform evaluations, and establish baseline information for future program designs.

The research design chosen for the TEE Program is a time-series comparison/cross sectional design. This research design essentially determines the program impacts by examining the change in participant's usage patterns over time. Comparing a representative control group's change in usage over a similar time period further refines the impact estimate. This experimental design helps to reduce any potential bias in the results.

The time series/cross sectional design achieves internal and external validity. Internal validity means the evaluation is conducted in a manner such that the results isolate the impact of the activity being studied. When other factors are not recognized, the changes attributed to the program may be the result of other phenomena. For example, if the experiment does not recognize the effect of a participant's demographic or end-use characteristics, the change in usage could be explained by the impact of the implementation of the program or, alternatively, by the change in lifestyle of the

participant. A research design can help achieve external validity by ensuring that the results are representative of a larger population of interest, allowing for the findings to be generalized. For example, for the TEE Program, the information determined by the 2006-2007 participants and the corresponding control group permits the evaluation to represent the total program impacts.

1.2 Evaluation Methodology

The evaluation methodology used billing data to determine the impact of the program using the maximum number of 2006-2007 participants and a representative group of non-participants. This initial analysis determines energy impacts, while minimizing the uncertainty associated with the estimate.

A systematic and comprehensive approach using billing analysis was used to determine the program energy impacts. The approach consists of a variety of methods ranging from a simplistic comparison approach to more complex regression techniques.

Specifically, the evaluation consisted of the following four steps:

1) Development of the participant billing information,
2) Development of a representative control group,
3) Temperature normalization of billing information, and
4) The quantification of the energy impacts.

In each of the subsequent sections of this report, the approach and the results of the analysis are presented.

2 The Participants

Billing analysis requires that sufficient billing information is available to establish consumption trends in both the pre-installation and post-installation periods. This section presents the development of the participant group consumption analysis. For a discussion of the methodology to develop the participant group, see Appendix A.

From program tracking records (i.e., the WX Data Collection Forms), it was determined that there were 242 participants. Using these accounts, KPCo gathered the appropriate billing data from the Marketing and Customer Service System (MACSS). Billing information from MACSS was available for all 242 customers.

The initial step in developing the participant information was to examine every individual read for each of the participants with billing records. When the information from a particular billing record appeared to be incongruent, that record was edited or eliminated from the analysis.

After the individual reads were examined, the participant data was split into pre- and post-installation periods. The next editing step checked the participant accounts to verify that there was enough data in each period to be accurately analyzed. At the end of the

editing of the participant billing data a total of 173 customers were available for the billing analysis.

Number of Participants	242	
Pre Annualized Usage (kWh)	19,442	
	Pct	**Number**
House Type		
Combination (Mobile/Modular/Site)	1%	2
Mobile	55%	134
Site-Built	44%	106
Electric Primary Heat	67%	162
Heating System Replaced		
Yes:	22%	53
		-
Electric Furnace	43%	23
Heat Pump	57%	30

Table 1 - Particpant Information

Table 1 presents information about the participant population. As this table shows, the participant group consists of more customers that live in mobile homes, and have electric heat.

3 The Control Group

The primary purpose of the TEE Program billing analysis is to determine the program's effects on electricity consumption. One of the challenges in the analysis is that residential energy consumption can be significantly affected by a variety of variables such as changes in weather, activity, demographics, building shell, etc. One of the most efficient methods for controlling these confounding effects is the establishment of a representative "control" group of non-program participants.

For the TEE Program evaluation, a systematic method for determining a representative control group was used. A detailed presentation of the methodology used to develop the control group is presented in Appendix A. This section presents the results of the development of the control group.

For the TEE Program KPCo provided a file with billing information for 1,495 customers. These customers were designated the "Control Group Pool". From this pool, all known participants were eliminated.

Next, the participant group was examined to establish matching criteria. The criteria that was determined to partition the participant group into homogeneous groups was based on annualized usage.

The control group pool customers were compared to the TEE Program participants based on annual usage within the strata. Based on the above methodology, up to five control group members were selected for each participant. Table 2 shows a comparison of the distribution of the Control Group annualized consumption, as compared to the Participant group. This table demonstrates that the control group is well matched to the participant group.

Statistic	Participants	Control Group
N	173	863
Minimum	3,949	4,273
25th Percentile	13,986	14,063
Median	19,337	19,369
Mean	19,442	19,436
75th Percentile	23,052	23,042
Maximum	66,070	61,193

Table 2 - Comparison of Pre-Installation Period Average Daily Usage

4 Temperature Normalization of Billing Information

One of the most important steps in the assessment of the effect of the TEE Program is the pre-installation to the post-installation comparison of energy usage. By controlling for other non-program influences, such as weather, the program's effects can be isolated and quantified. This normalization methodology is presented in Appendix A. This section presents the results of the temperature normalization procedure.

The temperature normalization procedure described in Appendix A presented an enormous computing challenge. For the electric consumption models, heating degree-days based on reference temperatures from 50^0F to 75^0F, and cooling degree-days based on reference temperatures from 60^0F to 75^0F were examined. The wide variety of reference temperatures meant that thousands of models were considered for each customer to determine the optimal models.

To capture accurate temperatures, information from the Ashland Kentucky weather station was used. The daily mean of this station was chosen to be representative of the average daily temperature for the TEE Program participants.

Table 3 shows the distribution of the actual to model predicted usage for the most recent 12 months of data in each period. The participants predicted mean usage is within 0.1% to 0.6% of the actual mean. This supports the conclusion that the models are performing well within each period. The comparison of annualized usage between groups for each period also supports the conclusion that the control group is well matched to the participant group.

	Participants		Control Group	
	Pre	**Post**	**Pre**	**Post**
Actual Average Annualized Usage	20,185	17,747	20,150	19,596
Predicted Average Annualized Usage	20,061	17,769	20,096	19,510
Actual Median Annualized Usage	19,247	16,809	20,021	19,241
Predicted Median Annualized Usage	19,229	16,800	20,023	19,144

Table 3 - Distribution of Actual and Predicted Electric Usage

The normal temperatures used in this analysis are 18-year average daily temperatures. The average normal temperatures are presented in Table 4.

Month	Ashland
Jan	36
Feb	35
Mar	45
Apr	55
May	62
Jun	71
Jul	74
Aug	75
Sep	68
Oct	57
Nov	47
Dec	38

Table 4 - Average Normal Daily Temperatures

Using normal temperatures the Normalized Annual Consumption (NAC) was calculated for each period for each group. Table 5 shows the NAC for each period. The mean and median consumption is decreased for the participant group from the pre-installation to the post installation period. The Control group shows a modest decrease in the mean and median consumption for the pre to post period. The comparison of the NAC between groups, for each period does however demonstrate that the control group is well matched to the participant group.

	Participants		Control Group	
	Pre	**Post**	**Pre**	**Post**
Mean	18,384	16,415	18,126	17,399
Median	17,765	15,654	18,181	17,052

Table 5 - Distribution of Electric NACs

5 The Energy Impacts

To fully investigate the effects of the program, several different analytical methods were used. These methods ranged from a simplistic comparison approach to a more complex regression technique. As expected, the estimates of savings should remain relatively stable from method to method. The more complex methods were expected to produce "better" estimates. This section presents the methodology to estimate the energy savings for the TEE Program.

In the evaluation of the TEE Program, the following two different methods were used. First, the energy impact was determined using an Augmented Comparison Method (PRISM). The second approach was a Regression Approach. Appendix A contains a detailed discussion of the methodology used to quantify the energy impacts. This section presents the results of that analysis.

One of KPCo's objectives was to establish savings estimates for subsets of the participant population, the electric heat participants and the base load participants. Accordingly, the analysis will be presented for these groups.

Participant Type	Number of Customers	Percent Of Population	Annualized Pre-Installation Usage (kWh)
Electric	162	67%	22,008
Base Load	80	33%	16,274

Table 6 - Participant Distribution

Table 6 shows the distribution of participants. As this table shows, the program was dominated by electric heating customers.

5.1 The Augmented Comparison Approach Results

For the net savings, the average control group pre- and post installation usage were used. Table 7 shows the mean savings by program component.

	Electric Heat	Electric Heat	Electric Heat Total	Base Load	Program Total
Heating System	**Replaced**	**Not Replaced**			
Pre Installation NAC (kWh)	20,828	19,755	19,954	14,559	18,170
Mean Savings (kWh)	3,979	1,589	2,032	1,136	1,736
Pct Savings	19%	8%	10%	8%	10%

Table 7 - Comparison of the Net Savings, By Component

Table 7 shows a mean savings for the electric heat customers of 2,032 kWh/year. This is a 10% reduction from the pre-installation NAC. This table also shows that the base load customers had a mean savings of 1,136 kWh/year. This is a 8% reduction from the pre-installation NAC. The tables also illustrate the unique impacts of electric heat customers that had a heating system replacement as compared to electric heating customers that did not have a heating system replacement.

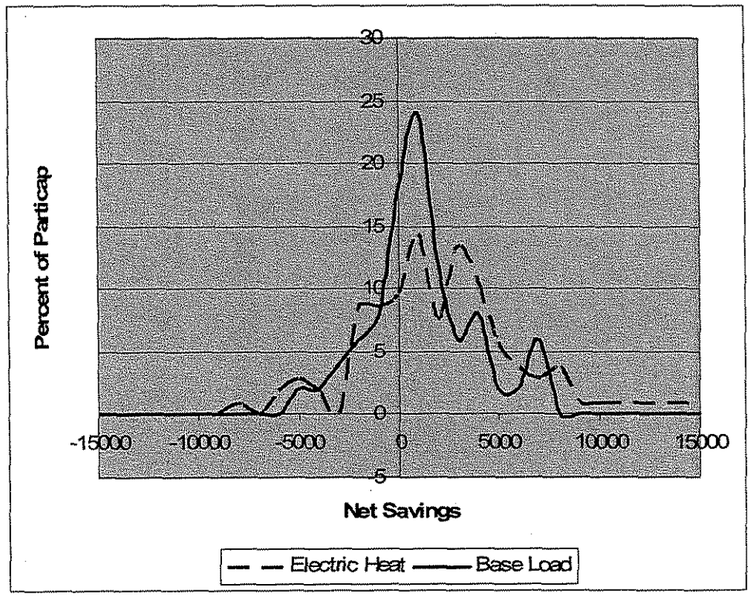


Figure 1 - Distribution of PRISM Savings

Figure 1 shows a comparison of the distribution of the PRISM savings estimates, for each participant type. This is typical of the distribution of savings generated by PRISM analysis. The distribution is essentially a *normal* (i.e., bell-shaped) curve, with most of the estimates falling around the center point or mean. The tails of the distribution are symmetrical. The large confidence intervals are exemplified by the large spread in values shown in this figure. Interestingly, about 27% of the participants showed a predicted *increase* in usage from the pre-installation to the post-installation period. This may be due in part to the heating system replacement[1] feature of the program.

[1] It was determined that the inclusion of heating system replacements and heating repair work does not necessarily increase the program's electric energy savings benefits. The justification for this is that a repaired heating system would lead to increased reliance as the primary heating source. Similarly, the installation of a new heating system can also lead to higher customer consumption, if alternative heating fuels were used or if the customer chose to increase their comfort level.

Some conclusions can be drawn from the augmented comparison approach. Although the results can be refined, it is clear from this initial analysis that the TEE Program has effected the electric consumption of the participants. In addition, the initial estimates can be considered a substantial amount of energy savings.

The variability of the savings estimates produced by this method is quite large. To produce a more precise estimate of savings, the regression approach was implemented.

5.2 The Regression Approach Analysis Results

The regression analysis was implemented using the four-step approach described in Appendix A. Unfortunately, there was not engineering estimates of savings available for the individual customers to incorporate into the model.

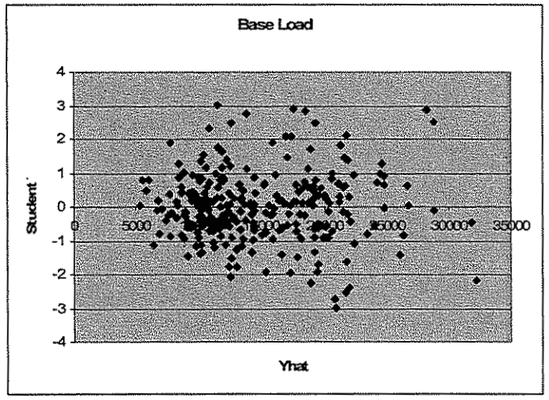
The initial analysis step was to build a simple regression model. As noted above, no engineering estimates of savings were available to this analysis. Accordingly, the analysis was performed using a participation indicator variable.

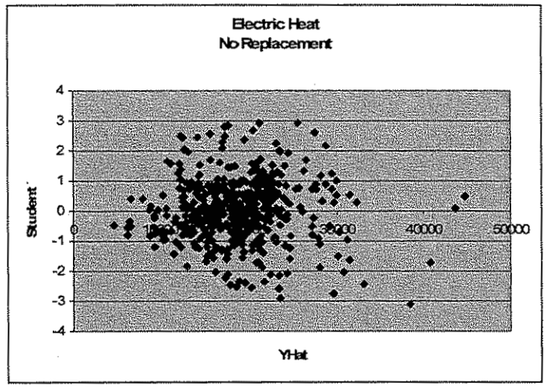
Heating System	Electric Heat Replaced	Electric Heat Not Replaced	Electric Heat Total	Base Load	Program Total
Pre Installation NAC (kWh)	20,828	19,755	19,953	14,559	18,170
Mean Savings (kWh)	3,700	1,217	1,677	1,092	1,483
Pct Savings	18%	6%	8%	7%	8%

Table 8 - Average Savings Estimates From Simple Model

Table 8 shows the average savings estimates from the simple model. The savings estimates shown in this table are not statistically different from the PRISM results. However, the estimates are much less variable. The savings for the average electric heat participant was 1,677 kWh/year. This is an 8% reduction from the pre-installation NAC. The savings estimate for the base load participants was 1,092 kWh/year. This is a 7% reduction from the pre-installation NAC.

One of the fundamental regression assumptions is that the standard error of the error terms (or residuals) has a constant variance across the range of predicted values. When the residuals are related to the predicted values, the model is said to be *heteroscedastic.* Heteroscedasticity is a violation of the basic regression assumptions that could lead to mis-specification of the mathematical relationships. Specifically, as a result of the residual standard error being related to the size of a customer's usage, heteroscedasticity will miss-estimate the confidence interval around the estimates. Heteroscedasticity is common in cross sectional models such as the Simple Model discussed above.





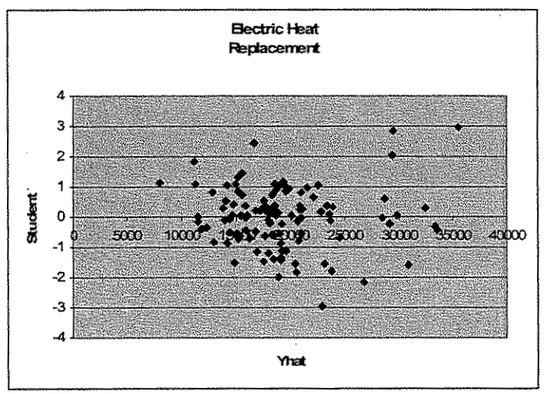


Figure 2 - Residual Plots

Figure 2 shows the residual plots of the error terms to the pre-installation NAC. In these figures, the residual for each participant and control group member is plotted on the

vertical axis and that customer's pre-installation NAC is plotted on the horizontal axis. These figures do not strongly suggest that as the pre-installation NAC increases as does the variance (i.e., the spread) of the residuals, which would be typical of a heteroscedastic relationship.

When heteroscedasticity is present, the ordinary least squares (OLS) regression approach to establishing the relationship between the dependent variable, and the independent variables may be inappropriate. Accordingly, a WLS approach was applied to see what, if any effect that heteroscedastic was influencing the analysis. The initial WLS analysis was performed using the Simple Model described above. Families of weights based on the standardized geometric mean, raised to the gamma power were developed. In order to determine the optimal gamma, the Simple model was calculated for each of the weights. The model that minimized the mean squared error was chosen as the optimal model.

Heating System	Electric Heat Replaced	Electric Heat Not Replaced	Electric Heat Total	Base Load	Program Total
Pre Installation NAC (kWh)	20,828	19,755	19,953	14,559	18,170
Mean Savings (kWh)	3,130	1,109	1,483	1,131	1,367
Pct Savings	15%	6%	7%	8%	8%

Table 9 - WLS Savings Estimates

Based on the WLS regression technique, the average savings were estimated. Table 9 shows the average savings estimates from the WLS model. Again, the savings estimates shown in this table are not statistically different from the PRISM results. However, the estimates are much less variable. The savings for the electric heating participants were 1,483 kWh/year per customer. This is a 7% reduction from the pre-installation NAC. The savings estimate for the base load customers was 1,131 kWh/year. This is an 8% reduction from the pre-installation NAC.

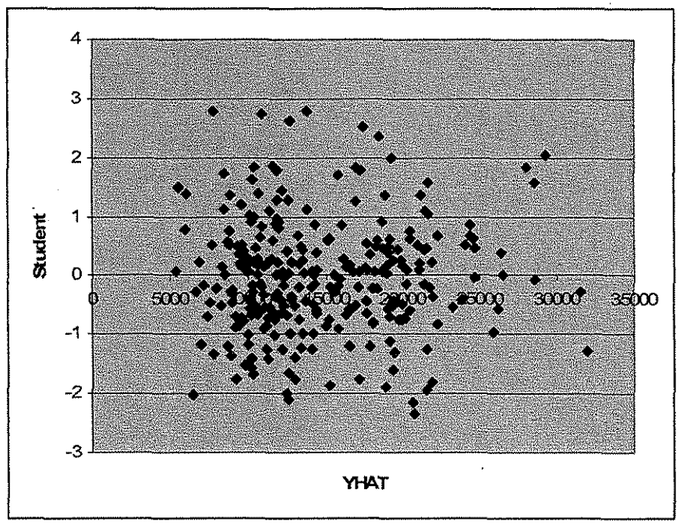


Figure 3 - Residual Plot-Weighted Least Squares Results

Figure 3 shows the residual plots for the WLS model. These plots show that the WLS approach has addressed the heteroscedasticity inherent in the data. Accordingly, it is appropriate to use WLS.

5.3 Summary of Analysis Results

Figure 4 shows a comparison of the savings estimates. Among the estimates based on billing analysis alone, the various procedures produced a range of point estimates of savings. However, the differences cannot be considered statistically significant. Among these estimates, the choice of the estimate that produces the most accurate estimate of program impact can be analytically determined. This "best" estimate of savings was determined by a review of the process to develop the estimates. The Augmented Comparison Approach (PRISM) produces unnecessarily large confidence intervals. The Simple Regression Approach produces valid estimates of savings, but violates some fundamental regression assumptions. The WLS regression model does not violate the basic regression assumptions, and contains only statistically significant variables. Therefore, the results based on this latter approach are used to define the most accurate estimate of savings.

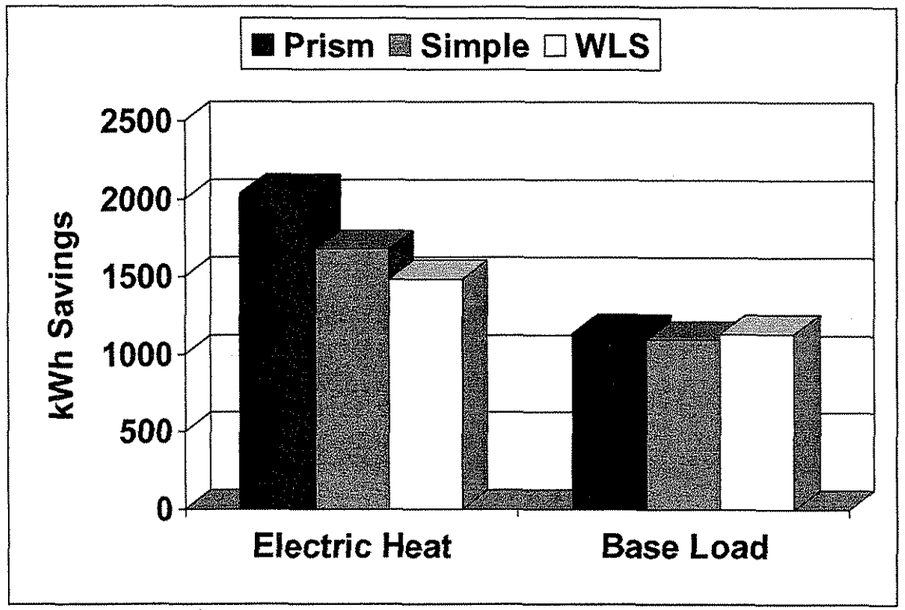


Figure 4 - Comparison of Savings Estimates

To determine the total annual impact of the program, the average per customer savings for each group (i.e., electric heat and base load) were multiplied by the number of customers in that group. Based on this analysis it shows that, in total, the 2006-2007 TEE Program saved about 331 MWH/year.

Appendix A Methodology

Methodology to Develop the Participant Analysis Group

The first step in the analysis of the TEE Program was to identify all participants that could contribute to the analysis. To this end, KPCo constructed a data set of all known participants' electric usage history. This data set contained information for 242 participants.

Once the billing data set was constructed it was examined, consisting of the following three steps:

- Merge billing data with site specific information.
- The first step eliminated records with unusually long or short number of days, bills with large or zero consumption, or any bill that was not within two years of the completion date.
- The next step limited the analysis to customers that had sufficient information during the pre and post installation periods. This included at least 275 days in each period, which consisted of at least 9 billing periods of information, having a minimum of 2 summer billing periods and 2 winter billing periods.

Methodology to Develop the Control Group

The Control Group for the TEE Program was developed following a four-step algorithm:

1. An appropriate pool of potential control group customers was established,
2. Criterion was developed to match control group pool customers to participants,
3. Known participants were eliminated from the control group pool, and
4. The control group pool customers were compared to each participant. Based on the established criteria, the best Control Group pool matches were selected.

Each of these steps is explained in detail below.

Step 1: The Establishment of a Control Group Pool

In order to develop a control group for the TEE Program, KPCo selected a large sample of LIHEAP customers. The customers in the Control Group Pool were examined, and if necessary, edited. This examination was consistent with the editing procedure applied to the participants.

Step 2: The Establishment of Control Group Matching Criteria

Based on the available information, criteria to match Control Group customers to specific participants were established. These criteria were based on annualized 2006 usage, as defined by Equation 1, pseudo summer load factor[2] and pseudo winter load factor, as defined by Equation 2.

[2] Typically a 'load factor' will describe a peak demand in relationship to an average demand for a period. Since demand information was not available, a proxy variable, the pseudo load factor, was used. The pseudo load factor describes the relationship between the average annual daily use and the average daily usage during the peak month.

$$AU = \frac{(\Sigma U_i)*365}{(\Sigma D_i)}$$

Where;

AU	=	Annualized Usage
U_i	=	Monthly Billed Consumption
D_i	=	Monthly Days in the Cycle

Equation 1 - The Calculation of Annualized Usage

$$LF = \frac{kWh_a}{(kWh_m)*12}$$

Where:

kWh_a	=	Annualized kWh
kWh_m	=	Peak Month Usage.

The pseudo summer load factor was based on the July bill. For the pseudo winter load factor, the monthly peak month usage was based on the January bill.

Equation 2 - The Calculation of Pseudo Load Factor

Step 3: Eliminating Known Participants

After the initial edits, any known current TEE Program participants were eliminated from the control group pool. This was done by matching the current participants against the Control Group Pool database.

Step 4: The Establishment of the Control Group

During this step, each control group pool customer was compared to each participant. For each control group pool customer within a given strata, the relative deviation in annualized usage was calculated using Equation 3.

$$ARD = \frac{(|U_c - U_p|)}{U_p} * 100$$

Where;
ARD = Absolute Relative Deviation
U_c = Annualized Usage for Potential Control Group Member
U_p = Annualized Usage for Participant

Equation 3 - The Determination of the Absolute Relative Deviation

For each participant, the ten control group pool customers with the smallest absolute relative deviation in the annualized usage was chosen for each participant. These ten control group matches were then examined further.

Based on the matching of the program participants, each selected control group member was assigned an installation date. This information was used to split the customers in the control group into pre- and post installation periods that are consistent with that of their matched participant.

Next, each member of the control group was checked to confirm that they had enough pre-installation and post installation billing data to be analyzed. This editing process was consistent with that applied to the participant group.

The best control group match was always chosen, and up to two others were chosen if the annual usage relative deviation was less than 10%. These customers were designated the Control Group.

The Control Group was chosen *with replacement*. Selecting a sample with replacement allows a customer to have the potential of being designated a Control Group member for more than one participant.

Temperature Normalization Methodology

The temperature normalization procedure used for this analysis is the *Princeton Scorekeeping Model* (PRISM) algorithm. Through years of experience, RLW has taken the fundamental concept of the PRISM methodology and refined it to produce more accurate estimates of normalized annual consumption (NAC).

The PRISM algorithm develops a mathematical model that represents the temperature to energy consumption relationship. The standard, Heating-Only version of this model is shown in Equation 4.

$$U_i = \alpha + \beta * DD_i(\tau) + e_i$$

Where;

U_i = average daily consumption in interval i.
$DD_i(\tau)$ = average degree days in interval i, based on reference temperature τ.
α,β = parameters to be estimated to minimize e.
e = a random error term.

Equation 4 - The PRISM Heating Only Model

The PRISM model reflects that a customer's energy usage is equal to some base level α, and a linear function between a reference temperature τ, and the outside temperature. The constant proportionality, β, represents a customer's effective heat-loss or heat-gain rate.

PRISM recognizes that each customer has unique space conditioning operating characteristics. To capture these unique space-conditioning characteristics, PRISM examines a range of heating and cooling reference temperatures. The model chosen to represent a customer's energy use is the model that best linearizes the relationship between usage and degree-days. For each customer, an optimal model based on a unique reference temperature (τ) is identified by the minimum mean squared error (MSE) of the regression.

Once the optimal parameters have been established, normalized annual consumption is estimated using Equation 5.

$$NAC=365*\alpha+\beta*DD_o(\tau)$$

Where:

DD_o is the number of degree days expected in a typical year.

Equation 5 - Determination of Normalized Annual Consumption (NAC) [3]

When this model is applied to a home's heating characteristics, it is referred to as the *heating only model* (HOM). When this model is applied to a home's cooling characteristics, it is referred to as the *cooling only model* (COM).

For the analysis of electric consumption data, it was not known whether or not the participants or control group members had significant space conditioning load. Therefore, the first adaptation of the PRISM methodology was to consider a *heating and cooling model* (HCM), along with the standard PRISM *heating only* or *cooling only models*. The expansion of the standard PRISM approach to consider heating and cooling loads is calculated using Equation 6.

[3] For a more comprehensive technical discussion of PRISM, see Impact Evaluation of Demand-Side Management Programs, Volume 1: A Guide to Current Practice, EPRI Report CU-7178,V1, pages 5-6.

$$U_i = \beta_0 + \beta_1 * HDD_i(\tau_1) + \beta_2 * CDD_i(\tau_2) + e_i$$

Where:

U_i	=	The electric usage during cycle i.
$HDD_i(\tau_1)$	=	The heating degree days based on reference temperature τ_1, during cycle i.
$CDD_i(\tau_2)$	=	The cooling degree days based on reference temperature τ_2, during cycle i.
β_i	=	The coefficients to be estimated to minimize the error term.
e_i	=	The error in predicting U.

Equation 6 - PRISM Heating and Cooling Model

As with the standard PRISM procedure, the optimal heating and cooling model is determined by calculating the regression models assuming various reference temperature values (τ_1 and τ_2). Expected annual degree-days are applied to the optimal model to calculate a normalized annual consumption (NAC). The results of the model can be interpreted as:

- β_o is an estimate of the average base load for a cycle;
- β_1 represents the heating slope, or the increase in electric usage for each incremental increase in heating degree days; and,
- β_2 represent the cooling slope, or the increase in electric usage for each incremental increase in cooling degree-days.

The standard PRISM approach uses usage and degree-day data on a billing cycle basis. However, the data has an inherent variability associated with the varying lengths of billing cycles. For the estimation of the heating and cooling slopes (β_1, and β_2) the effects of the varying lengths of the billing cycle are mitigated. This is a result of the number of degree-days being directly correlated to the number of days in the cycle. However, the estimates of base load (β_0) reflects the average base load per cycle and does not account for the days in the cycle. In effect, this estimate infers the base load will be β_o, regardless of the length of the cycle. Since base load usage is a function of time, this result may introduce a slight bias into the calculation. To eliminate this bias, the augmented PRISM approach uses usage per day as the dependent variable, and expresses the degree days on a per day basis.

The PRISM methodology assumes that there is a linear relationship between usage and temperature. However, if the assumption is not valid, it could lead to a violation of a basic regression assumption (i.e., the error terms are uncorrelated). To avoid any bias, two additional terms was considered in developing individual customer electric models. These terms are heating degree-days squared, and cooling degree-days squared. The incorporation of these variables result in Equation 7.

$$U_i = \beta_0 + \beta_1 * HDD_i(\tau_1) + \beta_2 * (HDD_i(\tau_1))^2 + \beta_3 * CDD_i(\tau_2) + \beta_4 * (CDD_i(\tau_2))^2 + e_i$$

Equation 7 - Electric PRISM Model, with Second Order Terms Incorporated

Alternative models, with different numbers of independent variables, introduce a challenge to choosing an optimal model. The standard PRISM approach relies on the maximization of R^2 to indicate the optimal model. However, in building mathematical regression models, the R^2 statistic has a tendency to increase as the number of independent variables increases. Therefore, when comparing models with different numbers of regressors, the maximum R^2 criteria may not lead to choosing the optimal model between alternative models. To avoid this possibility, an alternative method to determine the optimal model was used. The minimization of the mean squared error of the residuals (MS_E) is a good alternative. The MS_E accounts for the decrease in the degrees of freedom when an additional regressor is added to the equation. Therefore, the model that minimized the MS_E was chosen as the optimal model to represent the temperature versus usage relationship.

Lastly, in an effort to obtain the most accurate models possible, a system of re-analyzing poor performing models was developed. A "poor performing model" is defined as one that produced a low R^2 statistic.

The determination of the optimal model used a four-step approach. These steps are:

1) The optimal models are determined using all available data.
2) If the optimal model produced in Step 1 has a poor R^2, the usage data point with the largest prediction error was omitted. Using this trimmed and edited data set the models were re-estimated.
3) Choosing the optimal model for each customer from the first two steps, the customers with poor R^2 are again identified. For these customers, the usage data was limited to the most recent year of information. Using this trimmed data set, the models were re-estimated.
4) The models developed for each customer in each of the first three steps are compared. The optimal model (i.e., the model that minimizes RMSE) was chosen.

Normal temperatures were applied to the optimal models generated by this algorithm. The estimates produced are the Normalized Annual Consumption (NAC) for each period.

Energy Impact Analysis Methodology

In the evaluation of the TEE Program, the following two different methods were used. First, the energy impact was determined using an Augmented Comparison Method (PRISM). The second approach was a Regression Approach. This section discusses the methodology used to determine the energy impacts of the TEE Program.

The Augmented Comparison Approach

An augmented comparison approach controls for weather and other factors using a representative control group and simple equations. After the normalization of the participant and control group bills (see Temperature Normalization Methodology), the difference between the pre-program and post-program NACs were used to determine the raw energy savings that can be attributed to the program. The determination of energy savings is calculated using Equation 8.

$$S_{raw}=NAC_{Pre\text{-}Program} - NAC_{Post\text{-}Program}$$

Equation 8 - The Augmented Comparison Approach Determination of Gross Savings

To account for exogenous influences, the raw savings expressed in can be adjusted by using a representative control group. If it is assumed that the same outside influences are affecting both the control and participant groups, then the adjustment will yield an estimate of energy savings that are isolated from all other influences. Determining the pre- and post-program NACs for both the participant and control groups makes this adjustment. The estimated savings are calculated by adjusting the participant results by the Control Group results. This adjustment is shown in Equation 9.

$$S_{adjusted} = NAC_{pre-program}(P_i) * \frac{NAC_{Post-Program}(C_i)}{NAC_{Pre-Program}(C_i)} - NAC_{post\,Program}(P_i)$$

Where:

C_i = The average of control group members associated with participant *i*.
P_i = Participant *i*.

Equation 9 - The Augmented Comparison Approach, Determination of Net Savings

While this method is simple, it can obscure real program effects and usually produces a high variability around the estimate.

The Regression Approach

The regression approach was performed using a comprehensive and systematic approach. This approach, presented below, has been applied with great success to the analysis of conservation programs.

The regression approach consisted of four steps that result in the selection of an optimal model that accurately quantifies the program impact. This sub-section describes the four steps of the regression approach.

Step 1: The Simple Model

During this step an initial regression model is developed using ordinary least squares ("OLS"). This simple model determined the effect of *one* important change variable (i.e., the participation indicator variable status, or the participants engineering estimate of savings) on energy savings *while controlling for all other changes*. The basic form of this model is shown in Equation 10.

$$NAC_{post,i} = \beta_0 + \beta_1 NAC_{Pre,i} + \beta_2 P_i + \varepsilon_i$$

Where:

$NAC_{post,i}$ = Post Installation Normalized Annualized Consumption for customer i
$NAC_{pre,i}$ = Pre Installation Normalized Annualized Consumption for customer i
P_i = Participation Indicator Variable or Engineering Estimate of Savings
ε_i = Prediction error

Equation 10 - The Simple Regression Model

Step 2: Regression Diagnostics

As a result of the residual standard deviation related to the size of the customer's energy usage, one regression assumption most often violated is that the standard deviation of the error terms, (or "residuals") is not constant across the range of predicted values. When the standard deviation residuals are related to the predicted values, the model is said to be "heteroscedastic." Heteroscedasticity can often be detected in cross sectional models used to analyze program impacts. During this step, verification that the regression assumptions are valid is performed. If the initial regression model is found to be "heteroscedastic" further regression analyses are performed. These analyses are performed using a weighted least squares ("WLS") approach.

Step 3: Weighted Least Squares

As discussed above, one of the fundamental regression assumptions is that the standard deviation of the error terms (or residuals) has a constant variance across the range of predicted values. When the residuals are related to the predicted values, the model is said to be heteroscedastic. Heteroscedasticity is a violation of one of the basic regression assumptions and could result in the miss-specification of mathematical relationships. As a result of the residual standard deviation being related to the size of the customer's energy usage, heteroscedasticity is often detected in cross sectional models used to analyze program impact.

When heteroscedasticity is present, an ordinary least squares (OLS) approach to establishing the relationship between the dependent and independent variables may be inappropriate. An OLS approach that does not correct for the heteroscedastic relationship of its residuals will yield confidence intervals[4] that are misleading. More specifically, when heteroscedasticity is present, the

[4] Even though it is the best possible estimate given the data, it is unlikely that the point estimate will exactly equal the true, unknown parameter being estimated. Accordingly, instead of using a single value to

OLS regression coefficients are unbiased estimates of the true parameters, but they are subject to greater statistical variation than the appropriate estimates. Moreover, the standard errors produced by the OLS regression analysis are biased estimates of the true standard deviations of the regression coefficients.

Weighted least squares (WLS) is one approach to correct for heteroscedasticity in regression analysis. According to econometric theory, the advantages of WLS are:

a) Under a properly specified heteroscedastic model, WLS yields the best linear unbiased estimates of the true parameters and,
b) WLS gives an unbiased estimate of the variance of the estimators, providing appropriate confidence intervals and p-values.

In other words, WLS provides the most reliable estimate of savings and an accurate measure of the resulting reliability. The theory of WLS depends on a correct specification of the heteroscedasticity. The theory assumes that a positive-valued variable can be specified, say z, such that the residual standard deviation is proportional to z. Usually, z is taken to be some measure of size (for example, the pre-retrofit NAC consumption).

The benefits of WLS depend on the correct choice of z. Therefore, it is useful to have a way of comparing alternative candidates for z. If it can be confirmed that heteroscedasticity is present, the following procedure[5] is employed:

1. Postulate a family of possible candidates for z. In the following analysis, the regression has been estimated assuming that the residual standard deviation is proportional to pre-retrofit NAC dampened by raising this variable to some power between 0 and 1. This variable will be termed $(NAC_{Pre})^{\gamma}$, where $\gamma \geq 0$. Here the exponent, gamma, is an unknown parameter that creates a family of candidate choices of z.

2. For each candidate of z, geometrically standardize z by dividing each value of z by the geometric mean of the n sample values of z. The geometric mean is the n^{th} root of the product of the n values of z.

3. Fit the regression model using WLS with each geometrically standardized z, and calculate the root mean square error (RMSE) of each regression model.

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estimate the true, unknown value, it is common to use a set of values or a *confidence interval*. A confidence interval is a range of values between which we can define a statistical probability, based on the estimate variability that the true value will fall. Generally, the higher the probability, the wider the confidence interval. Usually, the confidence interval is stated in terms of the probability that the true value will fall within plus or minus the interval around the point estimate. For example, given a 90% confidence level (the probability), the true mean will fall within ± 5% of the estimated mean.

[5] The justification for this approach is from the statistical theory of maximum likelihood estimation. Although the WLS is different, the mathematical derivation of the methodology is the same as used by Box and Cox in their paper An Analysis of Transformations, (Journal of the Royal Statistical Society, Series B, 1964). A good summary of the approach is given in the text *Econometrics,* by G.S. Maddala, McGraw-Hill, 1977, pp. 315-317. J. Kmenta gives a similar methodology in Elements of Econometrics, to deal with autoregression in time series analysis.

4. Minimize the RMSE to find the best choice of z and use this particular WLS regression to obtain the best estimate of savings.

During this step, a residual analysis is performed. If heteroscedasticity is suspected, the models are estimated using WLS.

Step 4: Calculation of Energy Savings

The final step in the analysis estimates the energy savings by using the resultant models.

Appendix B Temperature Normalization Results Details

The original simple model approach (i.e., Step 1, all available data) was the most accurate for each group and used for this evaluation. None of the periods were improved by the alternative methods listed in (Steps 2 and 3).

As detailed in Appendix A Temperature Normalization Methodology, four variables were considered for the electric models. Heating and cooling degree-days were considered. Figure 5 shows that for the participants, models that featured the heating and cooling PRISM models were chosen nearly 70% of the time. The distribution of the type of models is fairly consistent from period to period and within customer groups. This suggests the models are stable across time and that the control group is well matched to the participant group.

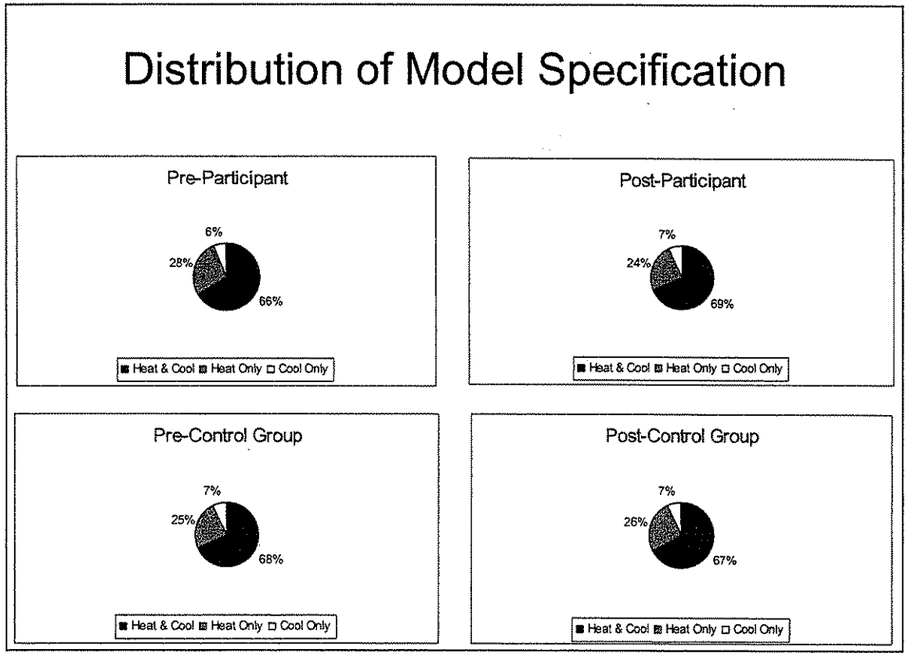

Figure 5 – Distribution of Model Specification

Table 10 compares the distribution of set points for the degree-day variables. For the participants, the median heating degree-day reference point was 60°F in the pre- and 58°F in the post-installation periods. For the control group, the median heating degree-day reference point was 60°F in the pre-and 59°F in the post-installation period. For the participants, the median cooling degree-day reference point was 67°F in the pre- and 67°F

in the post-installation periods. For the control group, the median cooling degree-day reference point was 66°F in the pre-and 68°F in the post-installation period. The distribution points of both groups are strikingly similar. This reinforces the conclusion that the models are stable across time and that the control group is well matched to the participant group.

	Heating Degree Day Reference Temperatures			
	Pre-Installation		Post-Installation	
Statistics	Participant	Control Group	Participant	Control Group
Maximum	74	74	74	74
75th Percentile	65	65	65	65
Median	61	60	58	59
Mean	60	60	59	59
25th Percentile	53	55	52	52
Minimum	50	50	50	50
	Cooling Degree Day Reference Temperatures			
	Pre-Installation		Post-Installation	
Statistics	Participant	Control Group	Participant	Control Group
Maximum	75	75	75	75
75th Percentile	73	70	71	72
Median	67	65	67	68
Mean	68	66	67	67
25th Percentile	64	62	62	62
Minimum	60	60	60	60

Table 10 – Distribution of Degree-Day Set Points

Table 11 shows the distribution of the R^2 statistics. For the participants and the control group, about half the models had R^2 over 90%. Again, the distribution of R^2 for each group in each period is very similar, supporting the conclusion that the models are stable across time and that the control group is well matched to the participant group.

	Pre-Installation		Post-Installation	
Statistics	Participant	Control Group	Participant	Control Group
Maximum	100%	100%	100%	100%
75th Percentile	96%	96%	97%	97%
Median	89%	91%	92%	93%
Mean	81%	84%	85%	88%
25th Percentile	80%	83%	82%	85%
Minimum	1%	0%	0%	0%

Table 11 – Distribution of R-Squared Statistics for the Electric Models

KENTUCKY POWER COMPANY
2007 TARGETED ENERGY EFFICIENCY PROGRAM

2007 ENGINEERING ESTIMATION

Draft Report

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Prepared for:

American Electric Power
1701 Central Avenue
P.O. Box 1428
Ashland, KY 41105-1428

Prepared By:

RLW Analytics, Inc.
2 Hyde Road
Clark Lake, MI 49234
(517) 529-6277

KENTUCKY POWER COMPANY
TARGETED ENERGY EFFICIENCY PROGRAM
2007 ENGINEERING EVALUATION

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1 Introduction

This report presents the 2007 Engineering Evaluation of Kentucky Power Company ('KPCo') Targeted Energy Efficiency Program ('TEE Program'). The TEE Program is designed to perform energy audits, provide energy education to all households, perform blower door tests and install extensive weatherization and energy conservation measures to low income customers living within the KPCo service territory. The TEE Program is a "piggyback" program leveraging the resources of five not-for-profit agencies including:

1. Big Sandy Area Community Action Agency
2. Gateway Community Action Council
3. LKLP Community Action Council
4. Middle Kentucky Community Action Partnership, Inc.
5. Northeast Kentucky Community Action Agency

These five agencies provide weatherization services to low-income customers via the existing Weatherization Assistance Program. This program is offered to electric heat and non-electric heat customers.

The primary objective of this evaluation was to quantify the savings for the 2007 program year. For this evaluation, engineering estimation was used to estimate 2007 program impacts. Engineering calculations provide energy savings estimates at the measure, project, and program levels.

Simple accounting of program activity from a tracking system typically represents the first level of impact evaluation for DSM programs. To enhance the accounting approach, engineering estimates can be developed through using the information contained in the program's tracking information. Engineering analyses offer reliable means for estimating program impacts at reasonably low costs.

For the engineering analysis component of the evaluation, individual estimates were developed based on the information contained in the data collection forms recorded at the time of measure installation.

The engineering analysis was performed by major end-use measure category. These categories included:

1. Lighting measures
   - CFL Light bulbs
2. Air infiltration measures,
3. Insulation measures
   - Attic Insulation
   - Wall Insulation
   - Floor Insulation
4. Heating system replacements,
5. Domestic hot water measures
   - Low-flow showerhead installation
   - Hot water heater tank wrap installation
   - Hot water heater temperature reduction
   - Hot water pipe insulation

The following sections discuss the engineering estimation approach for each measure and provide estimates of savings based on information contained in the data collection forms. It is important to note that no interactive savings effects are calculated.

2 Lighting Savings

The engineering estimation of annual lighting energy savings is as follows:

$$\text{Annual kWh savings} = (\Delta\text{Watts} \times \text{Hours}) / 1000$$

This algorithm is a straightforward and simple calculation, with the proper inputs for the wattage reduction and hours of use taken from the data collection forms.

2.1 Tracking Estimate of Savings for Lighting

Lighting measures were installed in 79 base load and 228 electric heat participants. Two CFL bulbs were installed in all of the base load and electric heat participants, a third CFL bulb was installed in 55 base load and 145 electric heat participants. The average wattage reduction was calculated to be 50.0 watts for the first bulb, 49.9 watts for the second bulb, and 52.5 watts for the third bulb. The average hours of use for the first bulb was estimated to be 7.3 hours, 6.7 hours for the second bulb, and 9.4 hours for the third bulb. This yields an average annual savings of 141 kWh for the first bulb, 126 kWh for the second bulb, and 178 kWh for the third bulb. In aggregate, the total annual savings associated with lighting measures were calculated to be 117,830 kWh. This yields overall average savings per participant of 384 kWh.

Table 1 shows the lighting tracking estimates of savings for installations done in 2007 through the TEE Program.

Customer Type	Average Wattage Reduction Bulb 1	Average Daily Hours of Use Bulb 1	Average Wattage Reduction Bulb 2	Average Daily Hours of Use Bulb 2	Average Wattage Reduction Bulb 3	Average Daily Hours of Use Bulb 3	Total Savings for CFL Installations (kWh)	Average Savings Per Customer for CFL Installations (kWh)
Electric Heat	49.90	7.11	49.74	6.61	53.81	9.41	85,982	377
Non-Electric Heat	50.45	7.97	50.38	7.03	48.94	9.27	31,848	403
Combined	50.04	7.33	49.91	6.71	52.50	9.38	117,830	384

Table 1: Lighting Savings Estimates

3 Air Sealing

To develop the engineering savings associated with air sealing measures we calculate the reduction in heat loss, in BTU/hr, due to infiltration using the following equation:

$$H_L = V \times \Delta T \times C_P$$

In this equation, V is the volume of outdoor air entering the building in cubic feet per hour, Δ T is an assumed temperature difference of 70 °F between the inside and outside of the heated space,

and C_p is the specific heat of air which is 0.018 BTU/ft^3-°F. The result is applied to the following equation to calculate the kWh savings per year:

Electric Resistance Heating Systems:

$$\text{Annual kWh} = \frac{H_L \text{ X HDD X } C_D \text{ X 24}}{3{,}413}$$

In this equation, HDD is the amount of heating degree-days, which varies by location. C_D is an empirical correction factor for the degree-day estimate, H_L is the building heat loss, and 24hrs/day and 3,413 BTU/kWh are conversion factors.

Assumptions:

HDD = 4,555 (Avg. mean of Ashland and Williamsburg)
C_D = 0.65 (from ASHRAE Handbook 1985 Fundamentals)

3.1 Tracking Estimate of Savings for Air Sealing

Infiltration measures were installed in 227 of the electric heat participant homes. In aggregate, the total annual energy savings associated with sealing measures were calculated to be 421,074 kWh. This yields overall average savings of 1,855 kWh per tracking system participant.

4 Insulation

To calculate the engineering estimate of savings associated with insulation measures we use the reduction of heat loss, in kWh per year, due to insulation:

Electric Resistance Heating Systems:

$$\text{Annual kWh} = \left(\frac{1}{R_{old}} - \frac{1}{R_{new}}\right) \text{X} \frac{\text{HDD X } C_D \text{ X A X 24}}{3413}.$$

In this equation, R_{old} and R_{new} are the total thermal resistance values, or R-values, for the surface in question both before and after the installation of the insulation. HDD is the amount of heating degree days, C_D is an empirical correction factor for the degree day estimate, A is the surface area, and 24 hrs/day and 3413 BTU/kWh are conversion factors.

Assumptions:

HDD = 4,555 (Avg. mean of Ashland and Williamsburg)
C_D = 0.65 (from ASHRAE Handbook 1985 Fundamentals)

4.1 Tracking Estimate of Savings for Insulation Measures

Approximately 127,273 ft^2 of insulation was installed in the electric participant homes, 114,271 ft^2 in the floor, 9,517 ft^2 in walls, and 3,485 ft^2 in the attic area. In aggregate, the total annual energy savings associated with insulation measures were calculated to be 505,168 kWh. Average savings per participant for attic areas were 1,243 kWh, walls were 2,826 kWh, and floors were 3,010 kWh.

Table 2 shows the insulated area square footage and savings estimates for the attic, wall and floor insulation measures that were installed in 2007 through the TEE program.

Area	Insulated Area (ft^2)	Total Savings (kWh)	Average Savings Per Home (kWh)
Attic	3,485	8,703	1,243
Walls	9,517	48,034	2,826
Floors	114,271	448,431	3,010
Total	127,273	505,168	3,460

Table 2: Insulation Savings Estimates

5 Domestic Hot Water

5.1 Water Heater Tank Wrap

Engineering estimates for the water heater tank wrap are based on the reduction of heat loss through the walls of the water heater. Standby losses are calculated using the heat transfer coefficient (U-value) of the tank before and after the installation of the insulating wrap, the outer surface area of the tank, and the temperature difference between the water and the outside of the tank. Also, water heater recovery efficiency is incorporated into the equation resulting in the following form:

$$TWSavings = \frac{(U_{pre} - U_{post}) \times (T_{hw} - T_{env}) \times tnkarea \times 8760}{EFF_r \times 3413}$$

Where:

TWSavings	= annual energy savings due to tank wrap installation in kWh;
U_{pre}	= U-value of tank wall prior to wrap (Btu / hr-ft²-°F);
U_{post}	= U-value of tank wall after installation of wrap (Btu / hr-ft²-°F);
T_{hw}	= measured hot water temperature in °F;
T_{env}	= average annual temperature outside of the tank, 58 °F if in unconditioned space, 72°F if in conditioned space;
tnkarea	= insulated surface area of tank in ft²;
8760	= number of hours per year;
EFF_r	= water heater recovery efficiency, .98 for electric water heaters, 1.8 for heat pump water heaters;
3413	= conversion factor Btu/kWh.

5.1.1 Tracking Estimate Savings for Tank Wraps

An insulation tank wrap was installed on 40 base load and 127 electric heat participants'. In aggregate, the total annual energy savings associated with tank wrap installations were calculated to be 23,746 kWh. This yields overall average savings per tracking system participant of 142 kWh.

5.2 Hot Water Temperature Turndown

RLW estimates this measure's savings by combining two of the model elements previously described to estimate annual hot water usage in the home and annual standby losses from the hot water heater before and after temperature turndown. The difference between these two estimates provides the savings value from our analysis.

Annual hot water usage for each household is estimated using the LBL model described for the pipe insulation measure presented below. This method predicts average daily hot water usage by household, based on the number of occupants, the age distribution of the occupants, the hot water using appliances present in the home, and whether or not the occupants pay for their hot water usage. Since this model contained hot water temperature as a term in the equation, it is applied twice using the temperature before and after turndown to derive an estimate of daily (and annual) hot water usage in the household.

Annual energy use due to standby losses is calculated using the equation utilized to estimate savings for the water heater tank wrap measure, but using the difference in temperature values associated with the temperature turndown instead of the difference in U-value associated with the tank wrap.

The resulting equation used to estimate savings from the temperature turndown measure is as follows:

$$TTSavings = \frac{1}{EFF_r \times 3413} \times \left\{ \begin{Bmatrix} 365 \times M_w \times Cp_w \times \begin{bmatrix} (HWUse_{bt} \times (T_{bt} - T_{cw})) \\ -(HWUse_{at} - (T_{at} - T_{cw})) \end{bmatrix} \end{Bmatrix} + \{U_{tank} \times tnkarea \times 8760 \times (T_{bt} - T_{at})\} \right\}$$

Where:

TTSavings	= annual energy savings due to hot water temperature turndown in kWh;
EFFr	= water heater recovery efficiency, .98 for electric water heaters, 1.8 for heat pump water heaters;
3413	= conversion factor Btu/kWh;
365	= 365 days per year;
M_w	= mass of water, or 8.33 lbm/gallon;
Cp_w	= specific heat of water, or 1.0 Btu/lbm. °F;
$HWUse_{bt}$	= daily hot water use before temperature turndown in gallons;
$HWUse_{at}$	= daily hot water use after temperature turndown in gallons;
T_{bt}	= hot water temperature before turndown in °F;
T_{at}	= hot water temperature after turndown in °F;
T_{cw}	= average water heater inlet, or cold water temperature, (55 °F);
U_{tank}	= hot water tank U-value (Btu/hr. ft². °F);
tnkarea	= surface area of tank in ft².

5.2.1 Tracking Estimate of Savings for Hot Water Temperature Reduction

The hot water temperature was turned down in 8 base load and 7 electric heat participants. The average temperature reduction was 13.7°F. In aggregate, the total annual energy savings associated with hot water temperature reduction were calculated to be 5,923 kWh. This yields overall average savings per participant of 395 kWh.

5.3 Low-Flow Showerheads

RLW applies a formula that accounts for the number of showers per day, shower duration, flow reduction, and the temperature difference between the supply water temperature and the estimated shower temperature for the summer and winter periods. This formula is shown below:

$$SHSavings = \sum_{seas} \frac{Shwrd \times NShwrs \times Wk_{seas} \times 7 \times \Delta flow \times M_w \times Cp_w \times \Delta T \times HWPct_{seas}}{EFF_r \times 3413}$$

Where:

SHSavings	= annual Energy Savings due to low flow showerheads in kWh;
seas	= season of the year (summer and winter);
Shwrd	= shower duration in minutes per shower, or 7.4[1];
NShwrs	= number of showers per day, equal to the number of occupants above age 6;
Wk_{seas}	= number of weeks per season equal to 26 each for summer and winter;
7	= number of days per week;
Δflow	= change in flow due to showerhead installation in gallons/minute, or 0.7[1];
M_w	= mass of water, or 8.33 lbm/gallon;
Cp_w	= specific heat of water, or 1.0 Btu/lbm. °F;
ΔT	= temperature difference between hot water and cold water (T_{hw} – 55 °F) with T_{hw} as measured on site;
HWPct	= percentage of shower water which is hot water by season (shown below);
EFFr	= water Heater Recovery Efficiency, .98 for electric water heaters, 1.8 for heat pump water heaters;
3413	= conversion factor Btu/kWh.

$$HWPct_{seas} = \frac{T_{shower,seas} - T_{cw}}{T_{hw} - T_{cw}}$$

Where:

$T_{shower.seas}$	= shower temperature per season, 110 °F for the winter, 100 °F for the summer;
T_{cw}	= cold water temperature, or 55 °F;
T_{hw}	= hot water temperature (measured) °F.

If T_{hw} as measured < T_{shower}, then HWPct = 1

5.3.1 Tracking Estimate of Savings for Low-Flow Showerheads

Low-Flow showerheads were installed at a total of 63 base load and 166 electric heat participant households. In aggregate, the total annual energy savings associated with low-flow showerhead installations were estimated to be 248,231 kWh. This yields overall average savings per participant of 1,084 kWh.

[1] From ACEEE *1994 Summer Study on Energy Efficiency in Buildings*, p. 8.91

5.4 Pipe Insulation

RLW employs a model which predicts average daily hot water usage by household, based on the number of occupants, the age distribution of the occupants, the hot water using appliances present in the home, and whether or not the occupants pay for their hot water usage. This model was obtained from recent work conducted at LBL[2] and can be applied using actual data for individual homes gathered from the program tracking data and from the on-site visits. The model used is the simplified equation presented in the LBL report and is employed as follows:

$$HWuse = F_{pay} \times F_{sr} \times \begin{Bmatrix} -1.78 + .9744 \times Nocc + 6.3933 \times age1 + 10.5178 \times age2 \\ +15.3052 \times age3 - 0.1277 \times T_{hw} + 0.1437 \times tnkvol \\ -0.1794 \times T_{cw} + 0.5115 \times T_{oa} + 10.2191 \times Occd \\ - dwp\left(0.692 \times Nocc + 1.335 \times \sqrt{Nocc}\right) \\ - cwp\left(1.1688 \times Nocc + 4.7737 \times \sqrt{Nocc}\right) \end{Bmatrix}$$

Where:

HWuse	= average daily hot water usage (gallons/day);
F_{pay}	= 1.0 if customer pays for their hot water, 1.3625 if not;
F_{sr}	= 0.3790 if senior only household (all occupants above age 65), 1.0 if not;
Nocc	= total number of occupants in the home;
age1	= number of preschool children (0-5 yrs);
age2	= number of primary and jr. high school age children (6-13 yrs);
age3	= number of high school age children and adults (14 yrs and over);
T_{hw}	= hot water temperature in °F;
tnkvol	= water heater tank size in gallons;
T_{cw}	= average water heater inlet, or cold water temperature, (55 °F);
T_{oa}	= average annual outdoor air temperature, (°F), average value of 58 °F used, based on typical year weather data for the KPCo service areas;
Occd	= presence of adults at home during the day, 1 if yes, 0 if no;
dwp	= presence of dishwasher in the home, 0 if yes, 1 if no;
cwp	= presence of clothes washer in the home, 0 if yes, 1 if no.

To estimate the savings due to the addition of pipe insulation, additional information is needed regarding the size and length of the insulated hot water piping and the flow rate in the pipe. The information on the pipe size and length can be obtained from the tracking and on-site data. The flow rate in the pipes is assumed to be 2.0 gallons per minute, which is then used to calculate the number of hours per year that the hot water is flowing in the pipes as follows:

$$Hours = \frac{HWuse \times 365}{gpm \times 60}$$

[2] Modeling Patterns of Hot Water Use in Households, J. Lutz, et. al., Lawrence Berkeley Laboratory, LBL-37 05, November, 1996.

Where:

Hours	= hours per year that hot water flows in the pipe;
gpm	= hot water flow rate in the pipe, (2 gallons/minute);
365	= 365 days per year;
60	= 60 minutes per hour.

The number of hours is used in conjunction with the insulation properties and the difference in temperature between the hot water and the surroundings to calculate the annual savings, using the following formula:

$$PISavings = \frac{IPL \times Hours}{EFF_r \times 3413} \times \left(16 - \frac{k_{ins} \times OA_{ins} \times (T_{hw} - T_{env})}{OR_{ins} \times \ln\left(\frac{OR_{ins}}{IR_{ins}}\right)} \right)$$

Where:

PISavings	= annual energy savings due to pipe insulation in kWh;
IPL	= *insulated pipe length in feet*;
16	= typical heat loss per foot of un-insulated copper pipe, Btu/hr. ft;
K_{ins}	= thermal conductivity of rubber rigid foamed insulation used to insulate the pipe, (.215 Btu . in/hr . ft² . °F)[3];
OA_{ins}	= outside surface area of the pipe insulation per foot of pipe length in ft²;
T_{hw}	= measured hot water temperature in °F;
T_{env}	= annual average temperature outside of the pipe, 58 °F if in unconditioned space, 72°F if in conditioned space;
OR_{ins}	= outside radius of the *insulation in inches*;
IR_{ins}	= inside radius of the insulation (outside radius of the hot water pipe) in inches;
EFFr	= water heater recovery efficiency, .98 for electric water heaters, 1.8 for heat pump water heaters;
3413	= conversion factor Btu/kWh.

This number is then doubled to account for the standby losses.

5.4.1 Tracking Estimate of Savings for Pipe Insulation

The formula above was used to obtain pipe insulation savings estimates. Pipe insulation was installed on 636 linear feet for base load and 1,786 feet for electric heat participants. In aggregate, the total energy savings associated with pipe insulation installation for the tracking system were calculated to be 2,176 kWh, or 0.90 kWh per linear foot of insulation. This yields overall average savings per participant of 9.4 kWh.

Table 3 shows the number of participants and savings estimates for the domestic hot water measures that were installed in 2007 through the TEE program.

[3] *ASHRAE Handbook, 1993 Fundamentals*, Chapter 22, Table 10.

Hot Water Measure	# of Baseload Participants	# Electric Heat Participants	Total Baseload Savings (kWh)	Average Baseload Savings (kWh)	Total Electric Heat Savings (kWh)	Average Electric Heat Savings (kWh)	Total Measure Savings (kWh)	Average Measure Savings (kWh)
Hot Water Tank Wrap	40	127	5,700	139	18,046	143	23,746	142
Temp. Reduction	8	7	2,999	375	2,924	418	5,923	395
Low-Flow Showerhead	63	166	68,291	1,084	179,940	1,084	248,231	1,084
Pipe Insulation	60	171	556	9.3	1,620	9.5	2,176	9.4
Total Water Savings			77,546	1,007	202,530	960	280,076	972

Table 3: Water Savings Measures Estimates

6 Heat Pump Installations

For electric furnace to heat pump conversions, the engineering estimate of savings is based on the ASHRAE simplified energy formula method.

First the heat loss is calculated using the following formula:

$$HL = UA(T_i - T_o)$$

Where:

HL = the component heat loss, Btu/hr
U = the overall heat transfer coefficient, Btu/(hr-ft^2-^{0}F)
A = the area of the component, ft^2
T_i = the indoor temperature, ^{0}F
T_o = the outdoor temperature, ^{0}F

The building heat loss (HL) is then input into the following formulas:

$$\text{Annual Electric Furnace}_{kWh} = \frac{(24 \text{ X HL X HDD X } C_d)}{(\text{Ti-To}) \text{ X } 3{,}413}$$

$$\text{Annual Heat Pump}_{kWh} = \frac{(24 \text{ X HL X HDD})}{((\text{Ti-To}) \text{ X } 1000 \text{ X HSPF})}$$

Where:

HDD = 4,555 (mean average of Ashland and Williamsburg)
C_d = 0.65
(Ti-To) = 70 ^{0}F (assumption)
HSPF = Heating Seasonal Performance Factor (@47 ^{0}F)

Savings for the heat pump retrofit is determined by the following formula:

$$Savings_{kWh} = Electric\ Furnace_{kWh} - Heat\ Pump_{kWh}$$

6.1.1 Tracking Estimate of Savings for Electric Heat Pump Installations

The formulas above were used to determine electric heat pump savings estimates. There were twenty-seven 2007 participants that received a new electric heat pump unit. Based on the assumption that these heat pumps have taken the place of electric furnaces the total annual energy savings associated with heat pump installations was calculated to be 77,462 kWh, for an average of 2,869 kWh per installed heat pump.

7 Engineering Summary

Table 4 presents the total estimated annual kWh savings by measure type for the 2007 TEE Program participants. Table 5 shows that floor insulation had the single largest energy savings impact for the average home, followed by heat pump replacements, wall insulation, air sealing measures, attic insulation, low-flow showerheads, hot water temperature reduction, CFL lamps, water heater tank wraps, and pipe insulation.

Using the engineering algorithms mentioned in this report, the tracking system calculated estimated total yearly kWh reduction for the 2007 TEE program as 1,401,610 kWh. The impact for Electric Heat customers is estimated to be 1,292,216 kWh. The estimated impact for Non-Electric Heat customers is estimated to be 109,394 kWh.

The average estimated savings for tracking system Non-Electric Heat customers were estimated to be 1,385 kWh/year/household. Savings for Electric Heat participants were estimated to be 5,668 kWh/year/household.

It is important to remember that engineering estimates of savings are historically higher than billing energy estimates. The engineering formulas in many cases overestimate actual savings. Many factors can contribute to this phenomenon; higher reported water use by the customer, customer specific behavior patterns, absence of snapback and persistence effects, and the lack of interactive effects for multiple measure installations (which may significantly decrease savings).

Measure Type	Electric Heat Tracking Total Savings (kWh)	Non-Electric Heat Tracking Total Savings (kWh)
CFL	85,982	31,848
Air Sealing Measures	421,074	na
Attic Insulation	8,703	na
Wall Insulation	48,034	na
Floor Insulation	448,431	na
Water Heater Tank Wrap	18,046	5,700
Hot Water Temperature Reduction	2,924	2,999
Low-Flow Showerheads	179,940	68,291
Pipe Insulation	1,620	556
Heat Pumps	77,462	na
Waterbed Covers	-	-
TOTAL	1,292,216	109,394
Average per Customer	5,668	1,385

Table 4: Estimated Total Annual kWh Savings by Measure Type

Table 5 presents the average kWh savings by measure estimates.

Measure Type	Electric Heat Tracking Savings/Measure (kWh)	Non-Electric Heat Tracking Savings/Measure (kWh)
CFL (per site)	377	403
Air Sealing Measures (per home)	1,855	na
Attic Insulation (per home avg)	1,243	na
Wall Insulation (per home avg)	2,826	na
Floor Insulation (per home avg)	3,010	na
Water Heater Tank Wrap (per wrap)	143	139
Hot Water Temperature Reduction (per home avg)	418	375
Low-Flow Showerhead (per home avg)	1,084	1,084
Pipe Insulation (per linear foot)	0.91	0.87
Heat Pumps	2,869	na
Waterbed Cover	na	na

Table 5: Estimated Average kWh Savings by Measure Type

8 Cost Effectiveness Estimates

RLW analyzed the distribution of TEE Program costs by measure and agency, based on electronic data. The average cost per home was $937.35 for all-electric homes and $88.45 for baseload (non all-electric) homes.

8.1 Simple Payback Period

One of the most commonly used cost analysis methodologies is the Simple Payback Period (SPP) analysis. The SPP determines the number of years required to recover an initial investment through project returns. The simple payback is determined by taking the initial cost and dividing it by the annual savings. The formula is:

$$SPP = (\text{Initial cost}) / (\text{Annual savings})$$

For the 2007 TEE Program the following information was used for the SPP analysis:

All-Electric Homes

Customer cost per kWh	$0.067
Average KPCo cost to weatherize an all-electric home	$937.35
Average annual kWh savings per all-electric home	5,668 kWh
Average annual cost savings per all-electric home	$379.76/year
Simple Payback Period (SPP) for all-electric home	2.47 years

Baseload Homes

Customer cost per kWh	$0.067
Average KPCo cost to weatherize a baseload home	$88.45
Average annual kWh savings per baseload home	1,385 kWh
Average annual cost savings per baseload home	$92.80/year
Simple Payback Period (SPP) for baseload home	0.95 years

8.2 Benefit Cost Ratio

A benefit/cost ratio (BCR), also know as a savings investment ratio (SIR), calculates the present worth of all benefits, then calculates the present worth of all costs, and takes the ratio of the two sums.

The calculations required for the benefit cost ratio of the 2007 TEE Program are as follows:

*Assuming a measure life of 10 years.

All-Electric Homes

Present worth of annual savings	$= \$379.76(P/A_{10,10}) = \$379.76(6.1446) = \$2,333.47$
Total project cost per home	= $937.35
Benefit/cost ratio	= $2,333.47 / $937.35 = 2.49

Baseload Homes

Present worth of annual savings	$= \$92.80(P/A_{10,10}) = \$92.80(6.1446) = \$570.22$
Total project cost per home	= $88.45
Benefit/cost ratio	= $570.22 / $88.45 = 6.45

COST/BENEFIT EVALUATION RESULTS

TARGETED ENERGY EFFICIENCY PROGRAM

Kentucky Power Company

Program Period: January 2006 - December 2007

Load Research Analysis
Evaluation Section
American Electric Power Service Corp

August, 2008

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I. COST/BENEFIT EVALUATION

Results:

Cost/benefit analyses of DSM programs may be performed using either a historical basis or a prospective basis. From a historical basis, actual costs and load impacts for DSM programs participants during a historical period (such as the first year of a program) are utilized to assess the net benefits. The net benefits may be calculated over a 20-year period for the first year's participants. These are after-the-fact analyses that could be utilized to determine the cost-effectiveness of previous activity, but may not by representative of the future and therefore, should not be the basis for DSM program decision-making.

Cost/benefit analyses from a prospective basis anticipate future DSM program participation, costs and impacts. These analyses expand upon actual field experience (cost, impact, etc.) to estimate the net benefit from projected implementation in the future. The foundation of DSM program knowledge serves as a basis to estimate projected costs, impacts, etc. The real value of field experience is applying what has been learned to guide decisions on future DSM program implementation. Cost/benefit analyses were performed on the TEE Program for the "All Electric" participants sector and also for the "Base Load" participants sector.

The TRC benefit/cost ratio for the 2006– 2007 Targeted Energy Efficiency Program is consistent with the TRC benefit/cost ratio seen in previous program evaluations.

TEE Program – "All Electric" Participants:

On a prospective basis, the TEE Program –"All Electric" participant sector was found to be cost effective based on the TRC and UC tests. However, the RIM test results are negative. The Participant Test was not applicable since there was no participant cost in the program.

B/C Ratio	Economic Test
1.99	Total Resource Test
0.78	Rate Impact Measure
1.99	Utility Cost
N/A	Participant

Program Costs (2006 $)

The cost/benefit analysis was performed using projected program costs based on the actual program costs realized in the 2006-2007 program evaluation period. The program duration covers from 2006-2007 with a total of 390 actual participants. The total 2006-2007 TEE Program cost was $405,461 including equipment/vendor, evaluation, and other miscellaneous costs. A breakdown of actual total TEE Program costs for both years are outlined in Table 1.

Table 1. All Program Participants (2006-2007)

Cost	*Dollars*
Equipment Vendor	$404,858
Other	$492
Evaluation	$111
Total	$405,461

Table 2 provides an allocation of the actual TEE Program costs to the "All Electric" participants sector for cost/benefit analysis. The evaluation cost and other costs are divided into the "All Electric" participant sector and the "Base Load" participant sector based on the actual costs for each sector.

Table 2: Actual TEE Program Costs – "All Electric" Participants (2006-2007)

Cost	*Dollars*
Equipment Vendor	$391,132
Other	$492
Evaluation	$111
Total	$391,735

Additional measure/program characteristics based on the three years of the program and assumed for the cost/benefit analysis are:

A. Life of measure assumed at 14 years, with no replacement

B. 0% Freeriders

C. Administration Cost at $175 per participant

D. Average Incremental cost $737

E. Evaluation costs set at $30 per participant

F. Includes T&D loss savings of 10% for energy and 11% for demand

G. Anticipated energy impact is 2,032 kWh per participant (based on 2006-2007 Load Impact Evaluation Report prepared by RLW Analytics).

TEE Program – "Base Load" Participants:

On a prospective basis, the TEE Program – "Base Load" sector was found to be cost effective based on the TRC, RIM, and UC tests. The Participant Test was not applicable since there was no participant cost in the program.

B/C Ratio	Economic Test
7.83	Total Resource Test
1.90	Rate Impact Measure
7.83	Utility Cost
N/A	Participant

Assumptions:

Program Costs (2006 $)

The total 2006-2007 actual TEE Program cost for the "Base Load" participants was $13,726 including actual equipment/vendor costs, allocated evaluation, and other miscellaneous expenses. A breakdown of actual "Base Load" participants program costs for both years are outlined in Table 4.

Table 3: Actual TEE Program Costs – "Base Load" Participants (2006-2007)

Cost	*Dollars*
Equipment Vendor	$13,726
Other	$0
Evaluation	$0
Total	$13,726

The projected/anticipated per participant annual program costs and program assumptions for the "Base Load" customers for the period 2006 – 2008 period are:

A. Life of measure assumed at 13 years, with no replacement
B. 0% Freeriders
C. Administration Cost at $50 per participant
D. Average Incremental cost $51
E. Evaluation costs set at $25 per participant
F. Includes T&D loss savings of 10% for energy and 11% for demand
G. The anticipated energy impact is 1,136 kWh per participant (based on 2006-2007 Load Impact Evaluation Report prepared by RLW Analytics).

Total TEE Program:

The cost/benefit analysis was performed using projected program costs based on the actual program costs realized in the 2006-2007 program evaluation The program duration covers from

2006-2007 with a total of 549 participants. The total costs and benefits of the TEE Program, as a whole, can be calculated by totaling the component costs and benefits from "All Electric" participants and "Base Load" participants. Results are shown below. On a prospective basis, the TEE Program was found to be cost effective based on the TRC and UC tests. However, the RIM test results are negative. The Participant Test was not applicable since there was no participant cost in the program.

B/C Ratio	Economic Test
2.26	Total Resource Test
0.86	Rate Impact Measure
2.26	Utility Cost
N/A	Participant

EVALUATION REPORT

RESIDENTIAL HIGH EFFICIENCY HEAT PUMP MOBILE HOME (HEHP-MH) PROGRAM

Kentucky Power Company

Program Period: January 2006 - December 2007

Load Research Analysis
Evaluation Section
American Electric Power Service Corporation

August 2008

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I. EXECUTIVE SUMMARY

This report provides the findings of the process evaluation, load impact evaluation and benefit/cost analysis for the program years 2006 and 2007 for Kentucky Power Company's (KPCo or Company) Residential High Efficiency Heat Pump - Mobile Home (HEHP-MH) Program. The HEHP-MH Program, initiated by Kentucky Power's DSM Collaborative, began operating in the American Electric Power (AEP) Kentucky service area in 1996.

KPCo's major goals for the HEHP-MH Program were to

- Reduce the energy consumption of occupants living in electrically heated mobile homes
- Assist and encourage mobile home owners to improve heating, ventilation, and air conditioning (HVAC) efficiency by installing high efficiency heat pumps
- Increase customer satisfaction and services, and
- Reduce Kentucky Power's long-range peak demand.

The Company promoted the program through HVAC contractors and paid incentives to both the contractor and the customers who purchased a high efficiency heat pump to replace their existing electric furnace. The customer and dealer incentives for the installation of a high efficiency heat pump were $400 and $50 respectively. Table EX-1 summarizes the participation numbers and market penetration rates for 2006-2007.

Table EX-1. Market Impact

Year	Participants	Total Market	Penetration Rate
2006	93	1,410	6.5%
2007	95	1,431	6.8%
Total	**188**	**2,841**	**6.6%**

Under the criteria used in Kentucky, the program passes each cost-effectiveness test.

Table EX-2. Cost-effectiveness Tests

Test	Benefit/Cost Ratio
Total Resource	9.79
Participant	9.07
RIM	3.45
Utility	6.02
Societal	9.79

These include the Total Resource Cost (TRC), Utility Cost (UC), Ratepayer Impact Test (RIM), Participant Cost (PC) and the Societal Cost (SC) economic tests. After adjusting for free-riders (48%, from the 2002 follow-up survey) and T&D avoided losses (10%), we estimate the net annual energy savings at 363 MWh. In addition, we estimate summer demand savings at 68 kW and winter demand savings at 137 kW.

Based on the findings in the 2006 Residential Appliance Saturation Survey, approximately 30,000 households reside in mobile homes. Ninety-five percent own their residence. Almost 90% use electricity for heating and two-thirds of these currently heat with a central forced air furnace. Additionally, 65% of occupants of mobile homes cool with a central air conditioner or a room/window unit.

Previous evaluations of this program relied upon engineering estimates. In 2008, AEP licensed a software tool known as the PRInceton Scorekeeping Method (PRISM) and developed at Princeton University. PRISM weather-normalized the billing histories and provides estimates of heating, cooling, base load, thermal integrity, and usage per change in degree days. The methodology for this report estimated the change in consumption of the participants and of a random sample of existing electrically heated mobiles homes that were not part of any KPCo program. PRISM weather normalizes the annual consumption (NAC) for each residence. The

difference in the average consumption between the control group and the participants represents the average change in usage per residence that is attributable to the program.

The program evaluation for this period used participant information from the following sources:

- participants' pre and post HVAC installation data
- demographic data (2006 Residential Customer Survey)
- rebate form information
- billing histories
- 2002 customer surveys

The evaluators found the HEHP-MH Program to be cost-effective based on the Total Resource Cost (TRC), Utility Cost (UC), Societal (SC), and Participant (PC) economic tests. The Program has significantly reduced participants' electric consumption.

Recommendations

KPCo has operated this program since 1996. When the next evaluation is due (assuming the Commission approves KPCo's request for a three year extension), the program will be fifteen years old. Plans for the next evaluation will be developed during 2009. The recommendations below will assist KPCo and AEP in developing a comprehensive plan for the impact of the MHNC Program.

- KPCo should survey contractors in the service territory to determine whether customers are purchasing heat pumps or furnaces for space heating and the SEER and HSPF ratings associated with them.
- KPCo should survey participants shortly after their new heat pumps are installed.
- KPCo should track new mobile homes sited in the KPCo service territory and develop a brief questionnaire to determine, independently, the rate of heat pump installation.
- KPCo should explore whether higher SEER/HSPF ratings are required and re-assess the incentive level provided and the incremental cost to participants.

When presented with these recommendations, KPCo program management agreed to implement each, with the consent of the DSM Collaborative.

II. PROGRAM DESCRIPTION

KPCo and the DSM Collaborative designed the HEHP-MH Program to encourage mobile home owners in the Kentucky Power service territory to upgrade their electric heating system with a high-efficiency heat pump. Eligible customers could receive up to $400 toward installing a heat pump having SEER and HSPF ratings exceeding U.S. Department of Energy efficiency standards. KPCo accepted applicants on a first-come first-served basis.

Program Promotion

Participants became aware of the program mainly through the local HVAC dealer network and by "word-of-mouth" (program participants telling their neighbors and friends about the program). The Company provided rebates to 188 customers during 2006 and 2007. Table 1 summarizes the participation for each year.

Table 1: Annual Participation

Year	Total
2006	93
2007	95
Total	**188**

Program Incentive

A customer incentive of $400, approved by the Kentucky Demand Side Management Collaborative, was maintained during the 2006-2007 evaluation period. Dealers received a $50 incentive for each installation.

III. DATA COLLECTION

The evaluation group evaluated several aspects of the HEHP-MH Program to determine the program's overall cost-effectiveness, which included market potential and penetration, load impact and program costs.

The program evaluation for this period used participant information from the following sources:

- Participants' pre and post HVAC installation data demographic data
- Rebate information
- Billing histories
- 2002 customer follow-up surveys
- 2006 Residential Customer Survey

For all participants, key participant information regarding the size and type of mobile home, and characteristics of previous heating and cooling systems were collected through the installation incentive form developed by Kentucky Power and used by HVAC dealers when the new heat pump was installed (see Appendix A).

IV. PROCESS AND MARKET EVALUATION

Process Analysis

The process analysis of the HEHP-MH Program utilized the installation data and the 2002 follow-up survey results to evaluate the delivery mechanism, promotional effectiveness, and customer satisfaction.

Delivery Mechanism: Kentucky Power Company utilized the Comfort Assured HVAC Dealers and KPCo employees to administer the program.

Promotional Effectiveness: Based on the 2002 follow-up survey, the Comfort Assured dealers and mobile home sales representatives were the main sources for the program awareness to the participants making up 52% and 10%, respectively. Additionally, 30% of the participants indicated that they first became aware of the program through friends or relatives. Therefore, "word-of-mouth" was still an effective source of information on the HEHP-MH Program.

Market Analysis

In the analysis of the market for the HEHP-MH Program free riders and market potential were examined. The findings of the 2002 participant survey indicated that 48% of the participants were free riders. We used the previous finding for free-riders in the current report.

Table 2. Market Impact

Year	Participants	Total Market	Penetration Rate
2006	93	1,410	6.5%
2007	95	1,431	6.8%
Total	**188**	**2,841**	**6.6%**

The findings of the 2006 Residential Customer Survey indicate that about 1,400 customers were "very likely" to replace their heating and cooling systems, and that twice as many people who replaced their current cooling system in the previous two years installed a heat pump versus a

central air conditioner. The program penetration for 2006-2007 is almost seven percent. KPCo's market penetration is quite low. The overall saturation for heat pumps in existing mobile homes is slightly under 30%. Heat pumps are becoming the system of choice for replacements, but significant market potential remains. A review of the SEER ratings incented through the program may be necessary, otherwise energy and demand savings realized by the program may diminish over time.

V. IMPACT EVALUATION

Methodology

For this evaluation, the Evaluation Section used a PRISM (PRInceton Scorekeeping Method) analysis. The analysis was performed by obtaining the individual weather-normalized annual consumption (NAC) for each residence in the participant group and the control group.

PRISM is a widely accepted software program, developed at Princeton University and used by many utilities to adjust individual household monthly energy consumption records for fluctuations in average annual temperature and variations in billing cycles. The primary output of the program is the NAC. NAC can be interpreted as the average annual long-run weather-adjusted consumption of the residence. (For a more complete description of PRISM, see Fels, 1986.) Statistical data checks were applied for robustness and validity of the estimates.

To select the control group, AEP randomly selected mobile homes sited in the AEP service territory prior to 2005. To make this determination, AEP used the Marketing and Customer Service System (MACSS) variable that captures the first "turn on date" of the meter. From this variable, we extracted the year the meter was "turned on" and then subtracted that year from 2008 to obtain the age of the residence.

Monthly energy consumption was extracted from MACSS for the participants and the control group customers who had sufficient billing histories. PRISM works most efficiently when at least nine months of history are available. The final analysis contained 1,571 residences from the control group and 128 residences from the participants.

Because the square footage of the residence can contribute to the total energy usage of the residence, we calculated the average square footage (1,287) of the participants from program records. We then referred to the 2006 Residential Customer Survey and calculated the average

square footage of respondents (1,206) who indicated that they resided in mobile homes and determined that the random sample was comparable in size.

The evaluation group derived the electricity savings by subtracting the estimate of individual average participant's change in electricity consumption from the estimate of average control group member's change in electricity consumption. Other outputs from the PRISM model include estimates of base load, total consumption, and cooling usage as well as the temperature at which the thermal integrity of the building is overcome and the heating or cooling system begins to operate. The final outputs of the program are estimates of the slope for heating and cooling, *i.e.*, the number of kWh used by the HVAC system for each increase (decrease) in degree days.

Findings:

Based on two-years (2006-2007) of the HEHP-MH Program with 188 participants, the net total HEHP-MH Program's annual energy savings was estimated to be 363 MWh annually (after adjusting for free riders and a 10% Transmission and Distribution loss savings). Each participant experienced an average energy savings of 3,364 kWh at the meter and a 1.4 kW reduction at the meter in winter and 0.7 in summer. The estimated net system winter coincident peak demand reduction was 137 kW.

Table 3: Estimated Load Impacts for HEHP-MH Program*

Year	MWh	Summer kW	Winter kW
2006	171	33	66
2007	191	35	71
Total	362	68	137

Energy Impact Analysis

The participants used 3,878 kilowatt-hours more in the pre-period than the control group. These results are expected. The control group represents the population as a whole and thus contains customers who have taken conservation actions on their own in the past. These customers are called "free drivers." These free drivers may have taken action on their own as a result of advertisements about the program that they may have seen. Tables 4 and 5 provide details of the energy impact analysis.

Table 4: Average Normalized Annual Consumption (NAC)

Period	Participant kWh	Control kWh
Pre	24,138	20,289
Post	20,260	19,774
Difference	3,878	515
Gross Energy Savings	3,364	

Table 5: Distribution of NAC

	Participant kWh	Percent	Control KWh	Percent
Pre Heat	10,460	43%	7,939	39%
Pre Cool	2,816	12%	1,918	9%
Pre Base Load	10,855	45%	10,425	51%
Post Heat	7,198	36%	8,111	41%
Post Cool	1,783	9%	1,536	8%
Post Base Load	11,271	56%	10,120	51%

Coincident System Peak Demand Impact Analysis

Demand savings, coincident with the system peak, were estimated by first calculating the coincident demand per unit. The average change in cooling usage between the participants and the control group was first determined. This difference then was divided by the load factor developed by AEP for cooling load times the number of hours in the cooling season. The results were then divided by the estimated number of units that would be operating at system peak. The result is a coincident peak kW demand savings estimate of 0.7 per participant at the summer system peak. Demand savings at the winter system peak were estimated to be 1.4 kW.

VI.COST/BENEFIT EVALUATION

Results

Cost/benefit analyses of DSM programs can use an historical basis or a prospective basis. From a historical basis, actual costs and load impacts for the HEHP-MH program for participants during a historical period (such as the first year of the program) were used to assess the net benefits. The net benefits were calculated over a 15-year period for all participants. These are after-the-fact analyses that were used to determine the cost-effectiveness of the previous activity, but may not by representative of the future and therefore, should not be the basis for DSM program decision-making.

Cost/benefit analyses from a prospective basis anticipate future DSM program participation, costs, and impacts. These analyses expand upon actual field experience (cost, impact, etc.) to estimate the net benefit from projected implementation in the future. The foundation of DSM program knowledge serves as a basis to estimate projected costs, impacts, etc. This is the real value of field experience applying the lessons learned to guide decisions on future DSM program implementation.

The benefit/cost ratios for the 2006 - 2007 HEHP-MH Program are somewhat higher than the benefit/cost ratios seen in previous program evaluations. The primary drivers for the increased B/C ratios were increased fuel costs and increased emission rates. Table 6 summarizes the results for the program.

Table 6. Cost-effectiveness Tests

Test	Benefit/Cost Ratio
Total Resource	9.79
Participant	9.07
RIM	3.45
Utility	6.02
Societal	9.79

On a prospective basis, the HEHP-MH Program should continue to be cost-effective based on the traditional cost-effectiveness tests and expected energy and demand savings. The free riders may increase and energy savings attributable to the program could diminish given that the minimum required SEER for a replacement air conditioning unit equals that of a heat pump over the extended life of the program.

Assumptions

The cost/benefit analysis was performed using projected program costs based on the actual program costs. The program evaluation covers the period from 2006-2007 with a total of 188 participants. The total HEHP-MH Program costs were $98,071 including promotional/administrative, customer incentives, dealer incentives, evaluation and other miscellaneous costs over the period.

A breakdown of actual program costs for the entire two-years is outlined in Table 8.

Table 7: Actual Program Costs

Year	Direct Equipment Purchases/Contractor Payments	Customer Incentives	Evaluation	Total Program Cost	Per Participant Incremental Cost
	$	$		$	$
2006	4,550	36,400		40,950	600
2007	4,850	38,800	261	43,651	600
2008			12,760	12,760	
TOTAL COSTS	9,400	75,200	13,021	97,361	

2008 Evaluation Costs are for program years 2006-2007.

Additional measure/program characteristics based on the historical years of the program and assumed for the cost/benefit analysis are:

A. Life of a heat pump assumed at 15-years, with no replacement

B. 48% of participants were free riders

C. Average rebate of $400 to the customer

D. Average rebate of $50 to the dealer

E. Average Incremental cost to the participant $600

F. Includes T&D loss savings of 10% for energy and 11% for demand

The assumed load impacts are identical to those described in Section VI.

VII. Recommendations

KPCo has operated HEHP-MH since 1996. When the next evaluation is due (assuming the Commission approves KPCo's request for a three year extension), the program will be fifteen years old. Plans for the next evaluation will be developed during 2009. The recommendations below will assist KPCo and AEP in developing a comprehensive plan for the impact of the Program.

- KPCo should survey dealers in the service territory to evaluate whether customers are purchasing heat pumps or furnaces for space heating and the SEER and HSPF ratings associated with them.
- KPCo should survey participants shortly after their mobile homes are occupied.
- KPCo should track new mobile homes sited in the KPCo service territory and develop a brief questionnaire to determine, independently, the rate of heat pump installation.
- KPCo should explore whether higher SEER/HSPF ratings are required and re-assess the incentive level provided and the incremental cost

When presented with these recommendations, program management agreed to implement each, with the consent of the Collaborative.

Appendix A.: Data Collection Form

HIGH EFFICIENCY/ HEAT PUMP/MOBILE HOME

A DEMAND -SIDE MANAGEMENT PROGRAM

Mobile Home Dimension _____ X _____
Width Length

☐☐☐-☐☐-☐☐☐☐
SOCIAL SECURITY NUMBER

_____
Customer Name (As shown on S.S. Card)

_____
Service Address
(Residence where Heat Pump is installed no P.O. Box)

☐☐☐-☐☐☐-☐☐☐-☐
ACCOUNT NUMBER

_____
Mailing Address (P.O./R.R. Box/Street City, Zip)

HVAC Dealer Use Only

Existing Equipment

AIR CONDITIONER

Type: Air Conditioning

☐ Central Split

☐ Central Package

☐ Window Units

Total Cooling Capacity _____ BTUH _____ Tons

Manufacturer	Model #

ELECTRIC FURNACE

Manufacturer	Size (KW)

New DSM Equipment

Type: Heat Pump ☐ Split ☐ Packaged

COOLING CAPACITY

Total Cooling Capacity _____ BTUH _____ Tons

Supplement al Heat _____

Manufacturer _____

Outdoor Unit: Model # _____

Indoor Unit Model # _____

_____ SEER _____ HSPF

NOTE: This equipment must meet the following minimum DSM efficiency requirements

SPLIT SYSTEM 13.0 SEER AND 7.7 HSPF

PACKAGED SYSTEM 13.0 SEER AND 7.7 HSPF

I verify that the above information is correct and I understand that the rebate I receive is considered taxable income by the IRS.

Customer Signature _____

Date _____

I verify that the existing equipment is currently being used to space condition the customer's residence at the above address and that the new demand side management (DSM) equipment will replace the customer's existing equipment.

HVAC Dealer Signature _____ Date _____ Do you have a KY HVAC License? (Must be to quality) Yes No License No. _____

HVAC Dealer _____

Mailing Address _____

_____

Federal Tax ID Number _____

Social Security Number _____

Appendix B: Technology Description

TECHNOLOGY DESCRIPTION

Kentucky Power Company's HEHP-MH Program was designed to promote a more efficient HVAC system for mobile home owners. Approximately one third of all the Company's electric space heating residential customers live in mobile homes. Many of these mobile homes are heated and cooled by relatively inefficient HVAC systems. A significant gain in efficiency can be obtained by upgrading these HVAC systems with high efficiency heat pumps, which exceed USDOE minimum efficiency standards (13 SEER and 7.7 HSPF).

Air Source Heat Pump

A heat pump is a high efficiency year-round heating and cooling system which operates entirely on electricity. The system is called a heat pump because it pumps or moves heat from one area to another. The basic components of a heat pump are: a compressor; circulating fluid (refrigerant); and two heat exchangers, one outside and one inside. In winter, heat in extracted from cold outdoor air even when the temperature is well below freezing. The heat is absorbed by the refrigerant, and then is pumped through the compressor to the indoor coil (heat exchanger) where the refrigerant releases its heat to the indoor air. Since there is less heat available at low outdoor temperatures, the heat pump system includes a supplemental resistance heater that automatically provides additional heat when the outdoor air temperature is too low for the heat pump compressor to supply the home's total heating demand. In the summer, the heat is absorbed by the refrigerant in the indoor coil from the circulating indoor air. The heat-laden refrigerant from the indoor coil is pumped to the outdoor coil where the heat is transferred to the outdoor air.

The heat pump system is the most efficient way to heat and cool electrically. The most significant energy savings are obtained during the heating season since it utilizes the "free" heat

that already exists in the outdoor air. The heat pump energy efficiency is determined by the seasonal energy efficiency ratio (SEER) for summer and the heating seasonal performance factor (HSPF) for winter, where these are defined as follows:

$$\text{SEER} = \frac{\text{Total Cooling Provided During Cooling Season (Btu)}}{\text{Total Energy Consumed by the System (Watt Hours)}}$$

$$\text{HSPF} = \frac{\text{Total Heating Provided During Heating Season (Btu)}}{\text{Total Energy Consumed by the System (Watt Hours)}}$$

EVALUATION REPORT

MOBILE HOME NEW CONSTRUCTION PROGRAM

Kentucky Power Company

Program Period: January 2006 - December 2007

Load Research Analysis
Evaluation Section
American Electric Power Service Corporation

August, 2008

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I. EXECUTIVE SUMMARY

This report provides the findings of the process evaluation, load impact evaluation and benefit/cost analysis for the program years 2006 and 2007 of Kentucky Power Company's (KPCo or the Company) residential Mobile Home New Construction Program (MHNC). The MHNC Program, initiated by the Kentucky DSM Collaborative, began operating in the American Electric Power (AEP) Kentucky service territory in 1996.

Kentucky Power's Mobile Home New Construction Program was designed as a market transformation program. The goal was to promote the awareness of and to increase the penetration of high efficiency heat pumps and to improve the insulation levels in new mobile homes.

Mobile homes represent one-third of the new residences that are sited in the KPCo service territory each year. Historically, new mobile homes had heating, ventilation, and air conditioning (HVAC) systems that consisted of an electric central furnace and a central air conditioning unit. Today, the market is being transformed. The 2006 AEP Residential Customer Survey indicated that 80% of new mobile homes were heat pump equipped. To verify that result, program management surveyed a sample of participating dealers and requested their sales records for 2007 and the first six months of 2008. The information obtained from that effort showed a new mobile home heat pump penetration rate of 46%. KPCo's program has contributed toward the transformation of the marketplace, but opportunities still remain to influence the market. Looking forward, the program would remain cost-effective even with a 70% free-ridership rate.

The Company promoted the program through mobile home dealerships and paid incentives to both the dealer and the customers who purchased a new mobile home with a high efficiency heat pump and a Zone 3 insulation package. The customer and dealer incentives for the installation of a high efficiency heat pump were $500 and $50, respectively. Table EX-1 provides the participation numbers and market penetration rates for 2006-2007.

Table EX-1. Market Impact

Year	Participants	Total Market	Penetration Rate
2006	184	1,221	15.1%
2007	213	1,202	17.7%
Total	**397**	**2,423**	**16.4%**

A follow-up survey conducted by MQA Research (MQA) during June 2002 indicated that seventeen percent of the participants were freeriders. During this evaluation period we did not conduct an additional survey and rely on the 2002 findings.

Program participants reduced their electricity consumption for space heating by 823 MWh. The program remains cost-effective using the assumptions from the 2005 evaluation. AEP conducted five cost-effectiveness tests. These are the Total Resource Cost (TRC), Utility Cost (UC), Ratepayer Impact Test (RIM), Participant Cost (PC) and the Societal Cost (SC) economic tests. After adjusting for freeriders (17%) and avoided T&D losses (10% for energy and 11% for demand), the net annual heating season energy savings were estimated at 683 MWh. Table EX-2 provides the results of the cost-effective tests.

Table EX-2. Cost-effectiveness Tests

Test	Benefit/Cost Ratio
Total Resource	3.66
Participant	3.46
RIM	2.59
Utility	3.75
Societal	3.66

As a result of the penetration findings, coupled with the change in the Housing and Urban Development code which governs the construction of mobile homes, the evaluation methodology used to estimate the energy and demand savings of the program was re-assessed and modified. It was not appropriate to continue to estimate the energy and demand savings from the program

by using the test residences sited in April 1996 and monitored through March 1997. Instead, a sample of new mobile homes sited during 2006 and 2007 was used as a control group. The difference in usage between the sample control group and the participants were estimated using the Princeton Scorekeeping Method (PRISM), developed at Princeton University.

With the change in evaluation methodology, coupled with the change in minimum SEER and HSPF ratings on January 23, 2006, the program savings are less than those previously reported. The average annual reduction in heating consumption is estimated at 2,073 kWh. The findings confirm the expected reduction from the findings in the sample of participating dealers and the required change in methodology. Program electricity savings may be attributed both to the increased insulation package and the presence of the heat pump. The program is still cost-effective based on the standard economic tests and using 2002 assumptions for free riders and the incremental participant cost.

Recommendations

KPCo has operated this program since 1996. When the next evaluation is due (assuming the Commission grants KPCo's request for a three year extension), the program will be fifteen years old. Plans for the next evaluation will be developed during 2009. The recommendations below will assist KPCo and AEP in developing a comprehensive plan for the impact of the MHNC Program.

- KPCo should survey dealers in the service territory to determine whether customers are purchasing heat pumps or furnaces for space heating and the SEER and HSPF ratings associated with them.
- KPCo should survey participants shortly after their mobile homes are occupied.
- KPCo should track new mobile homes sited in the KPCo service territory and develop a brief questionnaire to determine, independently, the rate of heat pump installation.
- KPCo should explore whether incenting higher SEER/HSPF ratings is prudent and re-assess the incentive level provided and the incremental costs to participants.

When presented with these recommendations, program management agreed to implement each, with the consent of the Collaborative.

II. PROGRAM DESCRIPTION

Program Background

The Mobile Home New Construction Program (MHNC) was designed to transform the market for new mobile homes within the KPCo service territory and to determine the energy implications of current (1996) design and installation practices. The MHNC Program, initiated by the Kentucky DSM Collaborative, has been operating in the KPCo service area since 1996. During *Phase One* of the program (April 1996 through March 1997), KPCo monitored HVAC system loads in three new mobile homes. These mobile homes had different HUD codes and were situated at the KPCo Coal Run service facility in Pikeville, Kentucky. These HUD code test site mobile homes differed from the other, either by the type of HVAC system or the building insulation levels or both. The normalized energy savings between two similar mobile homes equaled 310 kWh in the summer months, 4,376 kWh in the winter months, and 4,686 kWh annually. The savings reflected the result of the more efficient heat pump compared to the electric central furnace and the central air conditioner.

In *Phase Two* of the program (1997—1998), the Kentucky Demand Side Management Collaborative promoted the program directly to mobile home dealerships operating within the KPCo service territory. KPCo provided a $50 promotional incentive to the dealers for each mobile home that was sold with a high efficiency heat pump and an upgraded insulation package. To qualify for the incentive, aside from the Zone 3 insulation package, the efficiency rating of a split system heat pump had to be at a minimum of 11.0 SEER or 7.2 HSPF and for a package system heat pump, 10.0 SEER and 6.8 HSPF. For a detailed discussion of the technology please refer to Appendix A. KPCo provided a $500 incentive to the buyer which was designed to offset the incremental costs of upgrading the insulation and HVAC system. Mobile homes with a Zone 3 insulation packages had the highest envelope efficiency commercially available. The program has been extended by the

Kentucky Public Service Commission (KPSC or Commission) since that time and maintained the same rebate levels.

In light of the potential lost opportunity in improving cooling energy efficiency in the mobile home new construction market, the DSM Collaborative added an incentive for installing a high efficiency air conditioning unit to the MHNC program. Beginning January 1, 2003, the program paid $25 to the dealer and $125 to the customers who purchased a new mobile home with a high efficiency central AC equal to or exceeding 12 SEER. Participation levels for the high efficiency air-conditioning measure were well below anticipated levels. Only two customers purchased a high efficiency air-conditioning system during 2003-2004 evaluation period. Participating manufactured housing dealers were not purchasing 12.0 SEER air-conditioning systems due to the increased cost.

The KPCo DSM Collaborative requested approval from the Commission to discontinue this measure at the end of the 2005 calendar year because the expected participation levels did not materialize and the revised federal energy efficiency standards that went into effect on January 23, 2006.

On April 14, 2005, the Department of Energy's Office of Hearing and Appeals (OHA) granted Nordyne's application for exception relief from the 2006 13.0 SEER requirement for split system air-conditioners of the 3 to 5 ton capacity. The OHA granted Nordyne's application, which in effect would permit a 12 SEER air-conditioning system to be installed in HUD-Code homes until January 1, 2010. The DSM Collaborative recommended the measure for high efficiency air-conditioning be discontinued effective January 1, 2006. A evaluation report was issued in August 2005.

On August 15, 2005, the KPC DSM Collaborative requested approval from the Commission for a three year extension to continue the program from 2006-2008. The Commission approved the

request on November 21, 2005. The Company provided incentives to 184 participants in 2006 and 213 during 2007. Table 1 summarizes the annual participation for the program.

Table 1: Annual Participation

Year	Agreements
2006	184
2007	213
Total	**397**

Program Implementation

KPCo implemented the program through a network of 22 participating mobile home dealerships (Appendix B). The dealers provided each potential buyer a brochure describing the program (Appendix C). The dealers were key to the success of the program. KPCo relied entirely on its network of dealers to promote the program. The dealers provided the Company with customer installation reports on a periodic basis (shown in Appendix D). The incentive payments for the dealer and the buyer were compiled from these reports.

III. DATA COLLECTION

AEP relied on seven primary sources of data for this analysis. Data were collected from the following sources:

- Program records
- AEP Marketing and Customer Services System (MACSS) records
- 2006 KPCo Residential Customer Survey
- Survey of participating Dealers
- MQA findings
- KPC avoided energy and capacity costs
- Discussions with KPCo employees
- Daily high and low temperature data

Program Records

KPCo employees compiled the program records into two spreadsheets—one for each year. KPCo received the original form from the participating dealerships. The data collection form was used to record information for each mobile home sold having a Zone 3 insulation package. The form was completed by the dealership which included information on the dealership, the home buyer, the home size and characteristics and description of the HVAC equipment contained in the mobile home. The dealership and customer information was used to track where the mobile homes were sold, the location where they were installed, the purchase and delivery date, and verification of the Zone 3 insulation package. KPCo employees provided summary program costs on June 12, 2008.

MACSS Records

AEP matched the participant records to the AEP system of record for consumption history. AEP also used information from the MACSS to select the control group and its corresponding usage information.

2006 Residential Customer Survey

AEP conducted a system-wide Residential Customer Survey in 2006. The survey was designed to provide statistically significant results at the class level for each AEP operating company. Relevant data collected from customers who indicated their residence was a mobile home less than two years old was used in the analysis.

2008 Sample Survey of Participating Dealers

The 2008 Sample Survey of Participating Dealers indicate that customers are not only aware of heat pumps in new mobile homes, but that 46% of the customers purchasing new mobile homes in 2007 and the first six month of 2008 installed a high efficiency heat pump.

MQA Findings

Findings on freeridership from the 2002 MQA survey are carried forward into this analysis.

KPC Avoided Energy and Capacity Costs

AEP developed avoided energy and capacity costs in late 2007 for the Grid Smart initiative in each of our operating companies. These costs were used in this evaluation to impact the benefits of the program.

Discussions with KPCo Employees

The evaluator met with KPCo employees in Ashland, Kentucky in February 2008. In addition, numerous phone and e-mail conversations have occurred over the past nine months.

Temperature Data

Daily high and low data were obtained from internal records which were originally obtained from the National Oceanic and Atmospheric Administration. These were used as inputs to the PRISM model.

IV. PROCESS AND MARKET EVALUATION

Process

KPCo implemented the program during 2006-2007 through its network of dealers. KPCo employees provided brochures to the dealers and continued to provide support to them as needed. The sales representative at the dealer explained the program to the customer and provided them with the brochure (Appendix C) which also described the program, and explained the incentive offered for purchasing a new mobile home with a high efficiency heat pump and upgraded Zone 3 insulation package.

The dealers provided the Company with customer installation reports (Appendix D) from which incentive payments were made to the dealers and customers. KPCo employees entered the information into an Excel spreadsheet.

Market

The latest Residential Customer Survey showed that about 80% of new mobile homes were equipped with heat pumps. To verify these results, KPCo program management surveyed a sample of their participant dealers for sales records for 2007 and the first six months of 2008 and found that 46% of the new mobile homes sold by the dealers surveyed had a heat pump rather than a central furnace system. Even though the numbers from these two sources differ in both cases this information verifies that some market transformation has been occurring. HUD code changes raised minimum SEER standards in 2006, but even after the code changes, the existing stock of homes with lower SEER ratings could be sold.

Table 3 below indicates the market penetration of the program during 2006-2007.

Table 3. Market Penetration

Year	Participants	Total Market	Penetration Rate
2006	184	1,221	15.1%
2007	213	1,202	17.7%
Total	**397**	**2,423**	**16.4%**

While not every one of the new mobile homes with a heat pump sited in KPCo's service territory was of the highest efficiency, it is known from engineering data that a heat pump is more efficient than a traditional central forced air furnace. However, the 2006 HUD Code changes also may have contributed to the transformation of the market. Given these changes, AEP modified its historical method of estimating energy and demand savings.

V. IMPACT EVALUATION

Background

The impact evaluation methodology used in previous evaluations incorporated engineering estimates and used three mobile homes sited at the KPCo Coal Run service facility in Pikeville, Kentucky as the baseline for program electricity savings. These mobile homes were sited in March 1996. Significant changes in the market have occurred since that time and it is not any longer appropriate to use these residences for a baseline measurement. HUD codes changed in January 2006 and the market appears to have adopted heat pumps as the standard heating and cooling unit in Kentucky.

Methodology

For this evaluation, the Evaluation Section used a PRISM analysis. The analysis is performed by obtaining the individual weather-normalized annual consumption (NAC) for each residence in the participant group and the control group (For a more complete description of PRISM, see Fels, 1986.).

PRISM is a widely-accepted software program, developed at Princeton University and used by many utilities to adjust individual household monthly energy consumption records for fluctuations in average annual temperature and variations in billing cycles. The primary output of the program is the NAC. NAC can be interpreted as the average annual long-run weather adjusted consumption of the residence. Statistical data checks were applied for robustness and validity of the estimates.

Control Group Selection

To select the control group, AEP randomly selected mobile homes sited in the KPCo service territory during 2006 and 2007. To make this determination, AEP used a MACSS variable which captures the first turn on date of the meter. From this date we extracted the year the meter was "turned on" and then substracted the year from 2008 to obtain the age of the residence.

Monthly energy consumption was extracted from MACSS for the participants and the control group that had sufficient billing histories. PRISM works most efficiently when at least nine months of history are available. The final analysis contained 217 residences from the control group and 320 residences from the participants.

Because the square footage of the residence can contribute to the total energy usage of the residence, we calculated the average square footage (1,158) of the participants from program records. We then referred to the 2006 Residential Customer Survey and calculated the average square footage of respondents (1,148) who indicated that they resided in mobile homes sited in the last two years and determined that our random sample was comparable in size.

The evaluation group derived the electricity savings by subtracting the average participant usage for heating from the PRISM model from the average control group usage for heating. Other outputs from the PRISM model include estimates of base load, total consumption, and cooling usage as well as the temperature at which the thermal integrity of the building has been overcome and the heating or cooling system begins to operate. The final outputs of the program are estimates of the slope for heating and cooling, *i.e.,* the number of kWh used by the HVAC system for each increase (decrease) in degree days.

Energy Savings

As discussed in the methodology section, energy savings were derived from a PRISM analysis. Figure 1 compares the differences in energy use for the major components of household use for the two groups.

Figure 1. Major Components of Annual Electricity Usage

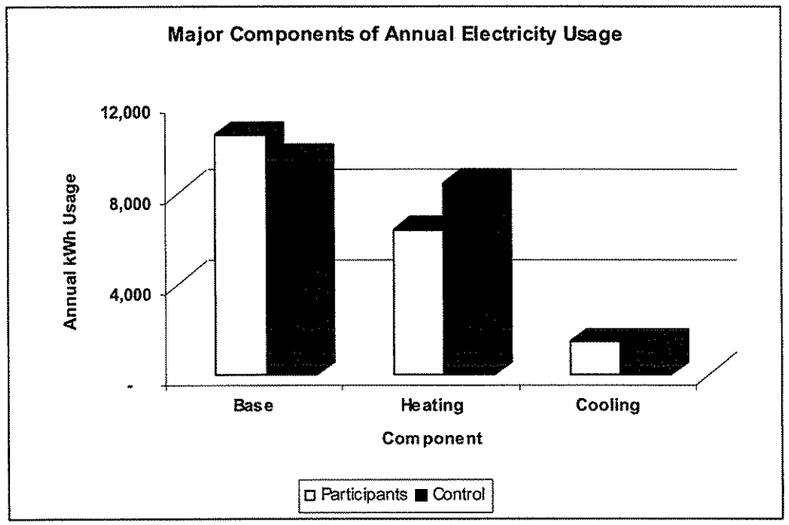

Figure 1. indicates that the participants use more electricity for base load than the control group. Base usage is generally considered as plug load. Cooling load was virtually the same for both groups. Participants used less than the control group for heating, however, in terms of whole house energy consumption the overall household difference is reduced by the difference in base usage. Table 4 summarizes the major outputs from the PRISM analysis.

Table 4. PRISM Analysis Results

	Participants	Control	Difference
Normalized Annual Consumption	18,215	19,401	(1,186)
Heating	6,383	8456	(2,073)
Cooling	1,440	1441	(1)
Base	10,549	9600	949
Reference Temperature Cooling	66.6	67.8	(1.2)
Reference Temperature Heating	55.1	57.5	(2.4)

PRISM uses an iterative regression model to compute an individual reference temperature for each residence. This reference temperature is representative of the thermal integrity of the residence. Essentially, given a specific thermostat setting for each residence, the reference temperature is the temperature at which the heating or cooling system begins to operate. Table 4 shows that, on average, participants have a 2.4 degree temperature advantage (heating) over the control group. This finding indicates that the participants, on average, will use energy for space conditioning less frequently during milder periods of the day. We presume, that if the thermostat settings are equal, the participant's heating system will not begin operating until the outside temperature reaches 55.1 degrees while the control group heating systems will operate at 57.5 degrees. Given the change in HUD codes, this difference in the operation of the systems can be attributed primarily to the increased insulation package and not the heat pump.

Using the previously defined methodology, total energy savings over the 2006-2007 evaluation period were calculated as follows:

Energy Savings Calculation

Average Savings	2,073	kWh		
Number of Participants	397			
Total Savings	=2,073 * 397	=	822,981	kWh

The 822,981 kWh is estimated at the meter. In the Cost-Effectiveness Analysis the total savings, measured at the meter is adjusted for free riders and transmission and distribution losses. Demand savings at the meter are estimated at 1.6 kW per participant for the winter and 0.7 kW in summer.

VI. COST-EFFECTIVENESS ANALYSIS

AEP uses a cost-effectiveness framework based on the 2002 *California Standard Practice Manual: Economic Analysis for Demand-Side Programs and Projects*. Within this framework total program benefits are compared to total program costs. Program benefits are defined as the expected kWh/kW saving attributed to the program. These kWh/kW savings are then multplied by the Company's most recently filed long-run incremental cost (value of avoided generation, transmission, distribution, line losses).

The benefits can be expected to accrue over the life of the measure. The dollar value of these benefits may vary over time, reflecting changes in the cost of alternative supply sources and expected inflation. Costs associated with the program include all costs contributing to the realization of program benefits, regardless of who incurs the cost. Traditionally, included in the program costs are all labor costs, miscellaneous materials and expenses, Company paid rebates, promotional expenditures and any participant expenditures exceeding the Company rebate. However, for purposes of analysis in Kentucky, only costs incremental to the Company after beginning the program offerings are included in the costs. Employee labor costs are not included unless they are incremental and were hired specifically for DSM program implementation.

Using the tests for cost-effectiveness, five stakeholders are considered, the program participant, the non-participant, the utility, all utility customers, and society as a whole. For these analyses, the program is considered as passing the cost-effectiveness test if the Net Present Value (benefits – costs) is greater than zero or the benefit/cost ratio (benefits/costs) is greater than 1.

We incorporated the following assumptions used in previous evaluations:

- Heat Pump life – 15 years, with no replacement

- Free riders -17%
- Incentive Payments : $500 to the participant and $50 to the dealer
- Average Incremental cost to the participant $ 1,012
- Includes T&D loss savings of 10% for energy and 11% for demand

Costs

Table 5 summarizes the program costs used in the analysis. KPCo employees provided the program data.

Table 5. Program Costs

Year	Direct Purchases & Payments	Promotion	Incentives**	Other	Evaluation	Total Cost	Incremental Participant Cost
2006	9,150	0	91,500	200		100,850	1,012
2007	10,650	0	106,500	250	259	117,659	1,012
2008*					12,760		
Total	**$19,800**	**0**	**$198,000**	**$450**	**13,019**	**$218,509**	-

*Evaluation Costs incurred in 2008 for 2006-2007 program evaluation.
**Incentive costs were calculated based on number of participants.

Because AEP is using a different evaluation methodology, evaluation costs were established using the $259 in costs from KPCo and an average of estimated evaluation costs from the MHNC, Mobile Home Heat Pump Program, and the Modified Energy Fitness Program. Each evaluation uses the same methodology and the data bases were developed concurrently. The MHNC program was the first program of the three to be evaluated. It did not seem appropriate to load all the learning curve costs and set-up costs to a single program. Software costs will be distributed to each AEP utility.

Benefits

Electricity savings attributable to the program were developed by reducing the meter energy savings by 17% to remove the electricity savings of free riders. This number was then adjusted upward by 10% to include the value of avoided transmission and distribution costs.

Table 6. presents the findings of the cost-effectiveness analysis.

Table 6. Cost-effectiveness Tests

Test	Benefit/Cost Ratio
Total Resource	3.66
Participant	3.81
RIM	1.97
Utility	2.80
Societal	2.74

Using a break-even approach to the program, it will still be cost-effective at the current spending level until the program has 70% free riders.

VII. Recommendations

KPCo has operated this program since 1996. When the next evaluation is due (assuming the Commission approves KPCo's request for a three year extension), the program will be fifteen years old. Plans for the next evaluation will be developed during 2009. The recommendations below will assist KPCo and AEP in developing a comprehensive plan for the impact of the MHNC Program.

- KPCo should survey dealers in the service territory to determine whether customers are purchasing heat pumps or furnaces for space heating and the SEER and HSPF ratings associated with them.
- KPCo should survey participants shortly after their mobile homes are occupied.
- KPCo should also track new mobile homes sited in the KPCo service territory and develop a brief questionnaire to determine, independently, the rate of heat pump installation.
- KPCo should explore whether higher SEER/HSPF ratings are required and re-assess the incentive level provided and the incremental cost.

When presented with these recommendations, program management agreed to implement each, with agreement of the Collaborative..

Appendix A: *Technology Description*

Phase One of Kentucky Power's Mobile Home New Construction Program was designed to investigate the energy impacts of alternative heating/cooling systems and improved envelope design and construction. Specifically, program goals were to investigate the marketing of new mobile homes in the KPCo service area, primarily focusing on the potential impact of the installation of high efficiency heat pumps in place of resistance heat and standard efficiency central air conditioning systems and of improved insulation levels in the building structure.

Approximately one third of the Company's residential electric space heating customers live in mobile homes. Furthermore, many of these mobile homes were heated and cooled by relatively inefficient HVAC systems. Significant efficiency gains in the HVAC systems could be obtained by installing high efficiency heat pumps or high efficiency central AC in new mobile homes when they are manufactured, along with upgrading the insulation levels which improve the home's envelope efficiency. These high efficiency measures provide optimum levels of cost-effective energy efficiency design and construction features for new mobile homes, which improve the energy performance, comfort, livability and affordability of new manufactured homes. Installing these measures after the mobile home has been constructed increases the costs significantly and results in a "lost opportunity" of improving the envelope design and raising efficiency standards for HVAC equipment in the mobile home construction industry.

Heat Pumps:

Heat pumps are the most energy efficient home heating and cooling technology available in today's market. The basic concept of a heat pump can be described as a mechanical device that pumps heat from a cooler to a warmer location. Even in cold temperatures, the outside air contains some level of heat that can be utilized. During the winter, heat is extracted from the outside air and is pumped into the dwelling. In the summer, the system is reversed and the heat is removed from the

indoor air and delivered to the outside. Heat pumps include a supplemental resistance heater that automatically provides additional heat when outdoor temperatures are too low for the heat pump to supply the total heating load.

Most of the significant energy savings from the heat pump are obtained during the heating season since it utilizes the heat that already exists in the air. The heat pump efficiency is determined by the seasonal energy efficiency ratio (SEER) for the summer and the heating seasonal performance factor (HSPF) for the winter. These are defined as follows:

$$\text{SEER} = \frac{\text{Total cooling provided during cooling season (BTU's)}}{\text{Total energy consumed by the system (Watt-hours)}}$$

$$\text{HSPF} = \frac{\text{Total heating provided during heating season (BTU's)}}{\text{Total energy consumed by the system (Watt-hours)}}$$

Insulation Levels:

The transfer of heat flow between a home's structure and its outside environment can be retarded by increasing the insulation in the home's walls, ceiling and floor and other building components. The rate of heat transmitted through the home by air is measured by the term, coefficient of heat transmission, U, defined as follows:

U = air-to-air overall coefficient of heat transmission through the surface of building components such as walls, ceiling, floor, etc. (Btu/h x sq.ft. x F)

The U-value is directly related to the amount of heat loss and heat gain through the building and is used by manufacturers to rate the building's envelope efficiency. The smaller the U-value, the more efficient the building because it reflects a decrease in the rate of heat flow through the building components.

By increasing the insulation level in building components, the rate of heat transfer between the home's structure and outside environment decreases, thus increasing the building's envelope efficiency. This reflects a decrease in the rate of heat gain through the building in the summer and

heat loss through the building in the winter. As a result, the building's HVAC system will not use as much electrical energy to maintain the comfort level of the home.

Mobile home manufacturers must meet U-value level requirements pertaining to various HUD Zone areas under the New Manufactured Housing Construction and Safety Standards. The HUD Zones, which pertain to geographical areas across the United States, specify a U-value zone maximum coefficient of heat transmission. The manufacturer must be able to design and construct the mobile home to meet zone requirements. There are three zones, with Zone 3 pertaining the highest envelope efficiency.

APPENDIX B

PARTICIPATING MOBILE HOME DEALERSHIPS

Grayson Mobile Homes
P.O. Box 8
Grayson, KY 41144

A & L Homes, Inc.
P.O. Box 331
Flemingsburg, KY 41041

Lakeside Homes
42 Jetts Dr.
Jackson, KY 41339

The Home Show
P.O. Box 897
Belfry, KY 41514

Glenn's Finer Homes
615 Kentucky Ave.
Norton, VA 24273

Watts Mobile Homes
917 Morton Blvd.
Hazard, KY 41702

Jerry Adkins Mobile Homes
2741 US 23 South
Pikeville, KY 41501

Clayton Homes
P.O. Box 310
Harold, KY 41635

Glenn's Finer Homes
P.O. Box 307
Pound, VA 24279

George Humfleet Homes
P.O. Box 189
London, KY 40743

Bluegrass State Home Showcase
P.O. Box 223
Banner, KY 41603

The Home Show
13135 St. Rt. 180
Ashland, KY 41101

Dream Homes
580 C. W. Stevens Blvd.
Grayson, KY 41144

Brown's Mobile Homes, Inc.
P.O. Box 476
Grayson, KY 41143

Rainbow Homes
Hwy 321
Paintsville, KY 41240

LUV Homes
8499 US 23
Ivel, KY 41642

Hylton Homes
P.O. Box 170
Ivel, KY 41642

Edgewood Mobile Homes
P.O. Box 360
Hazard, KY 41701

Best Buy Homes
2939 North Mayo Trail
Pikeville, KY 41502

Doyle Mobile Homes, Inc.
P.O. Box 87
Flemingsburg, KY 41041

Family Home Center
2221 Hwy US 60 East
Morehead, KY 40351

Premier Home Center
7145 N Mayo Trail
Pikeville, KY 41501

APPENDIX C: PROGRAM BROCHURE

Purchase a New Manufactured Home
Equipped with an Electric Heat Pump
and Receive $500* . . .
From Kentucky Power

You can receive a $500 rebate from Kentucky Power when you order a new manufactured home with a high efficiency heat pump and upgraded insulation package.

or

Purchase a new manufactured home with an upgraded insulation package and have the dealer install a high efficiency heat pump.

*** For Residential Services Only**

To qualify, the efficiency rating of the heat pump must be:

Split System:
13.0 SEER and 7.7 HSPF

Package System
13.0 SEER and 7.7 HSPF

Note: Savings based on Study conducted over 1 year, comparing various heating systems and insulation packages. Study conducted by Kentucky Power is on file with the Public Service Commission and copies of the study are available upon request.

For more information
call:
(606) 929-1540

AEP KENTUCKY POWER®

A unit of American Electric Power

APPENDIX D:CUSTOMER INSTALLATION REPORT

MOBILE HOME NEW CONSTRUCTION

A Demand Side Management Program

Date _____ AEP Confirmation No. _____

Dealer Name _____

Address _____

Telephone No. _____

City _____ State _____ Zip _____

Salesperson _____

Tax Exempt No. _____ Social Security No. _____

Purchase Date _____ Home Size _____X_____

One Site Date _____

Zone Three Insulation _____ yes Fireplace _____ yes _____ no Sky lights _____ yes _____ no
(must have to qualify for incentive)

Description of HEAT PUMP Equipment

Manufacturer _____ System Size _____ In Tons

Outdoor Unit Model # _____ Serial # _____

Indoor Unit Model # _____ SEER _____ HSPF _____

To Qualify Efficiency Ratings Must Be:
Split System 13.0 SEER or 7.7 HSPF
Package System 13.0 SEER or 7.7 HSPF

Heat Pump
Design: _____ Split System II _____Package System
Installed in: _____ New Construction (Must be to Qualify)

Heat Pump Installed in
AEP/Kentucky Region _____ yes
(Must be to Qualify)

Customer Name _____

Street Address _____

City _____ State _____ Zip _____

Mailing Address, if different: _____
_____

Social Security No _____
Electric Meter No. _____
Account No. _____

Telephone No
(H) _____
(W) _____
(O) _____

I verify that the existing equipment is currently being used to space condition the customer's residence at the above address
HVAC/Mobile Home Dealer Signature _____Date_____

I verify that the above information is correct and I understand that the rebate I will receive is considered taxable income by the IRS.
Customer Signature _____Date_____

Evaluation Report

Modified Energy Fitness Program

Kentucky Power Company

Program Period: January 2006—December 2007

Load Research Analysis
Evaluation Section
American Electric Power Service Corporation
Columbus, OH

August, 2008

Table of Contents

Executive Summary

Kentucky Power Company (KPCo or the Company) requested that AEP Service Corporation (AEPSC) perform a process and impact evaluation as well as a cost/benefit analysis for their Modified Energy Fitness Program (MEFP). The evaluation period covers program activity from January 1, 2006 through December 31, 2007. This report summarizes the results of the three requested analyses.

From January 1, 2006 through December 31, 2007, the MEFP has provided services to 2,005 customers. Under the terms of the contract with the implementation contractor, Honeywell International, KPCo paid for up to 1,000 completed audits each year.

MEFP was developed to promote conservation and efficient use of electricity by improving the "energy fitness" of electrically heated residences. The major goals of the program are:

1. reduce customer usage of electricity for space heating
2. reduce customer usage of electricity for water heating
3. encourage customers to use energy efficient measures
4. increase customer service and satisfaction
5. educate customers on using high efficiency measures; and
6. reduce the Company's long-range peak demand.

To achieve the MEFP goals the program is offered to residential customers in the KPCo service territory who have an electric heating system and an electric water heater who have a minimum average monthly usage of at least 1,000 kWh. The program achieved the goal of 1,000 participants per year.

Honeywell promoted the MEFP through a direct mail brochure on KPCo letterhead, which describes the program by explaining all of the services provided, and that Honeywell will contact the customer directly and arrange a time for the audit at the customer's residence. Customers are targeted by zip code.

As presented in Table ES-1 below, the total program continues to be cost effective, but electricity savings per dollar expenditure is declining. This report contains several recommendations related to program marketing and implementation methods, that, when implemented, are expected to improve the per participant electricity savings.

Table ES 1. Program Cost and Impact Summary

	2003/2004	2006/2007
Total Costs	$476,921	$728,544
Total Annual Savings (kWh)	1,870,011	1,744,350
Cost per Annual kWh Savings	$ 0.255	$ 0.418
Cost per kWh Saved*	$ 0.017	$ 0.028
Participants	1,287	2,005
Per Participant Cost	$371	$363
Per Participant Savings	1,453	870
Prospective Benefit/Cost (TRC)	2.92	3.37

* Assuming average measure life of 15 years

The previous evaluation (2003-2005) identified an average expected engineering estimate of electricity savings of 1,453 kWh per residence. Using the methodology specified in the 2005 report, this evaluation found an average expected engineering estimate of electricity savings of 870 kWh per residence.

Prior to installing any measures, a review of contractor data showed that 26% of the participants lived in residences that the contractor rated as "tight", meaning not requiring seal-up in the residence, while 71% of the participants needed some seal-up of the residence and 3% of the participants were rated "drafty", needing extensive seal-up.

KPCo expected to spend $383 per residence; however, actual audit costs averaged $363 vs. $371 during the previous period. Audit costs for the period were comparable to the audit costs for 2003-2004 and 800 more audits were performed during the 2006-2007 period. The contractor's marketing approach and KPCo's initial customer selection may have contributed to the lower electricity savings predicted from this group of participants. The corroboration for this finding is validated by the significant

significant drop in expected engineering estimates per residence. Table ES-2 summarizes the average costs of the components of the audit.

Table ES 2. Cost of an Audit

Measures	Average Cost ($)	Percentage
Admin/Audit	$148.40	41%
Blower Door	75.00	21%
CFL	12.24	3%
Water Heating	23.01	6%
Thermostats	25.39	7%
Air Sealing	79.03	22%
Average Cost	$363.07	100%

A comparative pre/post billing analysis was attempted to verify the engineering estimate of savings. Due to the requirement to produce this report in August 2008, there was not adequate time to obtain and utilize twelve months of post program usage for all participants. Continuing pre/post billing analysis efforts are intended.

To improve program effectiveness the following actions are recommended:

- Review criteria for selecting customers for leads to the contractor and develop a more focused approach.
- Consider providing follow-up information to the customer to re-enforce the educational benefits associated with the program.
- Work with the contractor to develop a more user friendly data base, better validation routines, and data delivery on a more frequent basis.

- Conduct Inspections on a random sample of the participant residences to provide a quality control perspective

Despite the reduction of measurable electricity savings in this evaluation, the program continues to have merit, as it has in the past. The body of the report provides a detailed discussion of the recommendations, program activity and associated costs.

KPCo commits to monitor the contractor on a more frequent basis. AEPSC and KPCo will review this program and try to develop a marketing approach that will provide increased electricity savings.

Program Description

The Modified Energy Fitness (MEF) program was targeted to residential customers within the KPCo service territory who use electricity as their primary heating and water heating source and use a minimum of 1,000 kWh per month. The program provides an energy audit and consultation to pinpoint energy conservation measures that can be implemented by a customer and educate the customer on the benefits of energy efficiency. Participants are provided with the direct installation of appropriate energy conservation measures which can decrease energy consumption, lower their electric bills, and increase the comfort level of their home.

Contractor Selection

Upon Commission approval (September 24, 2002), the Company issued a Request for Proposal (RFP) on November 5, 2002 to four qualified energy service contractors. Two energy services contractors responded to KPCo's RFP. The selected contractor had to demonstrate the ability to implement this program on a turnkey basis including program promotion, participant recruitment, screening and scheduling, procurement and installation of energy conservation measures, tracking of program process, collection of required customer demographic information and other pertinent data in an economically acceptable manner.

Honeywell International (Formerly Honeywell DMC Services, Inc.) provided the winning proposal and was awarded the contract. Honeywell immediately began the recruiting and training of local staff, provided promotional plans, installation guidelines, and developed channels of communication.

Kentucky Power's DSM Collaborative renewed the contract with Honeywell on an annual basis in 2004 and 2005 due to a backlog of applicants. Customer response to the program offering exceeded original projection of 500 participants per year. Honeywell was renewed as the program implementation contractor to take advantage of existing processes, including established channels of communication between Kentucky Power and Honeywell, the familiarity of the clerical and management staff with the promotional and installation guidelines, and the expertise of the installers of

the energy conservation measures. Startup costs would have been duplicated if another vendor had been selected to continue the program.

Program Promotion

Honeywell, as agreed to in the terms of the original contract, was responsible for program promotion including participant recruitment, screening and scheduling. KPCo provided Honeywell with a database of residential customers who use a minimum of 1,000 kWh per month and assisted with the development of a direct mail recruitment letter. A copy of the direct mail promotional letter is shown in Appendix A.

Program Implementation

The Scope of Work clarified contractor and the Company responsibilities and set forth program goals and guidelines for the contractor to follow. The Company and the contractor worked closely during the implementation design phase of the Program. Regular communications between the Company and Honeywell helped resolve any questions or situations that developed. Participant data was requested from Honeywell on an annual basis to ensure data collection guidelines were being followed.

Program Measures

Background

A primary contributor to a home's inefficiency in space heating and cooling is air infiltration through the home's envelope and excess air leakage in the heating and cooling ductwork. Heating and cooling equipment inefficiencies are also a contributor, but the effects from upgrading a home's heating and cooling system can be nullified if the home's air infiltration is not at acceptable minimum levels and the ductwork is not properly sealed to prevent air leakage.

MEFP provided the qualifying customer an energy audit to install various weatherization measures to reduce the home's air infiltration and energy conservation measures to improve the home's water heating efficiency and lighting efficiency. Customer education was provided to enhance the customer's understanding of the importance of improving their home's energy efficiency and incorporating energy

conservation activities into their daily lifestyles. The benefits for the services provided in the program are described in detail below.

Measures Provided

The services available from the audit were a blower door analysis, caulking and weather-stripping, three faucet aerators, two low-flow showerhead, one compact fluorescent lamp, hot water pipe insulation, duct sealing, a water heater wrap, a door sweep, hot water heater temperature turn-down, switch and outlet gaskets, an educational booklet, a programmable thermostat, and an audit report recommending additional actions the homeowner could take.

Data Collection

Data collection was extensive for MEFP so that an appropriate and comprehensive home energy analysis could be performed. The energy analysis included the load impact from the results of installing the multiple weatherization and other energy conservation measures in the home. The data collection also enabled the projection of load impacts for any recommended measure to be installed. This information was needed in order for the Company to perform appropriate process and impact evaluations of the program. The Company's evaluation objectives were: (1) determine the program's load impact, (2) assess the effectiveness of the program delivery mechanism and (3) assess the program's cost-effectiveness.

Data collection forms were used to obtain information on the customer's building structure, space heating/cooling system, hot water heating system and on the various weatherization and other energy conservation measures installed in the home. Honeywell collected demographic information (type of building, age of home, size of home). The Company and the Collaborative did not see a need for a survey to collect education level and income level of participants.

Honeywell completed the necessary data collection forms at the customer's home and then input the information into a computerized database at their office.

HomeSTAR Data Collection Form

Honeywell's HomeSTAR Data Collection Form (only the Blower Door page of the Data Collection Form is shown in Appendix B) was actually a set of individual forms used to record specific information on participants and the residences. The first form was designed to collect customer information such as home address, phone number, customer's account number, owner information, and building characteristics each residence's structural, thermal characteristics, heating and cooling system characteristics, water heating system characteristics, compact fluorescent bulb installation and blower door test results. Additional information was also provided to the field technician to determine HVAC and water heating system efficiency, and building components' heat losses and heat transfer coefficients.

AEPSC also obtained billing histories and other information relevant to the analysis from our customer accounting system and collected NOAA weather data for the electricity savings analysis.

Process Evaluation

The process evaluation of the MEFP program utilized the installation data, recruitment tracking data, and customer demographic information collected by Honeywell throughout the evaluation period to evaluate the delivery mechanism, promotional effectiveness and performance of the measures installed. The process evaluation, along with the impact evaluation, serves as a means to gauge the effectiveness in promoting a home energy efficiency program of this nature.

Marketing

The Company provided Honeywell with a database of residential customers who use a minimum of 1,000 kWh per month and assisted with the development of a direct mail recruitment letter. The recruitment letter was sent to a total of 3,300 customers during the evaluation period. The goal of the Modified Energy Fitness Program was to target 1,000 customers each year. The program goal was achieved and reached 1,000 participants in 2006 and 1,000 in 2007. A copy of the direct mail recruitment letter is shown in Appendix A.

The program was promoted primarily through telemarketing services by Honeywell to the qualified customers and secondarily by participant referrals.

To qualify for the program all customers must use electricity for space and water heating and meet the minimum usage requirement. However, that does not mean that KPCo cannot use discretion when the program is marketed. Currently, KPCo has approximately 143,000 active residential customer accounts. Of these (based on the revenue class code), almost 84,000 use electricity for space and water heating. After applying the minimum usage requirement, the number of eligible customers is 66,008. Providing the contractor with the total eligible population has not achieved the expected savings attributable to the program. Given that the overall program savings, as measured by the expected engineering estimates, have decreased each year since the program's inception, the marketing approach could be improved by further limiting its focus

KPCO will work with the contractor to develop a more comprehensive marketing approach that will attempt to target customers residing in homes that are not only high usage, but also older homes, and which also provide high potential for energy efficiency improvements .

Implementation

The bulk of the contractor payments are for delivering and installing the specified measures to a residence, their servicing fees, and performing the blower door test. To ensure that the measures implemented in the program are those that most effectively result in electricity savings, the program measures should periodically be reviewed and modified as necessary to achieve savings expectations..

KPCo will conduct quality control inspections on a periodic basis, and will work with the contractor to review the measures being installed and to revise the existing participant database so it is more user friendly to extract information for future evaluations.

Measures Provided

Table 1 summarizes the measures paid for during the 2006-2007 evaluation period.

Table 1. Measures Provided

Measure	2006	2007	Total
Audit Services	1,000	1,000	2,000
Blower Door (pre and Post)	1,000	1,000	2,000
Caulk (per lineal foot)	38,113	39,162	77,275
CFB (each)	1,000	999	1,999
Door Sweep (each)	49	95	144
Duct Sealing - Alum. Grip Tape (per lineal foot)	427	216	643
Duct Sealing - Alum.Tape (per lineal foot)	1,635	2,196	3,831
Education booklet (each)	997	1,000	1,997
Faucet Aerators –Installed (each)	1,475	1,541	3,016
H/W Pipe Ins. 1/2" (per lineal foot)	37	412	449
H/W Pipe Ins. 3/4" (per lineal foot)	105	694	799
Kitchen Aerators –Installed (each)	1,033	1,024	2,057
L/F Showerhead – Installed (each)	1,509	1,483	2,992
Program Administration	1,000	1,000	2,000
P/T electric furnace (each)	309	342	651
P/T Heat Pump (each)	390	343	733
Promotion Fee	1,000	1,000	2,000
Switch & Outlet Gaskets – Installed (each)	374	237	611
W/H Wrap (Installed)	37	119	156
Weather stripping (per lineal foot)	35,554	38,984	74,538

Impact Evaluation

Methodology

For this evaluation, two methodologies were used. The engineering analysis used in the previous evaluation was replicated to document whether the mix of measures and quantities installed were comparable to the residences treated in 2003-2005. In addition, a PRISM (PRInceton Scorekeeping Method) analysis was performed on available pre and post usage.

Engineering

The engineering analysis allowed a comparison between the previous evaluations and this period's program participants. The engineering calculations used to perform the 2003-2005 evaluation were described in the 2003-2005 evaluation report and were replicated for this report. The equations used in the analysis are presented in Appendix C.

PRISM

PRISM is a widely accepted software program, developed at Princeton University and used by many utilities and evaluation firms to adjust individual household monthly energy consumption records for fluctuations in average annual temperature and variations in billing cycles. The primary output of the program is the Normalized Annual Consumption (NAC). NAC can be interpreted as the average annual long-run weather-adjusted consumption of the residence. (For a more complete description of PRISM, see Fels, 1986.) Statistical data checks are applied for robustness and validity of the estimates.

PRISM is particularly useful when performing an evaluation of weatherization programs. In an impact evaluation, we are interested in determining the overall impact of the installed measures on the customer's usage rather than attempting to assess the impact of each individual measure. The overall impact of the program, including *the interaction effects of the measures, is the focus of an impact evaluation and not* the performance of the individual measures. As an example, if one replaces every

incandescent light bulb in an electrically heated residence with a compact fluorescent lamp and do not apply any weatherization measures, then the heating system will have to replace the heat previously generated by the light bulbs during the winter. If cooling is also present in the residence, summer cooling will be reduced during the morning and evening hours when lighting is used. The overall interaction between the heating requirements will not yield the predicted engineering estimates unless the interaction is taken into account.

Results

Engineering Analysis

The engineering estimates were compared with those from previous evaluations. Table 2 summarizes the findings.

Table 2. Comparison of Expected Engineering Estimates

	2002	2005	2008
Energy Savings	2,388	1,453	870

It is evident from Table 2 that energy savings, based on the expected engineering calculations have been trending downward. A discussion of why this is may be the trend was provided in the Process Evaluation section of this report.

PRISM Analysis

The PRISM analysis intended to compute the energy savings achieved per participant through analysis of monthly billed usage records. For this analysis available pre and post period participant metered usage was obtained from the customer accounting system. PRISM contains three separate models:

- Heating only
- Cooling only
- Heating and cooling

Available monthly energy consumption was extracted from the AEP customer information system for the participants for which adequate billing histories were available. The preliminary analysis contained usage from 1,576 participant residences. Table 3 summarizes the results of the preliminary PRISM analysis.

Table 3. Change in Consumption by Residence Type.

Residence Type	Number of Observations	Change in Consumption
Single Family	687	472
Mobile Home	525	439
Multi-Family	267	25
Other	3	2,455

Additional time is needed to obtain complete post implementation usage records and to review the details of the preliminary PRISM analysis. Therefore, the recommendation is to continue use of the engineering calculation for the savings achieved by the program participants, while continuing to devote effort to refining the PRISM analysis.

Benefit Cost Analysis

Benefit/Cost analyses of DSM programs may be performed using either a historical basis or a prospective basis. From a historical basis, actual costs and load impacts for DSM programs participants during a historical period (such as the first year of a program) are utilized to assess the net benefits. The net benefits may be calculated over a 20-year period for the first year's participants. These are after-the-fact analyses which could be utilized to determine the cost-effectiveness of previous activity, but may not by representative of the future and therefore, should not be the basis for DSM program decision-making.

Benefit/Cost analyses from a prospective basis anticipate future DSM program participation, costs and impacts. These analyses expand upon actual field experience (cost, impact, etc.) to estimate the expected net benefit from projected implementation in the future. The foundation of DSM program knowledge serves as a basis to estimate projected costs, impacts, etc. This is the real value of field experience: applying what has been learned to guide decisions on future DSM program implementation.

Program costs were comprised of two components: Contractor Payments ($728,544) and Evaluation Costs ($12,760). The total MEFP costs were $741,304. The average per participant cost of the audit was approximately $363, excluding evaluation costs.

Table 4. summarizes the cost of the audit program. KPCo contractor payments from the last evaluation period through this evaluation period were similar. Despite this finding, total audit costs for the period were comparable to the total audit costs for 2003-2004 and 800 more audits were performed during the 2006-2007 period.

Table 4. Cost of an Audit

Measures	Average Cost ($)	Percentage
Admin/Audit Services	$148.40	41%
Blower Door	75.00	21%
CFL	12.24	3%
Water Heating	23.01	6%
Thermostats	25.39	7%
Air Sealing	79.03	22%
Average Cost	$363.07	100%

Table 5 contains the results of the cost-effectiveness analysis.

Table 5. Comparison of Benefit Cost Ratios

Test	Benefit/Cost Ratio Engineering
Total Resource Cost	3.37
Participant	N/A
RIM	1.43
Utility	3.37
Societal	3.04

Recommendations

The contractor's marketing approach and KPCo's initial targeting of customer selection may have contributed to the lower electricity savings from this group of participants. Prospective participants are targeted by zip code. While this approach helped control costs, it did not lead to maximum electricity savings. The Company's initial screening criteria did not attempt to target residences that were both high usage and older that would likely result in increased energy savings.

The analysis led us to the following recommendations:

1. Review criteria for selecting customers for leads to the contractor and develop a more focused approach.
2. Consider providing follow-up information to the customer to re-enforce the educational benefits associated with the program.
3. Work with the contractor to develop a more user friendly data base, better validation routines, and data delivery on a more frequent basis.
4. Conduct inspections on a random sample of the participant residences to provide a quality control perspective

Despite the reduction in measurable electricity savings in this evaluation, the program continues to have merit. KPC will modify the marketing methodology to attempt to produce a substantial increase in the cost-effectiveness of the program.

Appendix A. Sample of Direct Mail Letter

AMERICAN ELECTRIC POWER

Direct Mail Letter

Kentucky Power
Modified Energy Fitness Program
11233 Kevin Avenue
Ashland, KY 41102

KENTUCKY POWER

The Modified Energy Fitness Program is a weatherization program for Kentucky Power's All Electric Customers.

Kentucky Power is committed to their customers and the environment. We have been serving your energy needs for more than 80 years. We have created a program to help with both. The **Modified Energy Fitness Program** is designed to help you save energy while maintaining your level of comfort. The program identifies key areas within your home where you are losing valuable energy. Honeywell International, a nationally recognized energy management firm, has been contracted by **Kentucky Power** to provide this residential energy efficiency service to our qualified customers.

To qualify for the program you must: **own a single family home, heat with electricity, have an electric hot water heater, and use an average of 1,000 kWh per month for the last 12 months. (Program is not available to gas customers)**

By participating in The Modified Energy Fitness Program you will receive:

- Air Infiltration Diagnostic Test
- Customized Report
- Energy Savings Booklet
- Energy Conservation Measures Installed (where needed)
  - * Hot Water Tank Insulating Blanket
  - * Pulsating Low Flow Showerhead
  - * Low Flow Faucet Aerators
  - * Weatherstripping / Caulking / Doorsweep
  - * Duct Sealing
  - * Compact Fluorescent Light Bulbs
  - * Water Bed Insulation Cover
  - * Programmable Thermostat

A representative of Honeywell International will contact you to schedule an energy audit of your home within a few days of receiving this letter. Remember, there is nothing to buy, and no follow-up sales call will result from your participation in the program. If you have any questions or wish to enroll immediately, call **1-866-225-0686.**

Sincerely

Don Music
Don Music
DSM Project Manager
Kentucky Power 1-800-572-1113

Emery Lee
Emery Lee
Program Manager
Honeywell International

Appendix B. Home STAR Data Collection Form

Home STAR Data Collection Form

Blower Door

Number of Floors ☐☐ Volume ☐☐☐☐☐ Windshield Factor

Number of Occupants ☐☐ Surface Area ☐☐☐☐☐ Shielded ☐

Outside Temp. ☐☐ Average ☐

Inside Temp. ☐☐ Exposed ☐

	House Pressure	Fan Pressure	Fan Configuration	CFM Airflow	
1	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	CFM @ 50
2	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	☐☐☐☐
3	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	AC/H
4	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	☐.☐☐
5	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	

Correlation Coefficient r= 0.99☐☐ Flow Coefficient c=☐☐☐.☐☐☐ Exponent n=☐.☐☐☐

Number of Floors ☐☐ Volume ☐☐☐☐☐ Windshield Factor

Number of Occupants ☐☐ Surface Area ☐☐☐☐☐ Shielded ☐

Outside Temp. ☐☐ Average ☐

Inside Temp. ☐☐ Exposed ☐

	House Pressure	Fan Pressure	Fan Configuration	CFM Airflow	
1	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	CFM @ 50
2	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	☐☐☐☐
3	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	AC/H
4	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	☐.☐☐
5	☐☐	☐☐☐	O ☐A ☐B ☐C ☐	☐☐☐☐	

Correlation Coefficient r= 0.99☐☐ Flow Coefficient c=☐☐☐.☐☐☐ Exponent n=☐.☐☐☐

Appendix C. Energy Impact

Energy Impact Analysis

The following energy impact analysis uses data/assumptions gathered from the Energy Fitness Program evaluation of January 1996 – December 1998 to determine the inputs to the cost/benefit analysis unless otherwise indicated by year in which the data was recorded.

Lighting Measure:

Characteristics of the bulbs replaced by the compact fluorescent bulbs were gathered by Honeywell at the time of installation. The information regarding the wattage, and the number of hours of use per day of the bulb which was replaced by the CFB was used in the analysis.

Weatherization Measure:

Blower door tests were used to quantify the air flow rate before and after the installation of the weatherization measures. The Honeywell representative gathered blower door test data on the air flow rate and recorded the cubic feet per minute (CFM), and air changes per hour (ACH) which depends on volume of the home. This information was used to calculate the weatherization impacts. .

The equations in Appendix D were used to estimate the energy savings due to weatherization measures for different types of space heating during the winter season (October through April) and for space cooling during the summer season (May through September).

Programmable Thermostat Measure:

Annual energy savings for 2003 and 2004 participants was calculated using energy savings formulas provided by Honeywell. The savings was calculated by taking

the seasonal usage multiplied by a usage factor (0.83) multiplied by a savings factor (0.03) multiplied by the average of the day, evening, and night setbacks.

Appendix D. Blower Door Assumptions

Appendix D

Blower Door Evaluation Assumptions
Kentucky Power Company
Modified Energy Fitness (MEF) Program
Blower Door Evaluation

Evaluation of Blower Door Test Results

I. Engineering Model to Calculate Heating Energy Savings

Q_H	=	Vol. * (AC/Hr_b- AC/Hr_a) * HC * HDD * 24 Hr/Day * Cd	Where Q_H in Btuh (Heat Loss)
E	=	Q_H/3413	For Electric Furnace, Resistance, or Boiler
E	=	Q_H/(1000*HSPF)	For Electric Heat Pump
E	=	Q_H/(1000*HSPF)*A	For Electric Add-On Heat Pump
			Where E is kWh

a. Given in Honeywell Database

i.	Vol.	Conditioned Volume ($ft.^3$)
ii.	AC/hr_b	Air Changes/Hr Before (Pre-Test)
iii.	AC/hr_a	Air Changes/Hr After (Post-Test)
iv.	Heating System Type	Electric Resistance Electric Heat Pump Electric Furnace Electric Boiler Other
v.	Add-On Heat Pump	Yes, No
vi.	Geothermal Heat Pump	Yes, No
vii.	Heating Seasonal Performance Factor (HSPF)	
viii.	Condition of House (Thermal Integrity)	Good Fair Poor

b. Weather and Home Characteristic Data

HC	=	Heating Coefficient of Air	= 0.018	For 70°F Standard Air (Btu/$ft.^3$ - °F)
HDD	=	Heating Degree Days (Kentucky Region)	= 4,676	(°F - Day)
Cd	=	Adjustment Factor for Solar and Internal Gains		Value Based on Condition of House
			= 0.30	Good
			= 0.65	Fair
			= 0.90	Poor
A	=	Add-On Heat Pump Adjustment	= 0.759	

Appendix D

Blower Door Evaluation Assumptions
Kentucky Power Company
Modified Energy Fitness (MEF) Program
Blower Door Evaluation

II. Engineering Model to Calculate Cooling Energy Savings

Q_C = HG Sensible + HG Latent

Where
- ΔCFM = $\Delta AC/HR * Vol. * 0.0167$
- HG_s (Sensible) = $1.1 * \Delta CFM * (t_o - t_i)$
- HG_s = $14.3 * \Delta CFM$; $t_o = 91^oF$, $t_i = 78^oF$)
- HG_L (Latent) = $0.68 * CFM * \Delta$Grains Moisture
- HG_L RH = $11.56 * CFM$; ΔGrains = 17 @ 55%

Q_C = $(14.3 + 11.56) * \Delta CFM$

Q_C = $25.86 * \Delta CFM$ Where Q_C in Btuh (Heat Gain)

E = $(Q_C * 24$ Hr/Day * CDD) / $(\Delta t * 1000 *$ SEER)

Where E is kWh

HC	=	Heating Coefficient of Air	= 0.018	For 70°F Standard Air (Btu/ft.^{3} - °F)
Δt	=	95 F - 75 F	= 20 F	
CFM	=	Air Flow Rate		ft.^{3} / Min.
Δ CFM	=	Change in Air Flow Rate Before and After Weatherization		
CDD	=	Where CDD is Cooling Degree Days (Kentucky Region)	= 1,121	(°F – Day)
SEER	=	Seasonal Energy Efficiency Ratio		
RH	=	Relative Humidity		