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COMMONWEALTH OF KENTUCKY

AUG 24 2012

BEFORE THE PUBLIC SERVICE COMMISSION

PUBLIC SERVICE
COMMISSION

In the Matter of:

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The Application Of Kentucky Power Company)
To Amend Its Demand-Side Management)
Program And For Authority To Implement A)
Tariff To Recover Costs And Net Lost)
Revenues, And To Receive Incentives)
Associated With The Implementation)
Of The Programs)

AUG 24 2012

PUBLIC SERVICE
COMMISSION
Case No. 2012-00367

Motion To Withdraw And Replace Application

Kentucky Power Company moves the Public Service Commission of Kentucky pursuant to 807 KAR 5:001, Section 3(5) for leave to withdraw the application it filed on August 15, 2015 in this proceeding, and in its place to substitute the redacted version of the application tendered with this motion. In support of this motion, Kentucky Power states:

1. On August 15, 2012, the Company filed its application in this proceeding seeking to amend its demand-side management program and also requesting related relief. The Application was placed online on August 16, 2012. Appended to the Application as Tab 5 was the July, 2012 evaluation report prepared by Applied Energy Group, Inc. ("AEG"). Tables 7, 8, and 9 (page 13), Figure 2 (page 14), and Table 11 (page 17) of the report disclose specific information concerning sales by the identified retailers of CFL bulbs. Tables 9 and 11 further provide the information by store.

2. This information is considered confidential and proprietary by the retailers providing the information. To Kentucky Power's knowledge, this information is not made public and the retailers take all reasonable efforts to protect the information from public

disclosure. It is Kentucky Power's understanding that such information may be used by competitors of the reporting retailers to gain an unfair competitive advantage.

3. The information for which confidential treatment is sought is used by AEG and the Company in connection with their internal review of the program and to gain a better understanding retailer performance and sales.

4. The memoranda of understanding between AEG. and the retailers participating in the evaluation requires that the information for which confidential treatment is being sought be protected from public disclosure unless aggregated and without attribution to an identified retailer.

5. Because of a miscommunication between Kentucky Power and its vendor, Applied Energy Group, Inc., Kentucky Power was not informed of the confidential and proprietary nature of the information prior to filing the Application.

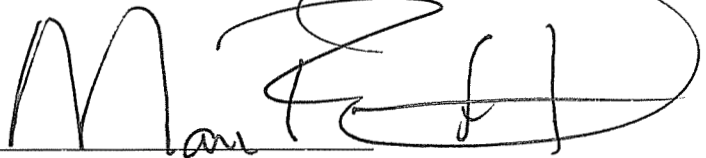
6. By a separate Petition, Kentucky Power is seeking confidential treatment of the information. In connection with that petition, Kentucky Power is filing under seal the pages of the report containing confidential information. Six public copies of the Application with the confidential information redacted are being filed in connection with this motion.

7. Failure to permit the withdrawal and return of the Application and the six copies filed on August 15, 2012 will undermine the Company's efforts to develop and evaluate demand-side management programs focused on the sale at retail of energy efficient devices. Retailers will be less likely to participate in such evaluations if their sales information, particularly on a store by store basis, is published.

Wherefore, Kentucky Power Company respectfully requests that the Commission issue an Order:

- (1) Permitting Kentucky Power Company to withdraw the Application and six copies filed on August 15, 2012 in this proceeding;
- (2) Removing from the Commission's website the version presently posted;
- (3) Allowing Kentucky Power to substitute the redacted copies of the Application filed with this Application; and
- (4) Granting Kentucky Power such further relief to which it may appear entitled.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Mark R. Overstreet', is written over a horizontal line. The signature is stylized with large, sweeping letters.

Mark R. Overstreet
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Frankfort, Kentucky 40602-0634
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HAND-DELIVERED

Jeff R. Derouen, Executive Director
Kentucky Public Service Commission
P. O. Box 615
211 Sower Boulevard
Frankfort, KY 40602

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AUG 24 2012

PUBLIC SERVICE
COMMISSION

August 15, 2012

Re: In the Matter of: The Application Of Kentucky Power Company To Amend Its Demand-Side Management Program And For Authority To Implement A Tariff To Recover Costs And Net Lost Revenues, And To Receive Incentives Associated with the Implementation of the Programs, Case No. 2012-00367

Dear Mr. Derouen:

Pursuant to the Commission's Order dated May 22, 1996, please find enclosed an original and six copies of Kentucky Power Company's Status Report. The report describes the operation of the Company's Demand-Side Management Program.

By this filing, the Company seeks authority to implement its revised electric tariff (P.S.C. Electric No. 9, Tariff D.S.M.C. 5th Revised Sheet No. 22-2) to recover its costs associated with its demand-side management programs, including net lost revenues and incentives related to the programs. This increase reflects a larger overall program portfolio to capture additional energy and demand reduction opportunities, and is required to recover a \$508,711 under-collection during the first half of 2012. Four copies of the revised tariff are also enclosed.

The Company's revision of the DSM Adjustment Clause factor for the residential sector is based upon the following calculations:

- ▣ The proposed adjustment clause factor is the midpoint between the ceiling and the floor calculations as demonstrated on Exhibit C.
- ▣ The floor was calculated by dividing the Collaborative projected remaining fourth quarter position (see Exhibit C, Column 4, Line 2) by the adjusted estimated sector kWh sales for the remaining fourth quarter (see Exhibit C, Column 4, Line 11).
- ▣ The ceiling was calculated by dividing the Collaborative projected remaining fourth quarter position (see Exhibit C, Column 4, Line 4) by the adjusted

estimated sector kWh sales for the remaining fourth quarter (see Exhibit C, Column 4, Line 11).

For the commercial sector the following calculations were used in connection with the Company's revisions:

- The proposed adjustment clause factor is the midpoint between the ceiling and the floor calculations as demonstrated on Exhibit C.
- The floor was calculated by dividing the Collaborative projected remaining fourth quarter position (see Exhibit C, Column 4, Line 16) by the adjusted estimated sector kWh sales for the remaining fourth quarter (see Exhibit C, Column 4, Line 24).
- The ceiling was calculated by dividing the Collaborative projected remaining fourth quarter position (see Exhibit C, Column 4, Line 18) by the adjusted estimated sector kWh sales for the remaining fourth quarter (see Exhibit C, Column 4, Line 24).

As set out in the Status Report, the Company recommends revision of the original 2012 program forecast for two of the Company's programs: the Targeted Energy Efficiency program and the High Efficiency Heat Pump program. The other forecasts contained in the Status Report are consistent with expense and participant levels shown in the February 15, 2012 filing in Case 2012-00051.

The forecasted participant levels for the Targeted Energy Efficiency program were reduced because of uncertainty in Community Action funding. Forecasted participant levels for resistance heat replacement in the High Efficiency Heat Pump program were reduced slightly to reflect customer response to the program for the period January through June 2012.

The Company also requests extension of the following programs for three years beginning 2013:

- 1) Residential Efficient Products
- 2) HVAC Diagnostic and Tune-up
- 3) Commercial High Efficiency Heat Pump/Air Conditioner
- 4) Commercial Incentive

If the extension is granted, the Company will consider implementing various improvements in these programs as described in the section of the program evaluation reports labeled "Key Findings and Recommendations".

The Company also proposes to extend the Pilot Residential and Small Commercial Load Management Program through 2013. Extending the program will allow the Company to evaluate the program using more participants through a full winter and summer season.

The complete evaluation report will be subsequently filed with the Commission along with recommendations for this pilot program. As part of the program extension, the Company requests that the Commission approve the proposed revision to the existing Tariff R.C.L.M. to continue the program operation through 2013. Section four of the Status Report includes an evaluation of the process and market for this program. Four copies of revised Tariff R.C.L.M. also are enclosed.

In sum, the Company requests the Commission approve the following:

- (1) The DSM Status Report and Schedule C Report enclosed with this letter.
- (2) The five program evaluation reports included in the following subsections of the DSM Status Report:
 - Section 2.* Commercial Incentive
 - Section 3.* Residential and Small Commercial HVAC Diagnostic and Tune-Up
 - Section 4.* Residential and Small Commercial Load Management Pilot
 - Section 5.* Residential Efficient Products
 - Section 6.* Small Commercial Heat Pump/Air Conditioner Incentive
- (3) A three-year extension beginning 2013 for the Residential Efficient Products, HVAC Diagnostic and Tune-up, Commercial High Efficiency Heat Pump / Air Conditioner, and Commercial Incentive programs.
- (4) A one year extension of the Pilot Residential and Small Commercial Load Management program.
- (5) The P.S.C. Electric No. 9, Tariff R.C.L.M. (Pilot Residential and Small Commercial Load Management) 1st Revised Sheet Nos. 23-1 and 23-2 to become effective September 27, 2012.
- (6) The P.S.C. Electric No. 9, Tariff D.S.M.C. 5th Revised Sheet No. 22-2 to become effective September 27, 2012. This will allow the Company to utilize the new residential and commercial factors with the first billing cycle in October 2012.

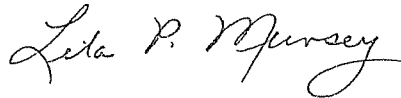
The Attorney General's representative abstained on all matters prior to leaving the meeting before the program recommendations were reviewed because of concerns that under the Collaborative's bylaws an abstention is treated as an affirmative vote. The Attorney General's representative did not approve the proposed DSM Status Report, Schedule C, or the Company's proposed revisions to the tariffs. The Company's proposed revision of the DSM Adjustment Clause factor for residential customers is supported by the Company's DSM Collaborative with the exception of the representatives of Northeast Kentucky Community Action ("NKCA") and Big Sandy Area Development District ("BSADD"), (see Exhibit C, Column 4, Line 13). The

Jeff R. Derouen
August 15, 2012
Page 4

representatives of the BSADD and NKCA objected to the increased rates for residential customers required under the revised tariff, but otherwise supported the Company's recommendations. The revised DSM Adjustment clause factor for the commercial sector has been agreed upon and is proposed by the DSM Collaborative with exception of the Office of Attorney General (see Exhibit C, Column 4, Line 26).

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,

A handwritten signature in cursive script that reads "Lila P. Munsey".

Lila P. Munsey
Manager, Regulatory Services

enclosure

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

	<u>RESIDENTIAL</u> (\$ Per KWH)	<u>COMMERCIAL</u> (\$ Per KWH)	<u>INDUSTRIAL*</u>	
Floor Factor =	0.001394	(0.000453)	- 0 -	(I) (R)
Ceiling Factor =	0.002677	0.002242	- 0 -	(I) (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

	<u>RESIDENTIAL</u>	<u>COMMERCIAL</u>	<u>INDUSTRIAL*</u>	
<u>DSM (c)</u>	1,263,159	318,523	- 0 -	(R) (R)
<u>S (c)</u>	620,412,000	355,891,200	- 0 -	(R) (R)
Adjustment Factor \$	0.002036	\$ 0.000895	- 0 -	(I) (I)

* The Industrial Sector has been discontinued pursuant to the Commission's Order dated September 28, 1999

DATE OF ISSUE August 15, 2012 EFFECTIVE DATE Service rendered on or after September 27, 2012

ISSUED BY GREGORY G. ROULEY PRESIDENT/COO FRANKFORT, KENTUCKY
NAME TITLE ADDRESS

Issued by authority of an Order of the Public Service Commission in Case No. 2012-XXXX dated

R.C.L.M.
(Pilot Residential and Small Commercial Load Management)

AVAILABILITY OF SERVICE.

Available on a voluntary basis to individual residential customers and small commercial customers receiving retail electric service from the Company. Small commercial customers are defined as commercial electric service accounts having a metered peak demand of 100kW or less during the past 12 billing periods. Availability is limited to the first 200 residential and 25 small commercial customers applying for service under this tariff or until 450 load control devices have been installed. This tariff will be in effect once the Company has successfully launched its Residential and Small Commercial Load Management Pilot program and will continue through December 31, 2013. Enrollment to participate in R.C.L.M. will end on February 28, 2013.

(T)

(T)

(T)

For non-owner occupied residence or facility, the Company will require written permission from the owner to install load control and communication equipment.

PROGRAM DESCRIPTION.

R.C.L.M. seeks to reduce peak demand through certain load management measures to assist in lowering costs and delaying future generating requirements. To participate, customers must allow the Company, or its authorized agents, to install load control equipment and, if necessary, auxiliary communicating devices to control the customer's central air conditioning, heat pumps, and/or electric water heating equipment. All such devices shall be installed at a time that is consistent with the orderly and efficient deployment of this program.

The Company will utilize the installed control devices to reduce customer's energy use during load management events. The Company plans to control devices for up to 150 hours per year (combined planned load management and emergency load management) with no single event lasting more than six (6) consecutive hours.

Cycling of the central air conditioning and heat pump systems or thermostat setback may be employed during load management events in the summer season. Water heating equipment may be cycled or turned off during load management events in both summer and winter seasons.

Company planned load management events shall not exceed six (6) consecutive hours per day during the summer months and four (4) consecutive hours per event during the winter months. Such non-emergency load management events shall not exceed 15 events and shall occur only during the months and hours listed below:

<u>Season</u>	<u>Months</u>	<u>Applicable Hours</u>
Summer	June through September	Noon to 8 P.M.
Winter	November through February	7 A.M. to 11 A.M. 6 P.M. to 10 P.M.

For emergency purposes, load management events shall not exceed 10 events per PJM planning year (June – May) and not last longer than six (6) hours duration. Emergencies shall be determined by PJM as defined in PJM Manual 13 – Emergency Operations. Emergency load management events can only occur between Noon and 8 pm on weekdays during June through September.

(Cont'd on Sheet No. 23-2)

DATE OF ISSUE August 15, 2012 EFFECTIVE DATE Service rendered on or after September 27, 2012

ISSUED BY GREGORY G PAULEY, PRESIDENT/COO FRANKFORT, KENTUCKY

NAME

TITLE

ADDRESS

Issued by authority of an Order of the Public Service Commission in Case No. 2012-XXXX dated

R.C.L.M. (Cont'd)
(Pilot Residential and Small Commercial Load Management)

RATE CREDIT.

Residential and Small Commercial customers shall receive the following monthly billing credits for each qualifying central air conditioning and heat pump unit controlled during the summer billing months of June to September:

\$20.00 per year (\$5.00 for each summer month; June, July, August, and September)

Residential and Small Commercial customers shall receive \$1 per month billing credit for each qualifying electric water heater unit controlled during the summer billing months of June, July, August and September and the winter billing months of November, December, January and February.

Such credits shall not reduce the customer's bill below the minimum charge as specified in the tariff under which the customer takes service.

EQUIPMENT.

The Company, or its authorized agents, will furnish and install, in the customer's presence, load control equipment and, if necessary, an auxiliary communicating device inside the customer's residence or facility. Ownership of the programmable communicating thermostat will be transferred to the property owner upon installation. All other load management equipment will be owned and maintained by the Company, or its authorized agents, until such time as the experimental load management pilot program is discontinued or the customer requests to be removed from the program after completing the initial mandatory period of one (1) year. At that time, and at the Companies discretion, some or all of the load control equipment and any auxiliary communicating device may be removed by the Company, or its authorized agents. The customer is not required to pay a deposit for any auxiliary communicating equipment. However, failure to return the auxiliary communicating device in good working order may result in additional charges in the amount of the current cost of the auxiliary equipment.

(T)
(T)

Should the customer lose or damage the load control devices or auxiliary communicating equipment, the customer will be responsible for the cost of repairing or replacing the device(s). If the device(s) malfunctions through no fault of the customer, the Company will replace or repair at its expense.

CONTRACT.

Participating customers must agree to participate for an initial period of one (1) year and thereafter may discontinue participation by telephone.

(Cont'd on Sheet No. 23-3)

DATE OF ISSUE August 15, 2012 EFFECTIVE DATE Service rendered on or after September 27, 2012

ISSUED BY GREGORY G. FAULEY PRESIDENT/COO FRANKFORT, KENTUCKY
NAME TITLE ADDRESS

Issued by authority of an Order of the Public Service Commission in Case No. 2012-XXXX dated

R.C.L.M. (Cont'd)
(Pilot Residential and Small Commercial Load Management)

SPECIAL TERMS AND CONDITIONS.

R.C.L.M. is subject to the Company's Terms and Conditions of Service and all provisions of the tariff under which the Customer takes service, including all payment provisions.

The Company shall not be required to install load control equipment if the installation can not be justified for reasons such as: technological limitations, safety concerns, or abnormal utilization of equipment, including vacation or other limited occupancy residences.

The Company and its authorized agents shall be permitted access to the customer's premises during normal business hours to install, inspect, test, or maintain the load control device(s). The Company may also be allowed access to the customer's premise to repair or remove faulty load control device(s). In the event the Company requires access to the load control device(s), and the Customer does not provide such access within 30 days of the request, then the Company may discontinue the Rate Credit until such time as the Company is able to gain the required access. The Company shall not be responsible for the repair, maintenance or replacement of any customer-owned equipment.

The Company shall collect data during the course of this experimental load management program. Customer-specific information will be held as confidential and data presented in any analysis will protect the identity of the individual customer.

DATE OF ISSUE October 25, 2010 EFFECTIVE DATE Service rendered on or after Oct 15, 2010
ISSUED BY Lila P. Munsey MANAGER OF REGULATORY SERVICES FRANKFORT, KENTUCKY
NAME TITLE ADDRESS

Issued by authority of an Order of the Public Service Commission in Case No. 2010-00198 dated October 15, 2010

PUBLIC SERVICE COMMISSION
JEFFERSON COUNTY
EXECUTIVE DIRECTOR

TAMMIS BR...

Boyd L. Loring

FRANKFORT, KENTUCKY
ADDRESS

PURSUANT TO ORDER OF THE PUBLIC SERVICE COMMISSION

KENTUCKY POWER COMPANY
Demand Side Management
Status Report
As of June 30, 2012

INDEX

PAGE	DESCRIPTION
1	Definitions
2	Summary Information (All Programs)
3	Summary Energy/Demand Information (All Programs)
 <u>DSM Programs:</u>	
Residential Programs	
4	Targeted Energy Efficiency
5	High Efficiency Heat Pump - Mobile Home
6	Mobile Home New Construction
7	Modified Energy Fitness Program
8	High Efficiency Heat Pump
9	Community Outreach Compact Fluorescent Lamp (CFL)
10	Energy Education for Students
11	Residential HVAC Diagnostic and Tune-up
12	Pilot Residential Load Management
13	Residential Efficient Products
14	Energy Fitness - Inactive
15	Compact Fluorescent Bulb - Inactive
16	High Efficiency Heat Pump Retrofit - Inactive
 Commercial Programs	
17	Commercial HVAC Diagnostic and Tune-up
18	Pilot Commercial Load Management
19	High Efficiency Heat Pump/Air Conditioner
20	Commercial Incentive
21	Smart Audit - Inactive
22	Smart Incentive - Inactive
 Industrial Programs	
23	Smart Audit - Inactive
24	Smart Incentive - Inactive

DEFINITIONS

- 1) YTD Costs - Year-to-Date costs recorded through June 30, 2012.
- 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, 2012
- 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, 2012. 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, June 30, 2008, June 30, 2010, August 15, 2011 and August 15, 2012 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 (1/1/96 to 6/30/97). The lost revenue, efficiency incentive and maximizing incentive for the period 1/1/2012 to 12/31/2012 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, 2012

DESCRIPTION	YTD	PTD
Total Revenue Collected	<u>\$3,350,222</u>	<u>\$20,295,335</u>
Total Program Costs	1,359,722	15,312,436
Total Lost Revenues	311,708	4,830,158
Total Efficiency / Maximizing Incentive	152,295	1,821,554
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	<u>0</u>	<u>15,700</u>
Total DSM Costs As of June 30, 2012	<u>\$1,823,725</u>	<u>\$22,038,816</u>

KENTUCKY POWER COMPANY
SUMMARY INFORMATION (ALL PROGRAMS)
As of June 30, 2012

DESCRIPTION	YTD		PTD	
Actual In-Place Energy Savings:	1,246,032	kWh	588,659,979	kWh
w/ T&D Line Losses:	1,370,636	kWh	647,525,977	kWh
Total kW Reductions:				
Winter	932	kW	26,670	kW
w/ T&D Line Losses:	1,035	kW	29,604	kW
Summer	551	kW	6,607	kW
w/ T&D Line Losses:	612	kW	7,334	kW

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Targeted Energy Efficiency
PARTICIPANT DEFINITION:	Number of Households
CUSTOMER SECTOR:	Residential - Low Income
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	All Electric	Non All Electric
Jan	20	1
Feb	29	4
Mar	27	1
Apr	20	2
May	19	3
Jun	27	2
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	142	13
PTD	3,463	1,092

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	79,850	89,795,611
Anticipated Peak Demand (kW) Reduction:		
Summer	42	777
Winter	72	3,142

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	273,684.00
Equipment/Vendor:	173,271.00	0.00	3,606,183.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	0.00	0.00	0.00
Other Costs:	0.00	0.00	9,553.00
Total Program Costs	173,271.00	0.00	3,889,420.00
Lost Revenues:	52,258.00	1,944.00	815,309.00
Efficiency Incentive:	15,221.00	184.00	135,956.00
Maximizing Incentive:	66.00	0.00	123,436.00
Total Costs	240,816.00	2,128.00	4,964,121.00

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 \$171,959 for all-electric and \$1,312 for non-all-electric homes.

The YTD Estimated in Place Energy (kWh) Savings for all-electric participants and non-all-electric participants is 76,970 and 2,880 respectively.

The YTD Anticipated Peak Demand (kW) Reduction summer/winter for all-electric and non-all-electric participants is 39/70 and 3/2 respectively.

The YTD Lost Revenue for all-electric participants and non-all-electric participants is \$48,115 and \$4,143 respectively.

The YTD Efficiency Incentive for all-electric participants is \$15,221.
The YTD Maximizing Incentive for non-all-electric participants is \$66.

The participant and expense forecast for 2012 is 275 all-electric homes, 25 non-all-electric homes and \$303,300.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	High Efficiency Heat Pump - Mobile Home
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	
Jan	10
Feb	11
Mar	16
Apr	35
May	26
Jun	12
Jul	0
Aug	0
Sep	0
Oct	0
Nov	0
Dec	0
YTD	110
PTD	2,598

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	74,000	87,599,200
Anticipated Peak Demand (kW) Reduction:		
Summer	52	491
Winter	87	4,179

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	52,556.00
Equipment/Vendor:	5,850.00	0.00	81,205.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	46,800.00	0.00	1,102,800.00
Other Costs:	0.00	0.00	1,167.00
Total Program Costs	52,650.00	0.00	1,237,728.00
Lost Revenues:	32,588.00	5,820.00	570,028.00
Efficiency Incentive:	26,043.00	18,331.00	272,557.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	111,281.00	24,151.00	2,080,313.00

COMMENTS:

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

The participant and expense forecast for 2012 is 210 and \$94,500 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Mobile Home New Construction
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	Heat Pump	Air Conditioner
Jan	8	0
Feb	8	0
Mar	13	0
Apr	13	0
May	15	0
Jun	22	0
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	79	0
PTD	2,384	2

Impacts	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	55,840	128,218,400
Anticipated Peak Demand (kW) Reduction:		
Summer	35	718
Winter	8	5,138

Costs	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	36,529.00
Equipment/Vendor:	3,950.00	0.00	141,713.00
Promotional:	0.00	0.00	3,939.00
Customer Incentives:	39,500.00	0.00	1,198,950.00
Other Costs:	0.00	0.00	4,866.00
Total Program Costs	43,450.00	0.00	1,385,997.00
Lost Revenues:	27,801.00	0.00	615,041.00
Efficiency Incentive:	6,554.00	0.00	179,373.00
Maximizing Incentive:	0.00	0.00	2,580.00
Total Costs	77,805.00	0.00	2,182,991.00

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 participant and expense forecast for 2012 is 190 heat pumps and \$104,750 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Modified Energy Fitness
PARTICIPANT DEFINITION:	Number of Home Audits
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	
Jan	98
Feb	109
Mar	99
Apr	110
May	120
Jun	110
Jul	0
Aug	0
Sep	0
Oct	0
Nov	0
Dec	0
YTD	646
PTD	8,837

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	106	82,127,889
Anticipated Peak Demand (kW) Reduction:		
Summer	-19	999
Winter	149	4,538

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	0.00	0.00	36,328.00
Equipment/Vendor:	208,408.00	0.00	3,185,472.00
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	208,408.00	0.00	3,221,800.00
Lost Revenues:	61,763.00	0.00	798,318.00
Efficiency Incentive:	4,115.00	0.00	312,256.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	274,286.00	0.00	4,332,374.00

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 including customer education.

The participants and expense forecast for 2012 is 1,216 and \$427,000 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION

PROGRAM:	High Efficiency Heat Pumps
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	Resistance	Non Resistance
Jan	18	32
Feb	15	22
Mar	10	41
Apr	17	42
May	18	39
Jun	10	41
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	88	217
PTD	706	1,349

Impacts	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	152,390	2,350,379
Anticipated Peak Demand (kW) Reduction:		
Summer	(17)	120
Winter	175	2,062

Costs	Year-To-Date	Retroactive Adjustment	Program-To-Date
Description			
Total Evaluation	0.00	0.00	12,236.00
Equipment/Vendor:	15,700.00	0.00	127,300.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	125,600.00	0.00	789,700.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	141,300.00	0.00	929,236.00
Lost Revenues:	26,437.00	0.00	162,948.00
Efficiency Incentive:	22,676.00	0.00	256,089.00
Maximizing Incentive:	0.00	0.00	17,177.00
Total Costs	190,413.00	0.00	1,365,450.00

COMMENTS:

This program was implemented to reduce residential electric consumption by replacing older, less efficient electric heating systems with high efficiency heat pumps. Customers are provided an incentive encouraging them to promote the highest efficiency equipment practical.

The YTD Estimated in Place Energy (kWh) Savings for resistance heat replacement and non-resistance heat replacement participants is 27,420 and 124,970, respectively.

The YTD Anticipated Peak Demand (kW) Reduction summer/winter for resistance heat replacement and non-resistance heat replacement participants is -13/48 and -4/127 respectively.

The YTD Lost Revenue for resistance heat replacement and non-resistance heat replacement participants is \$8,006 and \$18,431 respectively.

The Efficiency Incentive for resistance heat replacement participants is \$3,458 and for the non-resistance heat replacement participants is \$19,218.

The participant and expense forecast for 2012 is 175 resistance heat replacement customers, 475 non-resistance heat replacement customers and \$292,500 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Community Outreach Compact Fluorescent Lamp
PARTICIPANT DEFINITION:	Number of Customers
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	
Jan	0
Feb	1
Mar	471
Apr	0
May	1,476
Jun	387
Jul	0
Aug	0
Sep	0
Oct	0
Nov	0
Dec	0
YTD	2,335
PTD	15,804

Impacts		
	<u>Year-To-Date</u>	<u>Program-To-Date</u>
Estimated in Place Energy (kWh) Savings	174,100	1,176,623
Anticipated Peak Demand (kW) Reduction:		
Summer	112	407
Winter	105	589

Costs			
<u>Description</u>	<u>Year-To-Date</u>	<u>Retroactive Adjustment</u>	<u>Program-To-Date</u>
Total Evaluation	0.00	0.00	18,415.60
Equipment/Vendor:	22,439.00	0.00	137,053.48
Promotional:	175.00	0.00	16,104.38
Administration:	0.00	0.00	1,808.14
Other Costs:	0.00	0.00	0.00
Total Program Costs	22,614.00	0.00	173,381.60
Lost Revenues:	42,420.00	0.00	110,835.00
Efficiency Incentive:	11,138.00	0.00	73,095.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	76,172.00	0.00	357,311.60

COMMENTS:

The Community Outreach Compact Fluorescent Lighting (CFL) program is designed to educate and influence residential customers to purchase and use compact fluorescent lighting in their homes. A package of 4 high efficiency CFLs are distributed to customers at scheduled community outreach events.

The participant and expense forecast for 2012 is 4,800 customers and \$58,500, respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Energy Education For Students
PARTICIPANT DEFINITION:	Number of Students
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	
Jan	0
Feb	0
Mar	275
Apr	0
May	250
Jun	0
Jul	0
Aug	0
Sep	0
Oct	0
Nov	0
Dec	0
YTD	525
PTD	5,098

Impacts		
	<u>Year-To-Date</u>	<u>Program-To-Date</u>
Estimated in Place Energy (kWh) Savings	36,340	323,943
Anticipated Peak Demand (kW) Reduction:		
Summer	41	157
Winter	25	150

Costs			
<u>Description</u>	<u>Year-To-Date</u>	<u>Retroactive Adjustment</u>	<u>Program-To-Date</u>
Total Evaluation	0.00	0.00	10,261.00
Equipment/Vendor:	8,995.00	0.00	50,111.00
Promotional:	250.00	0.00	250.00
Education Workshops	0.00	0.00	13,000.00
Administration	0.00	0.00	7,562.00
Total Program Costs	9,245.00	0.00	81,184.00
Lost Revenues:	16,932.00	0.00	38,685.00
Efficiency Incentive:	1,664.00	0.00	18,256.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	27,841.00	0.00	138,125.00

COMMENTS:

The Energy Education for Students program is designed to partner with the National Energy Education Development Project (NEED) to implement an energy education program for 7th grade students at participating middle schools. The students will be provided a package of four 23 watt CFLs to install in their homes. The program will influence residential customers to purchase and use compact fluorescent lighting in their homes.

The participant and expense forecast for 2012 is 2,000 students and \$31,700.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION

PROGRAM:	Residential HVAC Diagnostic and Tune-up
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants		Heat Pump	Air Conditioner
Jan		67	14
Feb		22	11
Mar		23	6
Apr		46	21
May		66	56
Jun		100	39
Jul		0	0
Aug		0	0
Sep		0	0
Oct		0	0
Nov		0	0
Dec		0	0
YTD		324	147
PTD		1,082	379

Impacts		Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings		38,340	310,154
Anticipated Peak Demand (kW) Reduction:			
Summer		19	205
Winter		56	240

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	10,638.00	0.00	15,394.00
Equipment/Vendor:	21,350.00	0.00	68,150.00
Promotional:	0.00	0.00	4,818.00
Customer Incentives:	21,350.00	0.00	68,050.00
Administration:	0.00	0.00	0.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	53,338.00	0.00	156,412.00
Lost Revenues:	3,676.00	1,944.00	9,412.00
Efficiency Incentive:	0.00	184.00	8,930.00
Maximizing Incentive:	2,667.00	0.00	2,667.00
Total Costs	59,681.00	2,128.00	177,421.00

COMMENTS:

The Residential HVAC Diagnostic and Tune-up Program provides incentives to customers for a variety of HVAC services including over and under refrigerant charge and other diagnostic performance checks on residential unitary central air conditioning and heat pump units.

The YTD Estimated in Place Energy (kWh) Savings for heat pump and air conditioner participants is 34,830 and 3,510 respectively.

The YTD Anticipated Peak Demand (kW) Reduction summer/winter for heat pump and air conditioner participants is 13/56 and 6/0 respectively.

The YTD Lost Revenue for heat pump and air conditioner participants is \$3,430 and \$246 respectively.

The Maximizing Incentive for heat pump participants is \$1,771 and for air conditioner participants is \$896.

The participant and expense forecast for 2012 is 250 central air conditioners and 750 heat pumps and \$121,260 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Pilot Residential Load Management
PARTICIPANT DEFINITION:	Number of Switches Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	A/C Switches	Water Heater SW
Jan	0	0
Feb	8	8
Mar	13	10
Apr	0	0
May	12	12
Jun	3	2
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	36	32
PTD	42	36

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	0	0
Anticipated Peak Demand (kW) Reduction:		
Summer	0	0
Winter	0	0

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	15,674.99	0.00	24,467.99
Equipment/Vendor:	75,290.65	0.00	169,995.65
Promotional:	12,141.49	0.00	12,141.49
Customer Incentives:	18.00	0.00	18.00
Other Costs:	668.81	0.00	668.81
Total Program Costs	103,793.94	0.00	207,291.94
Lost Revenues:	0.00	0.00	0.00
Efficiency Incentive:	0.00	0.00	0.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	103,793.94	0.00	207,291.94

COMMENTS:

The Pilot Residential Load Management Program will determine whether peak demand can be effectively reduced through the installation of load control devices on central air conditioners, heat pumps, and/or electric water heaters.

The participant and expense forecast for 2012 is 110 air conditioners or heat pumps switches and 106 water heating switches at \$267,080. Other cost included above is for tax on equipment.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION

PROGRAM:	Residential Efficient Products
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	CFL	Specialty Bulbs	LED Lights
Jan	11,783	0	0
Feb	18,998	0	0
Mar	6,057	0	0
Apr	5,377	0	0
May	3,779	0	0
Jun	5,487	0	0
Jul	0	0	0
Aug	0	0	0
Sep	0	0	0
Oct	0	0	0
Nov	0	0	0
Dec	0	0	0
YTD	51,481	0	0
PTD	185,173	0	0

Impacts	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	691,230	2,922,558
Anticipated Peak Demand (kW) Reduction:		
Summer	244	392
Winter	244	1,728

Costs	Year-To-Date	Retroactive Adjustment	Program-To-Date
Description			
Total Evaluation	19,877.00	0.00	25,945.00
Equipment/Vendor:	94,142.00	0.00	267,854.00
Promotional:	0.00	0.00	0.00
Customer Incentives:	55,156.00	0.00	189,531.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	169,175.00	0.00	483,330.00
Lost Revenues:	43,122.00	0.00	76,827.00
Efficiency Incentive:	43,759.00	0.00	85,204.00
Maximizing Incentive:	30.00	0.00	30.00
Total Costs	256,086.00	0.00	645,391.00

COMMENTS:

The Residential Efficient Products Program will provide incentives and marketing support through retailers to build market share and usage of ENERGY STAR lighting products. Designed to produce long-term energy savings in the residential sector by increasing the market share of ENERGY STAR CFLs and (or) other ENERGY STAR lighting products

The participant and expense forecast for 2012 is 134,257 ENERGY STAR CFLs and 800 other lighting products and \$345,320 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Energy Fitness - Inactive
PARTICIPANT DEFINITION:	Number of Households
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	
Jan	0
Feb	0
Mar	0
Apr	0
May	0
Jun	0
Jul	0
Aug	0
Sep	0
Oct	0
Nov	0
Dec	0
YTD	0
PTD	2,812

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	0	55,360,221
Anticipated Peak Demand (kW) Reduction:		
Summer	0	441
Winter	0	1,932

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:	Compact Fluorescent Bulb - Inactive
PARTICIPANT DEFINITION:	Number of Bulbs Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	
Jan	0
Feb	0
Mar	0
Apr	0
May	0
Jun	0
Jul	0
Aug	0
Sep	0
Oct	0
Nov	0
Dec	0
YTD	0
PTD	269

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	0	280,416
Anticipated Peak Demand (kW) Reduction:		
Summer	0	3
Winter	0	3

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 Retro - Inactive
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Residential
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	Resistance	Non Resistance
Jan	0	0
Feb	0	0
Mar	0	0
Apr	0	0
May	0	0
Jun	0	0
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	0	0
PTD	1,367	929

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	0	71,026,985
Anticipated Peak Demand (kW) Reduction:		
Summer	0	851
Winter	0	2,995

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

COMMENTS:

This program was discontinued December 31, 2001.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Commercial HVAC Diagnostic and Tune-up
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Commercial
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants		
	Heat Pump	Air Conditioner
Jan	0	1
Feb	3	0
Mar	5	13
Apr	9	3
May	21	2
Jun	18	5
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	56	24
PTD	163	70

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	7,360	83,887
Anticipated Peak Demand (kW) Reduction:		
Summer	5	65
Winter	14	74

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	10,152.00	0.00	14,252.00
Equipment/Vendor:	3,900.00	0.00	11,250.00
Promotional:	0.00	0.00	4,818.00
Customer Incentives:	5,850.00	0.00	16,800.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	19,902.00	0.00	47,120.00
Lost Revenues:	662.00	0.00	2,901.00
Efficiency Incentive:	0.00	0.00	3,496.00
Maximizing Incentive:	996.00	0.00	996.00
Total Costs	21,560.00	0.00	54,513.00

COMMENTS:

The Commercial HVAC Diagnostic and Tune-up Program provides a variety of HVAC services, including diagnostic performance checks on commercial unitary central air conditioning and heat pump units.

The Equipment / Vendor cost includes the cost of incentives for participating HVAC dealers promotion of the program. The customer incentives are \$75 per program participant.

The YTD Estimated in Place Energy (kWh) Savings for heat pump and air conditioner participants is 6,010 and 1,350 respectively.

The YTD Anticipated Peak Demand (kW) Reduction summer/winter for heat pump and air conditioner participants is 3/14 and 2/0 respectively.

The YTD Lost Revenue for heat pump and air conditioner participants is \$569 and \$93 respectively.

The Maximizing Incentive for heat pump participants is \$623 and for air conditioner participants is \$373.

The participant and expense forecast for 2012 is 55 central air conditioners and 115 heat pumps and \$37,380 respectively.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Pilot Commercial Load Management
PARTICIPANT DEFINITION:	Number of Switches Installed
CUSTOMER SECTOR:	Commercial
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	Heat Pump	Air Conditioner
Jan	0	0
Feb	0	0
Mar	0	0
Apr	0	0
May	0	0
Jun	0	0
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	0	0
PTD	0	0

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	0	0
Anticipated Peak Demand (kW) Reduction:		
Summer	0	0
Winter	0	0

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	7,532.34	0.00	11,347.34
Equipment/Vendor:	7,500.00	0.00	18,000.00
Promotional:	228.80	0.00	228.80
Customer Incentives:	0.00	0.00	0.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	15,261.14	0.00	29,576.14
Lost Revenues:	0.00	0.00	0.00
Efficiency Incentive:	0.00	0.00	0.00
Maximizing Incentive:	0.00	0.00	0.00
Total Costs	15,261.14	0.00	29,576.14

COMMENTS:

The Pilot Commercial Load Management Program will determine whether peak demand can be effectively reduced through the installation of load control devices on central air conditioners, heat pumps, and/or electric water heaters.

The participant and expense forecast for 2012 is 10 air conditioner switches and 10 water heater switches with a projected expense of \$36,105.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Commercial High Efficiency HP/AC
PARTICIPANT DEFINITION:	Number of Units Installed
CUSTOMER SECTOR:	Commercial
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants		Heat Pump	Air Conditioner
Jan		0	0
Feb		1	0
Mar		1	0
Apr		0	1
May		1	0
Jun		7	0
Jul		0	0
Aug		0	0
Sep		0	0
Oct		0	0
Nov		0	0
Dec		0	0
YTD		10	1
PTD		31	4

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	1,470	16,408
Anticipated Peak Demand (kW) Reduction:		
Summer	1	6
Winter	3	11

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	12,083.00	0.00	16,863.00
Equipment/Vendor:	550.00	0.00	1,700.00
Promotional:	0.00	0.00	9,636.00
Customer Incentives:	4,150.00	0.00	12,100.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	16,783.00	0.00	40,299.00
Lost Revenues:	88.00	0.00	279.00
Efficiency Incentive:	0.00	0.00	1,224.00
Maximizing Incentive:	839.00	0.00	839.00
Total Costs	17,710.00	0.00	42,641.00

COMMENTS:

The Commercial High Efficiency Heat Pump/Air Conditioner program offers financial incentive to small commercial customers (< 100 kW demand) who upgrade to a new qualifying central air conditioner or heat pump with a Consortium for Energy Efficiency (CEE) rating. Applicable for 5 ton units or less.

The YTD Estimated in Place Energy (kWh) Savings for heat pump and air conditioner participants is 1,410 and 60 respectively.

The YTD Anticipated Peak Demand (kW) Reduction summer/winter for heat pump and air conditioner participants is 1/3 and 0/0 respectively.

The YTD Lost Revenue for heat pump and air conditioner participants is \$88 and \$000 respectively.

The Maximizing Incentive for heat pump participants is \$522 and for air conditioner participants is \$317.

The participant and expense forecast for 2012 is 20 central air conditioners and 40 heat pumps with a program budget of \$50,474.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Commercial Incentive
PARTICIPANT DEFINITION:	Number of Participants Projects Installed & Inspected
CUSTOMER SECTOR:	Commercial
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	
Jan	0
Feb	1
Mar	3
Apr	4
May	4
Jun	12
Jul	0
Aug	0
Sep	0
Oct	0
Nov	0
Dec	0
YTD	24
PTD	42

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	59,610	80,693
Anticipated Peak Demand (kW) Reduction:		
Summer	97	177
Winter	97	177

Costs			
Description	Year-To-Date	Retroactive Adjustment	Program-To-Date
Total Evaluation	33,799.00	0.00	50,988.00
Equipment/Vendor:	268,708.00	0.00	464,251.00
Promotional:	0.00	0.00	9,294.00
Customer Incentives:	28,024.00	0.00	58,312.00
Other Costs:	0.00	0.00	0.00
Total Program Costs	330,531.00	0.00	582,845.00
Lost Revenues:	3,961.00	0.00	4,523.00
Efficiency Incentive:	0.00	0.00	42,852.00
Maximizing Incentive:	16,527.00	0.00	16,527.00
Total Costs	351,019.00	0.00	646,747.00

COMMENTS:

The Commercial Incentive program offers energy savings for all commercial business customers through promotion of high efficiency electric lighting, HVAC, pumps, and motors. Primary objectives include; increasing the market share and installation rate of high efficiency technologies, and improving the operating efficiencies of existing long life equipment for commercial customers.

The participant and expense forecast for 2012 is 185 customers and \$1,630,725.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Smart Audit - Commercial - Inactive
PARTICIPANT DEFINITION:	Number of Audits
CUSTOMER SECTOR:	Commercial
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	Class I	Class II
Jan	0	0
Feb	0	0
Mar	0	0
Apr	0	0
May	0	0
Jun	0	0
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	0	0
PTD	1,952	194

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	n/a	n/a
Anticipated Peak Demand (kW) Reduction:		
Summer	n/a	n/a
Winter	n/a	n/a

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

COMMENTS:

This program was discontinued December 31, 2002.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION

PROGRAM:	Smart Incentive - Commercial - Inactive
PARTICIPANT DEFINITION:	Number of Incentives
CUSTOMER SECTOR:	Commercial
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	Existing Building	New Building
Jan	0	0
Feb	0	0
Mar	0	0
Apr	0	0
May	0	0
Jun	0	0
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	0	0
PTD	182	69

Impacts	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	0	125,682,085
Anticipated Peak Demand (kW) Reduction:		
Summer	0	1,519
Winter	0	2,640

Costs	Year-To-Date	Retroactive Adjustment	Program-To-Date
Description			
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 - Inactive
PARTICIPANT DEFINITION:	Number of Audits
CUSTOMER SECTOR:	Industrial
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants	Class I	Class II
Jan	0	0
Feb	0	0
Mar	0	0
Apr	0	0
May	0	0
Jun	0	0
Jul	0	0
Aug	0	0
Sep	0	0
Oct	0	0
Nov	0	0
Dec	0	0
YTD	0	0
PTD	60	4

Impacts	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	n/a	n/a
Anticipated Peak Demand (kW) Reduction:		
Summer	n/a	n/a
Winter	n/a	n/a

Costs	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

COMMENTS:

This program was discontinued December 31, 1998.

KENTUCKY POWER COMPANY

PROGRAM INFORMATION	
PROGRAM:	Smart Incentive - Industrial - Inactive
PARTICIPANT DEFINITION:	Number of Incentives
CUSTOMER SECTOR:	Industrial
REPORTING PERIOD:	January 1, 2012 - June 30, 2012

New Participants		General	Compressed Air
Jan		0	0
Feb		0	0
Mar		0	0
Apr		0	0
May		0	0
Jun		0	0
Jul		0	0
Aug		0	0
Sep		0	0
Oct		0	0
Nov		0	0
Dec		0	0
YTD		0	0
PTD		1	0

Impacts		
	Year-To-Date	Program-To-Date
Estimated in Place Energy (kWh) Savings	0	170,525
Anticipated Peak Demand (kW) Reduction:		
Summer	0	6
Winter	0	6

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

COMMENTS:

This program was discontinued December 31, 1998.



Kentucky Power Company Commercial Incentive Program

Process, Market and Impact Evaluation • July 2012

Submitted by

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Abstract

Kentucky Power Company retained Applied Energy Group to conduct a process, market and impact evaluation of its Commercial Incentive Program. The Commercial Incentive Program provides financial incentives to business customers who implement qualified energy efficient improvements and technologies. The program provides prescriptive and custom incentives to all KPCO electric commercial customers. Prescriptive incentives include lighting, HVAC, motors and drives while custom incentives include all eligible energy savings measures not covered by a prescriptive incentive. The maximum payout is 50% of incremental equipment costs, up to \$20,000 annually per project and customer electric account.

To arrive at the final recommendations of the evaluation, AEG reviewed program materials and conducted interviews with Kentucky Power program staff, the third-party program implementation contractor and participating customers. The results of the analysis, along with key findings and recommendations for program improvements are included in this report.

Table of Contents

Abbreviations	i
Definitions	ii
Executive Summary	iv
1. Introduction.....	1
2. Program Description	1
3. Evaluation Methodology	3
4. Process and Market Evaluation Findings.....	6
4.1 Program Logic Model	6
4.1.1 Activities and Outputs	9
4.1.2 Outcomes	10
4.1.3 External Factors.....	10
4.1.4 Best Practices	11
4.2 Program Performance	11
4.3 Program Marketing	15
4.3.1 Program Awareness	15
4.3.2 Motivation for Participation.....	16
4.4 Program Tracking & Incentive Processing.....	16
4.5 Program Satisfaction	17
5. Impact Evaluation Findings	18
5.1 Gross Energy and Demand Savings	18
5.2 Net Energy and Demand Savings	19
5.2.1 Free Ridership.....	20
5.2.2 Spillover	21
5.3 Program Site Inspections and Performance Verification	22
5.4 Program Cost-Effectiveness	23
6. Key Findings and Recommendations	25
6.1 Summary of Key Findings	25
6.1.1 Program Performance Indicators	25
6.1.2 Program Tracking	26
6.1.3 Program Awareness and Marketing Strategies.....	26
6.1.4 Best Practices	26
6.1.5 Verify Program Impacts.....	27
6.2 Recommendations	27
6.2.1 Implementation Contractor to Increase Local Staff.....	27
6.2.2 Streamline Program Processes.....	27
6.2.3 Leverage Express Program	28
6.2.4 Express Program Incentives	29
Appendix A. Participating Customer Survey Guide	30
Appendix B. Cost-Effectiveness Analysis Inputs.....	34

List of Tables

Table ES1 2011 Actual versus Original Budget, Participation and Expenditures	v
Table ES2 2011 Energy Savings	vi
Table 1 Program Budget and Participation Goals, 2010-2012	2
Table 2 Anticipated Energy and Demand Savings, 2010-2012	3
Table 3 Overview of IMPVP Options	5
Table 4 Program Projects, Paid and Cancelled in 2011	13
Table 5 2011 Cost per Participant, Budgeted and Actual	14
Table 6 Number of Trade Ally Presentations/Meetings by Month	15
Table 7 Total Gross Demand and Energy Savings, by Project	19
Table 8 2011 Net Demand and Energy Savings, by Project	20
Table 9 Free Ridership Probability Scores, Questions 1 and 3	21
Table 10 Free Ridership Weighted Probability	21
Table 11 Spillover Probability	22
Table 12 Spillover Weighted Probability	22
Table 13 Installation Verification Site Visits, 2011	23
Table 14 Program Cost-Effectiveness Results	24
Table 15 Cost-Effectiveness Results if Planned Participation Achieved, 2011	24
Table 16 Cost-Effectiveness Results if Program Administration Costs Reduced, 2011	25
Table 17 Kentucky Power Portfolio Cost-Effectiveness Results, 2011	25
Table 18 2011 Actual versus Original Budget, Participation and Expenditures	25
Table 19 2011 Energy Savings	27

List of Figures

Figure 1 Program Logic Model	8
Figure 2 Project Status by Month, 2011	12
Figure 3 Program Processes, Length of Time (n=5)	14
Figure 4 How Customers First Learned of the Program (n=5)	16
Figure 5 Customer Motivation for Participation (n=5)	16
Figure 6 Participant Satisfaction with the Program (n=5)	17
Figure 7 Reasons Participant Would Recommend the Program (n=5)	18

Abbreviations

AEG	Applied Energy Group, Inc.
AEP	American Electric Power
EM&V	Evaluation Measurement and Verification
DSM	Demand Side Management
HVAC	Heating Ventilation & Air Conditioning
IPMVP	International Performance Measurement and Verification Protocols
KPCO	Kentucky Power Company
NTG	Net-To-Gross Ratio
PSC	Public Service Commission
QA/QC	Quality Assurance/Quality Control

Definitions

Benefit-Cost Ratio: The ratio of total benefits of a program to the total costs discounted over some specified time period. The benefit-cost ratio gives a rough measure of the participant rate of return and provides an indicator of program risk. A ratio above one indicates a beneficial program.

Participant Cost Test: Measures the quantifiable benefits and costs to the customer due to participation in a program.

Program Administrator Cost Test: Measures the net costs of a demand-side management program as a resource option based on the costs incurred by the program administrator (including incentive costs), excluding any net costs incurred by the participant. The benefits are similar to the Total Resource Cost benefits, but costs are more narrowly defined.

Ratepayer Impact Measure (RIM) Cost Test: Measures what happens to customer bills or rates due to changes in utility revenues and operating costs caused by the program. Rates will go down if the change in revenues from the program is greater than the change in utility costs. Conversely, rates or bills will go up if revenues collected are less than the total costs incurred by the utility. The RIM test indicates the direction and magnitude of the expected change in customer bills or rate levels.

Total Resource Cost (TRC) Test: Measures the net costs of a demand side management program as a resource option based on the total costs of the program, including both the participant and utility costs.

Coincidence Factor: The ratio, expressed as a numerical value or as a percentage, of the simultaneous maximum demand of a group of electrical appliances or consumers within a specified period to the sum of their individual maximum demands within the same period.

Cost-effectiveness: A criterion that specifies that a technology or measure delivers a good or service at equal or lower cost than current practice, or the lowest cost alternative for the achievement of a given target.

Demand Side Management (DSM): Programs designed to provide incentives to end-use customers or curtailment service providers to enhance the ability and opportunity for reduction of load during peak hours.

Evaluation Measurement and Verification: A set of analyses used to assess energy efficiency programs in terms of energy and demand savings and cost-effectiveness. There are several approaches to EM&V, some of which have been codified as best practices (see IPMVP). Most energy efficiency programs are subject to some type of EM&V.

GRID SMART® Programs: An AEP energy efficiency initiative that includes over 100 energy efficiency programs across the AEP service territory. The programs feature smart grid technologies such as smart meters, voltage optimization equipment and smart appliances that can reduce energy use.

Gross Energy Savings: Energy and demand savings seen by the participant at the meter. These are the appropriate program impacts to calculate bill reductions for the Participant Test.

Impact Evaluation: A method of evaluation that assesses any changes, intended or unintended that are directly attributable to an energy efficiency program.

International Performance Measurement and Verification Protocols (IPMVP): Provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency,

and renewable energy projects in commercial and industrial facilities. It may also be used by facility operators to assess and improve facility performance. Energy conservation measures covered in the protocols include fuel saving measures, water efficiency measures, load shifting and energy reductions through installation or retrofit of equipment, and/or modification of operating procedures.

Kilowatt (kW): A unit of power that describes the rate at which energy is generated or used. It quantifies the electric power required by an appliance or device such as a light bulb.

Kilowatt Hour (kWh): A unit of energy that describes how much electricity is consumed over a period of time. For example, if you turn on a 100 watt light bulb all day for 24 hours the light bulb consumed 2.4 kWh of electricity.

Net Energy Savings: The energy and demand savings attributable to the program, adjusted for free riders and spillover.

Net-to-Gross (NTG) Ratio: The ratio of net energy savings to gross energy savings indicates the overall effectiveness of an energy efficiency program. As the NTG ratio approaches one, the magnitude of the program impact increases.

Free Riders: Customers who participate in energy efficiency programs who would have engaged in the efficient behavior in the absence of the program. As a result, the presence of free riders tends to overestimate the energy savings of the program.

Spillover: Customers who engage in energy efficient behavior, but do not participate in the program, due to some influence of the program.

Process Evaluation: A method of evaluation that uses empirical data to assess the delivery of energy efficiency programs, verify goals and determine whether the program is implemented as designed.

Program Logic Model: Graphic representation of an energy efficiency program and its processes. Logic models shows the causal relationships or linkages among the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders critical to a program's performance.

Executive Summary

Applied Energy Group, Inc ("AEG") was retained by Kentucky Power Company ("KPCO" or "Kentucky Power") to conduct a process, market and impact evaluation of its Commercial Incentive Program. The Commercial Incentive Program provides prescriptive and custom financial incentives to all electric business customers who purchase and install qualified energy efficient improvements and technologies. In 2012, new construction and a direct install program will be added to the program. Prescriptive incentives include lighting, HVAC, motors and drives while custom incentives include all eligible energy savings measures not covered by a prescriptive incentive. The maximum payout is 50% of incremental equipment costs, up to \$20,000 annually per project and customer electric account.

AEG designed the process and market evaluation to examine program processes and customer responses to the program. The evaluation identifies methods for gathering data and measuring program results, and makes recommendations for program improvements. To arrive at the final recommendations, AEG performed the following tasks:

- Reviewed program materials, data and tracking methods.
- Updated program logic model and assessed program flow.
- Conducted interviews with KPCO staff and program implementation contractor.
- Conducted surveys of participating customers.

AEG designed the impact evaluation to assess the gross and net demand savings, gross and net energy savings, and the cost-effectiveness of installed measures. The evaluation verifies gross and net savings and measure installation. To verify program impacts AEG performed the following tasks:

- Calculated the gross energy (kWh) and peak (kW) impacts by project using engineering calculations.
- Performed cost-effectiveness analysis using a benefit-cost analysis model.
- Conducted site inspections of a sample of installed projects.

Summary of Key Findings

The primary objectives of the Commercial Incentive Program are to increase the market share of commercial grade high efficiency technologies sold through market channels, increase the installation rate of high efficiency technologies in commercial facilities, and improve operating efficiency of existing long life equipment to insure peak operating efficiency.

Program Performance Indicators

In 2011, eighteen (18) lighting projects were completed through the Commercial Incentive Program at a higher cost per participant than originally budgeted due to high fixed costs independent of program participation. Sixteen (16) projects were cancelled, primarily resulting from participants purchasing and/or installing equipment prior to beginning the participation process. Kentucky Power achieved approximately 20 percent of the 88 participant goal.

Table ES1 2011 Actual versus Budgeted Participation and Expenditures

	Actual	Original Budget	Revised Budget
Participation	18	88	88
Expenditures	\$252,314	\$896,152	\$910,560

The Commercial Incentive Program was approved in October 2010. KEMA implemented the program from its headquarters in Michigan until a local representative was hired in September 2011. Program participation was slow until October 2011, not long after the local representative was retained.

Program Tracking

The program tracking and monitoring system accurately tracks program data. However, based on the project applications provided by KEMA:

- 50 percent of pre-approval inspections were conducted before the pre-approval application was submitted, on average 35 days prior to the application submittal. 6 percent of inspections were conducted on the same date.
- 22 percent of post-installation inspections were conducted before the final application was submitted, on average 5 days prior to the application submittal. 28 percent of inspections were conducted on the same date.

Program Awareness and Marketing Strategies

The marketing strategy for the program included promoting the program directly to both eligible customers as well as business organizations, contractors and local government officials that were expected to promote the program to eligible customers.

KPCO Customer Services Group provided program information to eligible customers. According to KEMA, the Customer Services Group referred between 10 and 20 percent of program participants. The Trade Ally kick-off meetings held by KEMA were poorly attended. However, the KEMA representative met with numerous business and civic organizations as well as eligible customers in late 2011.

According to survey respondents, customers most often learned of the program from a business associate or the Kentucky Power website. Approximately 60 percent of participating customers met with the KEMA local representative prior to submitting the pre-approval application.

Best Practices

Kentucky Power's program design and processes are largely consistent with best practices for similar energy efficiency programs. Depending on the design of the commercial energy efficiency program, incentives may be direct (i.e. rebates and discounts) or indirect (i.e. manufacturer and/or retailer buy-downs). Direct incentives are typically a range per measure or a percentage of project costs. For example, incentives for fluorescent fixtures typically range between \$1 and \$200 per unit or between 30 and 50 percent of project cost. Custom incentives range between \$0.03 and \$0.75 per kWh saved,

depending on the type and cost of the project. Incentives for large scale projects are typically capped at a percentage of the incremental cost.¹

The challenges posed by lack of information are ubiquitous to energy efficiency programs. Investment in education and outreach will boost awareness of the potential benefits of energy efficiency. Successful marketing strategies can increase program participation.

Verify Program Impacts

The net-to-gross ratio for the Commercial Incentive Program is estimated 77 percent, with 29 percent free ridership and 6 percent spillover. Program cost-effectiveness was greatly affected by the low participation rates and high program administration, marketing and evaluation costs.

If the planned participation levels of 88 completed projects were achieved and projects save an average of 25,000 kWh and 5.5 kW, the program would be cost-effective and pass the TRC test, assuming actual 2011 expenditures. Alternatively, if program administrative costs were set equal to the ratio of original approved incentive to administrative costs and projects save an average of 25,000 kWh and 5.5 kW, the program would be cost effective and pass the TRC test, assuming actual 2011 participation. Going forward, it is vital that either participation goals be met or program administrative costs be reduced for the Commercial Incentive Program to reach acceptable cost-effectiveness levels.

Table ES2 2011 Energy Savings

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)	TRC
Program Total	77%	74.86	74.86	316,362	0.63

Site inspections and installation verifications were performed on eight fully installed projects to ensure proper installation. Proper installation verification was confirmed at all locations.

Recommendations

AEG has several recommendations on how to improve the program. These include:

Implementation Contractor to Increase Local Staff

AEG recommends that KEMA increase the local staff by at least one employee. Four (4) KEMA staff members worked remotely from Michigan until the local representative was hired in September 2011. While participation increased significantly between October and December, the program was promoted primarily through direct customer contact and Trade Ally outreach. AEG recommends that KEMA continue to utilize direct customer contact and Trade Ally outreach as the primary promotional activities. However, these promotional activities require considerable amounts of time to be successful. Because of the large geographic area of the Kentucky Power service territory, KEMA needs on-site staff in both the northern and southern portion of Kentucky Power's territory. An additional local

¹ National Action Plan for Energy Efficiency (2010). *Customer Incentives for Energy Efficiency Through Program Offerings*. Prepared by William Prindle, ICF International, Inc. <www.epa.gov/eeactionplan>

representative assisting with promotional efforts should increase participation and improve overall efficiency, particularly as the new program components are offered to customers.

Streamline Participation Process

AEG recommends that KEMA improve and streamline the participation process. The Commercial Incentive Program participation process was designed to include the following steps:

- 1) Customer/contractor submits the pre-approval application.
- 2) KEMA reviews the application and conducts a pre-approval inspection. If approved, the customer receives a letter confirming the funding reservation and detailing the terms and conditions of the program.
- 3) The approved equipment is installed and the customer/contractor submits the final application.
- 4) KEMA reviews the application and conducts a post-installation inspection. If approved, the customer incentive is processed.

The program does not operate as designed. In 2011, 50 percent of pre-approval inspections were conducted before the pre-approval application was submitted and 22 percent of post-installation inspections were conducted before the final application was submitted. KEMA is contracted to provide customer technical support to facilitate the pre-approval application, as needed. Therefore, the KEMA local representative is likely conducting the pre-approval inspection while providing technical support.

AEG recommends that the pre-approval inspection be conducted no sooner than the day the pre-approval application is submitted to KEMA. The KEMA representative may provide technical assistance to the customer/contractor for the application and conduct the inspection on the same day, but the application must be submitted to KEMA that day. The post-installation inspection should be conducted after the final application has been received and reviewed by KEMA.

AEG recommends that the program be modified such that KEMA conducts random inspections of at least 15 to 20 percent of pre- and post-installation projects, to be adjusted depending upon the inspection findings. The inspections are to be random; the pre- and post-installation inspections are not necessarily to be conducted on the same project. Depending upon the inspection findings, Kentucky Power and KEMA should reassess the need for pre-installation inspections.

AEG recommends that Kentucky Power and KEMA examine the customer incentive reservation period. Currently, customer incentives are reserved for 180 days, during which time the project must be completed. Rather than one consistent reservation period, the length of the incentive reservation may be based on the type and difficulty of the project. For example, a simple lighting retrofit may have a reservation of 90 days while a project that undertakes lighting and HVAC may have 120 days.

Leverage Express Program

In 2012, the Commercial Incentive Program will consist of three programs: Prescriptive and Custom Incentives (current program), Express Program, and the New Construction Program. The Express Program will provide incentives to non-residential customers with an average demand of less than 100 kW that have a participating contractor install efficient measures. The New Construction Program will

provide incentives to non-residential customers that are above the current building energy code for new additions, major renovations or new facilities.

AEG recommends that KEMA leverage the new Kentucky Power Express Program and New Construction Program to increase program awareness. KEMA should encourage sub-contractors involved in the Express Program to promote prescriptive and custom incentives to eligible customers. Additionally, KEMA should promote the prescriptive and custom incentives to customers that participate in the New Construction Program.

Express Program Incentives

AEG reviewed the Express Program, anticipated for mid-2012. The program will provide incentives to non-residential customers with an average demand of less than 100 kW that have a participating contractor install efficient measures. KPCO service territory comprises approximately 26,970 commercial and public authority accounts with a peak demand of 50 kW or less.²

AEG recommends that KPCO consider increasing incentives to 60 to 70 percent of the installed equipment costs. Incentives are currently capped at 50 percent of the incremental material costs, the same as the current Commercial Incentive Program prescriptive and custom incentives. However, direct install programs typically offer small non-residential customers higher incentives and, occasionally, financing for the remaining portion of the installation cost.

² Case No. 2010-00198.

1. Introduction

Applied Energy Group, Inc. (“AEG”) was retained by Kentucky Power Company (“Kentucky Power” or “KPCO”) to conduct a comprehensive evaluation of its 2010-2012 Demand Side Management (“DSM”) Program Portfolio.³ The 2010-2012 DSM Program Portfolio includes the Residential Efficient Products Program, Residential and Small Commercial HVAC Diagnostic and Tune-up Program, Commercial Incentive Program, Small Commercial High Efficiency Heat Pump and Air Conditioner Program, and the Residential and Small Commercial Load Management Pilot Program. The DSM programs will be evaluated concurrently and individual program Evaluation, Measurement and Verification (“EM&V”) reports will be filed with the Kentucky Public Service Commission (“PSC”) by the August 15, 2012 regulatory filing deadline.

Kentucky Power is an electric utility that serves approximately 175,000 customers in all or part of 20 eastern Kentucky counties.⁴ The utility is part of the American Electric Power (“AEP”) system, which is one of the largest electric utilities in the United States.⁵ The 2010-2012 DSM Program Portfolio was implemented to help Kentucky Power and AEP reduce electricity use and peak demand, help customers lower their electricity bills, and encourage long-term change in the market through the adoption of energy efficiency technologies and services.

The Commercial Incentive Program provides prescriptive and custom financial incentives to all electric business customers who purchase and install qualified energy efficient improvements and technologies. Prescriptive incentives include lighting, HVAC, motors and drives while custom incentives include all eligible energy savings measures not covered by a prescriptive incentive. The maximum payout is 50% of incremental equipment costs, up to \$20,000 annually per project and customer account.

This report describes the key findings from the process, market and impact evaluation and provides recommendations for improving program performance and operations. Section 2 provides a program description and Section 3 described the process and impact evaluation methodology. Sections 4 and 5 present the process, market and impact evaluation findings. Key findings and recommendations are described in Section 6.

2. Program Description

The Commercial Incentive Program provides financial incentives to business customers who purchase and install energy efficient technologies in existing and new construction facilities. The program is available to all commercial customers within the KPCO’s retail electric service territory. Prescriptive and custom incentives are available for a variety of efficient technologies.

³ Kentucky Power’s 2010-2012 DSM programs were approved in Case No. 2010-00095 and Case No. 2010-00198.

⁴ Kentucky Power. Facts, Figures & Bios. Accessed at www.kentuckypower.com/info/facts/

⁵ American Electric Power delivers electricity to more than 5 million customers in 11 states and ranks among the nation’s largest generators of electricity, with almost 38,000 megawatts of generating capacity in the U.S.

Prescriptive Incentives are intended to encourage business customers to purchase and install a standard set of high efficiency measures. Incentives are available for:

- Lighting
- Heating, Ventilation and Air Conditioning (HVAC)
- Refrigeration
- Miscellaneous Equipment

Custom Incentives are intended to encourage business customers to purchase and install high efficiency measures not covered by a prescriptive incentive. Incentives are based on measure-specific energy savings and paid at 8 cents per unit of electricity (kWh) saved.

Maximum incentives per project are 50% of incremental equipment costs, up to \$20,000 annually per project and per customer account. The primary objectives of the Commercial Incentive Program are:

- Increase the market share of commercial grade high efficiency technologies sold through market channels.
- Increase the installation rate of high efficiency technologies in commercial facilities.
- Improve operating efficiency of existing long life equipment to insure peak operating efficiency.

In 2012, KPCO will add new construction and direct install ("Express Program") components to the program. The New Construction Program will provide incentives to non-residential customers that are above the current building energy code for new additions, major renovations or new facilities. The Express Program will provide incentives to non-residential customers with an average demand of less than 100 kW that have a participating contractor install efficient measures. Express Program incentives are capped at 50% of the incremental material costs, not to exceed \$20,000 per facility per year.

The Kentucky Public Service Commission ("PSC") approved a three-year budget and participation goals for the Commercial Incentive Program.⁶ Table 1 presents the originally filed program budget and participations goals for 2010 through 2012. The program budgets were revised from the original filing to \$910,560 in 2011 and \$1,630,725 in 2012. Table 2 shows the anticipated energy and demand savings for 2010 through 2012.

Table 1 Program Budget and Participation Goals, 2010-2012

	2010	2011	2012
Contractor Administration	\$98,450	\$236,268	\$461,796
Customer Incentive	\$44,748	\$562,544	\$1,099,517
Promotion	\$25,000	\$60,000	\$98,960
Evaluation	\$8,000	\$37,340	\$68,210
Total	\$176,198	\$896,152	\$1,728,483
Participation	7	88	172

⁶ See Case No. 2010-00198.

Table 2 Anticipated Energy and Demand Savings, 2010-2012

	Summer kW	Winter kW	kWh
2010	47	82	392
2011	596	1,034	4,929
2012	1,165	2,021	9,635

3. Evaluation Methodology

AEG designed the process, market and impact evaluation to determine the efficacy of program procedures and systems, evaluate the achievement of program objectives, provide insight into and recommendations for program improvement and verify the direct impacts of program activities.

The process and market evaluation identifies whether key elements, such as incentive levels, program delivery, program tracking mechanisms and quality assurance/quality control ("QA/QC") procedures are performing as designed and identifies issues or opportunities to improve these key elements. The goals of the process and market evaluation are to:

- Examine key performance indicators to identify participation or program issues;
- Conduct a comprehensive review of program tracking or monitoring systems to review the accuracy of and trends in data;
- Determine awareness levels as a way to refine marketing strategies and reduce barriers to program participation; and
- Assist program implementers and managers to structure programs and achieve cost-effective savings while maintaining high levels of customer satisfaction;
- Provide recommendations for changing the program's structure, management, administration, design, delivery, operations and/or goals.

Impact evaluations assess the cost-effectiveness of a DSM program and verify the energy and demand savings directly associated with it. The goals of the impact evaluation are to:

- Verify the annual energy and coincident peak capacity savings and total resource benefit claims made by Kentucky Power; and
- Provide verification and documentation of DSM program impacts.

To arrive at the final recommendations, AEG carried out the following research activities.

Review Program Materials

AEG reviewed current program materials, documents and processes, including the rebate applications and marketing and outreach materials. The review served as the basis for understanding whether the program has been implemented as planned. The review was particularly important for preparing the interview guides and survey instruments for other process evaluation tasks.

Program Logic Model

AEG developed a program logic model based on a review of program materials and discussions with Kentucky Power program staff. The model shows the linkages between the program components, including activities, outputs, outcomes and key stakeholders. The model also highlights potential external influences and program inputs.

Program Tracking and Database Review

AEG reviewed current Kentucky Power rebate application review and processing, program tracking and reporting, and tracking databases.

Kentucky Power Staff Interview

AEG conducted a comprehensive, group interview with Kentucky Power program staff in November 2011. The purpose of this interview was to get staff impressions of program implementation activities, program performance, marketing and customer awareness of the program, program data and tracking mechanisms, and opportunities for improving the program. Between December 2011 and March 2012 AEG conducted individual interviews with program staff, as well as informal discussions regarding program performance. The individual interviews focused on program design and delivery issues, program performance, potential areas of improvements, and overall program effectiveness.

Third-Party Implementer Interview

The Commercial Incentive Program was implemented by KEMA. As program implementer, KEMA worked with Kentucky power to perform the following duties:

- Develop, track and administer services to achieve completion of program goals and budget.
- Program design: define program eligibility, product selection and incentives and establish data collection requirements and tracking and reporting systems.
- Program implementation: market and promote the program, engage businesses and facilities to participate, process applications and issue customer checks, and provide technical service.
- Provide training to Kentucky Power personnel and trade allies on the program application, procedures, etc.
- Customer Service: provide call center support and maintain a secure customer database.
- Perform QA/QC.

AEG interviewed KEMA in November 2011 and January 2012. The interview provided information on program implementation activities, program data and tracking methods, the relationship between the program implementation contractor and customers, and barriers to increased participation. AEG also obtained detailed information on program performance.

Participating Customer Surveys & Site Visits

AEG administered an internet survey to a sample of program participants to assess program experience and awareness, customer satisfaction, barriers to participation, free ridership and areas for potential program improvement. Eighteen (18) projects, completed by 10 businesses, received an incentive for completing a project in 2011. KEMA provided email contact information for 9 of the businesses. The population size was too small to achieve a sample size at a 90 percent confidence interval with an error

margin of +/-10 percent. Therefore, AEG issued the survey to all 9 businesses (see Appendix A for the survey guide). Five (5) surveys were completed.

AEG conducted site visits of 8 participating customers to assess services rendered and verify that the rebated equipment was installed, as compared to KEMA's records.

Review Engineering or Deemed Savings Assumptions

AEG reviewed the engineering and/or deemed savings assumptions utilized by KEMA to calculate program energy and demand impacts. Kentucky Power's initial program filing deemed savings assumptions were reviewed to ensure consistence with the impact evaluation results.

Gross Energy and Demand Impacts

AEG determined the gross energy and demand savings of a representative sample based the International Performance Measurement and Verification Protocols ("IPMVP")⁷ Option A.

Table 3 Overview of IMPVP Options

IPMVP M&V Option	Measure Performance Characteristics	Data Requirements
Option A: Engineering calculations using spot or short-term measurements, and/or historical data	Constant performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • Spot measurements • Run-time hour measurements
Option B: Engineering calculations using metered data.	Constant or variable performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • End-use metered data
Option C: Analysis of utility meter (or sub-meter) data using techniques from simple comparison to multivariate regression analysis.	Variable performance	<ul style="list-style-type: none"> • Verified installation • Utility metered or end-use metered data • Engineering estimate of savings input to SAE model
Option D: Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering	Variable performance	<ul style="list-style-type: none"> • Verified installation • Spot measurements, run-time hour monitoring, and/or end-use metering to prepare inputs to models • Utility billing records, end-use metering, or other indices to calibrate models

Engineering calculations referenced from the *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs*, using Kentucky Power specific inputs, were utilized to calculate gross energy and demand impacts by project.

Net Energy and Demand Impacts

AEG adjusted the gross energy and demand savings to reflect estimates of free ridership and spillover. Free ridership and spillover were determined from the retailer interviews; see Section 5 for a detailed explanation.

⁷ IPMVP provides best practice techniques for verifying results of energy efficiency projects, i.e. verifying savings attributed to energy efficiency projects.

Cost-Effectiveness Analysis

AEG analyzed the cost-effectiveness of the Commercial Incentive Program utilizing Bencost, an updated version of a public domain model that AEG customized for Kentucky Power. Bencost is an input-output model that calculates four standard California cost-effectiveness tests, the Total Resource Cost, Participant Test, Utility Test and Rate Impact Measure Test. The analysis was conducted using Kentucky Power specific inputs, including avoided costs, discount rates, participation and incentives. Appendix B provides more detail regarding the cost-effectiveness inputs and outputs.

4. Process and Market Evaluation Findings

The process and market evaluation identified whether key elements, such as incentive levels, program delivery, program tracking mechanisms and QA/QC procedures were performing as designed. When potential deficiencies in these areas arise, the process and market evaluation identified opportunities for improving these key elements.

4.1 Program Logic Model

Program logic models are graphic representations of an energy efficiency program and its processes. Logic models show the causal relationships or linkages between the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders that are critical to a program's performance.⁸

Key elements of a program logic model include:

- **Inputs.** Resources that program stakeholders contribute to a program, such as knowledge, skills, expertise, finances or equipment.
- **Outputs.** Program activities and number of people reached, based on program goals.
- **Outcomes.** Short-term, intermediate or long-term results of the program outputs. Assists evaluators and program administrators in establishing program results.
- **External Influences.** Factors outside the utility's control that may influence the program outcomes. They help to identify important program partnerships as well as the issue(s) the program can realistically influence. The factors help determine which evaluation measures will accurately reflect project outcomes or any other goals that must be met to address the problem or situation.

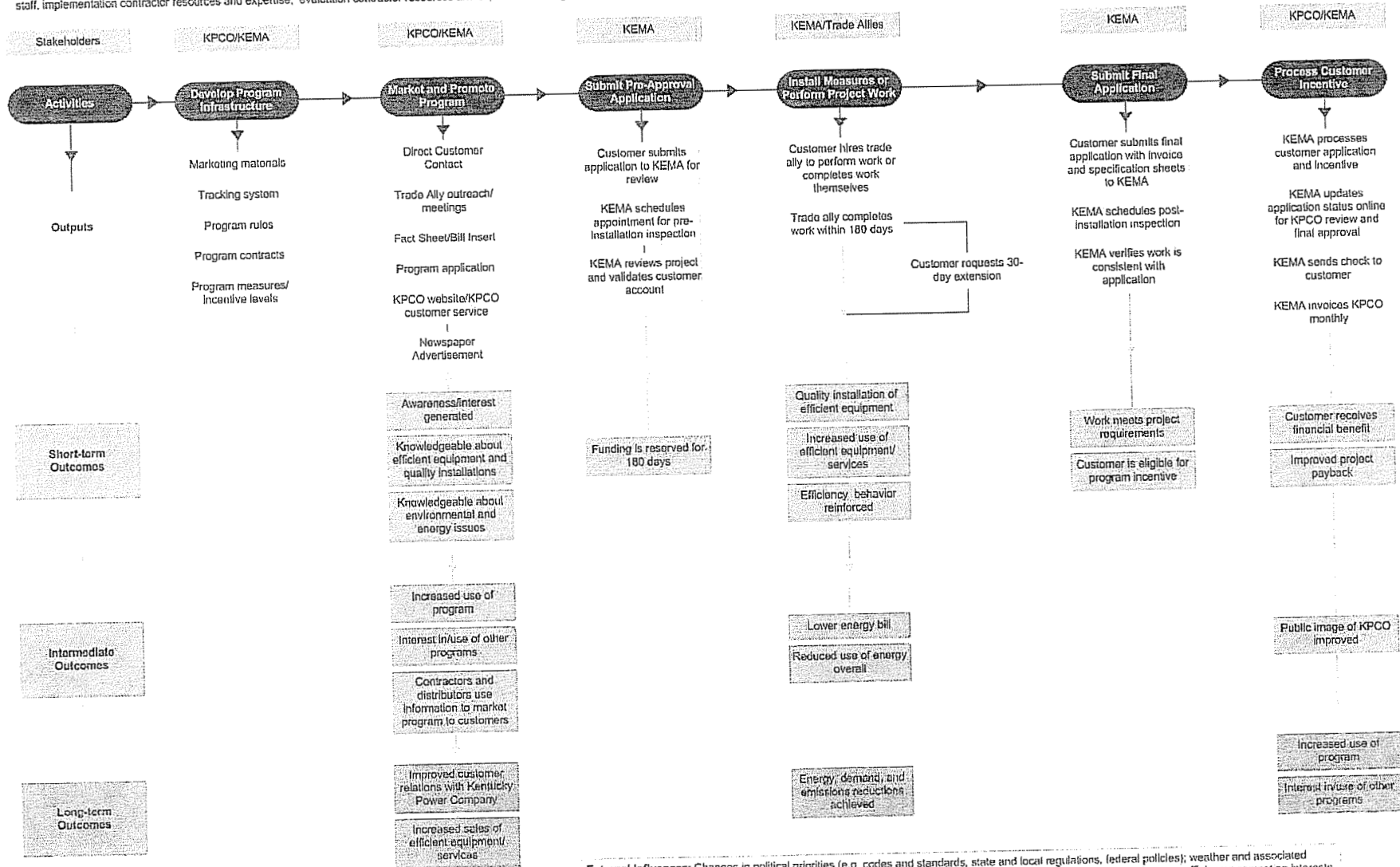
In the logic model presented in Figure 1, program activities are oriented sequentially across the top of the page from the left to the right. The sequence of program activities is important. For example, the program's infrastructure, including its advertising materials, tracking systems, program rules, and contracts must be developed before the program can be marketed and customers recruited. The

⁸ McCawley, P. (2001). *The Logic Model for Program Planning and Evaluation*. Moscow: University of Idaho Extension.

performance outputs and outcomes are oriented vertically from top to bottom. The box on the bottom right contains the external factors outside the utility's control that may affect program performance.

Figure 1 Program Logic Model

Inputs: program funding, PSC goals and reporting requirements, AEP human resources and integrated resource plan goals, Kentucky Power program staff, implementation contractor resources and expertise, evaluation contractor resources and expertise, existing awareness of Kentucky Power



4.1.1 Activities and Outputs

There were six main activities in the Commercial Incentive Program. The program activities and their corresponding outputs help to establish linkages between the situation that the program was designed to address and the program's intended outcomes. Therefore, activities and outputs are discussed together.

Develop Program Infrastructure

Activities included gathering market knowledge, setting program goals, designing the program, establishing program rules, developing marketing approaches and content, and establishing institutional and operating structures. KEMA, in consultation with Kentucky Power staff, designed the program, including eligible measures and incentive levels, rebate applications and application processes, data tracking system and marketing materials.

Promote and Market Program

The marketing strategy included direct customer contact, trade ally meetings and cold calls, chamber of commerce meetings as well as fact sheets, newspaper advertisements and bill inserts. KEMA's local representative recruited trade allies to promote the program and engaged and educated eligible customers. The KPCO Customer Services Group provided program information to eligible customers.

Submit Pre-Approval Application

The customer may have obtained a pre-approval application from the KPCO Commercial Incentive Program's website or KEMA's local representative. The customer completed the pre-approval application and submitted it to KEMA via mail, email or fax prior to purchasing equipment or committing to a project. KEMA reviewed the application, verified customer eligibility and scheduled a pre-installation inspection. Once the pre-installation had been completed and the existing equipment verified, the application was approved and the customer incentive was reserved.

The local representative marketed and promoted the program through cold calls and directly engaging potential participants. During an in-person meeting with a potential participant, the representative would provide the application and explain the participation process. The representative may have completed the pre-approval application with the customer and/or conducted the pre-installation inspection during the meeting. The pre-approval process had an advertised time of four to six weeks.

The customer received a letter confirming the equipment, the total incentive and the incentive reservation as well as detailing the terms and conditions of the program. Customer incentives were reserved for 180 days, during which time the project had to be completed.

Install Measures/Perform Project Work

The customer performed the approved project within the 180 day reservation period. If the customer did not complete the project within 180 days, they were reminded of the project reservation. Three 30-day extensions were granted to the customer.

The customer was responsible for securing materials, hiring a contractor (if needed) and paying up-front costs.

Submit Final Application

Within 60 days of project completion, the customer completed the final application and submitted it to KEMA via mail, email or fax. The final application was the same form as the pre-application, but required a customer signature. KEMA reviewed the application and conducted a post-installation inspection to verify the equipment installed was consistent with the application.

Process Customer Incentive

Kentucky Power program staff reviewed the final application information provided by KEMA and approved the incentives. KEMA processed customer incentives and issued incentive checks.

Kentucky Power maintained the right to conduct random post-installation inspections to verify the services are being performed properly and to determine customer satisfaction. To-date no inspections have been conducted.

4.1.2 Outcomes

Outcomes are the result of program partners and target audiences responding to the program outputs.

Short-term Outcomes

When the program is marketed and promoted, customer awareness and interest in more efficient equipment may increase. Other short-term outcomes include increased quality installation, increased awareness of environmental and energy issues, reinforcement of efficiency behavior and financial benefits from program participation.

Intermediate Outcomes

Intermediate outcomes may include increased use of the program, interest in, and use of, other KPCO efficiency programs and reduced energy consumption.

Long-term Outcomes

The long-term outcomes may include an expanded market for efficient equipment and sales, reduced utility emissions, fewer greenhouse gases emitted. Kentucky Power may enhance its public image as a utility that responds to customer needs without sacrificing consideration of environmental issues.

4.1.3 External Factors

Documenting external factors outside the control of Kentucky Power and its stakeholders improves program planning and evaluation by identifying important program partners, the activities the program can realistically influence, which evaluation measures will accurately reflect project outcomes, and other needs that must be met.

- Changes in political priorities (e.g. codes and standards, state and local regulations, federal policies, perceptions of energy and climate change);
- Weather and associated impacts on customer actions and energy bills;
- Energy prices and regulation;
- Changes in utility rate structures;
- Perceptions in the value of energy efficiency;

- Competing interests among demand side customers; and
- Cost, performance and availability of efficient technologies and services.

4.1.4 Best Practices

Program administrators encounter common challenges that hinder energy efficiency programs from achieving maximum benefits, including, but not limited to:

- Lack of information and awareness of energy efficiency benefits.
- Limited resources / High initial costs energy efficient technologies.
- Competing priorities among customers and program administrators.
- Lack of clear, well-communicated program goals that correspond to overall organizational goals.

Best practices can provide ideas and/or tools to overcome these and other program barriers. Some key best practices include, but are not limited to, the following:

- Coordinate with other energy efficiency program administrators to overcome market barriers.
- Increase awareness by investing in education, outreach and marketing activities.
- Solicit stakeholder input and feedback to optimize program design and delivery.
- Develop reliable program tracking systems to support evaluation and implementation.

4.2 Program Performance

In 2011, eighteen (18) lighting projects were completed and approximately \$25,000 in incentives was issued through the Commercial Incentive Program. Kentucky Power achieved approximately 20 percent of the 88 participant goal for 2011.

The Commercial Incentive Program was approved in October 2010, two months later than anticipated. Kentucky Power staff immediately sought an implementation contractor, awarded KEMA the contract in December 2010 and finalized a contract with KEMA in February 2011. The kick-off meeting was held March 15, 2011, approximately one month after the agreement between Kentucky Power and KEMA was finalized. KEMA implemented the program from its headquarters in Michigan until a local representative was hired in September 2011. As seen in Figure 2, program participation was slow until October 2011, not long after the local representative was retained.

Figure 2 Project Status by Month, 2011

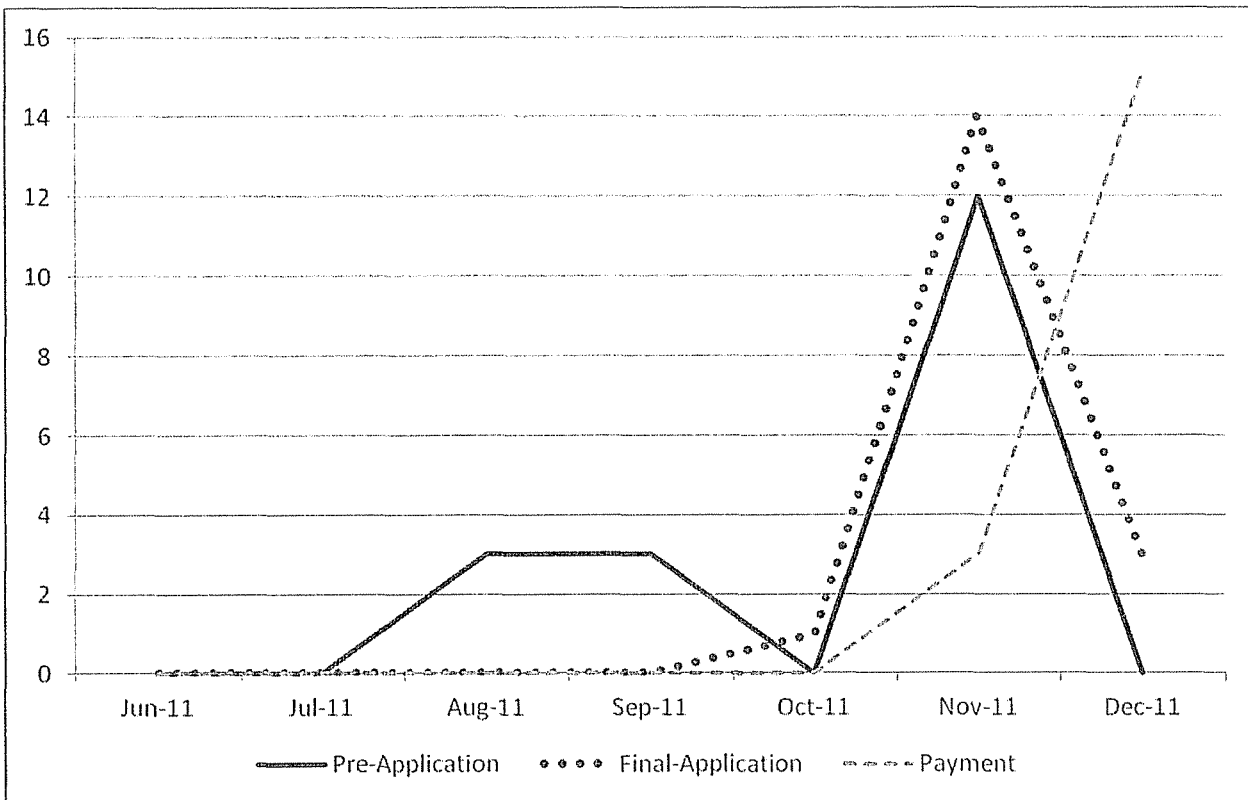


Table 4 presents the paid and cancelled projects in 2011 as well as the associated incentives and energy savings by project. Sixteen (16) projects were cancelled. According to KEMA, most cancellations resulted from participants purchasing and/or installing equipment prior to beginning the participation process. Projects in-process or recently completed were ineligible for the Commercial Incentive Program.

Table 4 Program Projects, Paid and Cancelled in 2011

Status	Organization	Building Type	Project Type	Projects	Incentive	kWh Savings
Paid	Ammar's Inc (Magic Mart)	Retail/Service	Custom	3	\$2,200	27,496
	Ashland Hospital Corporation	Medical	Lighting	1	\$7,317	116,896
	Breathitt County Board of Education	K-12 School	Lighting	1	\$2,310	37,125
	Cintas	2 Shift Manufacturing	Lighting	1	\$3,631	89,884
	Eastern Kentucky Exposition Center	Miscellaneous	Lighting	1	\$1,620	23,283
	Edward Jones Branch 1699	Retail/Service	Lighting	1	\$286	3,045
	Edward Jones Branch 32540	Retail/Service	Lighting	1	\$286	3,045
	Floyd County Schools	K-12 School	Custom	3	\$2,112	26,397
	Greenup County Bd of Ed	K-12 School	Lighting	1	\$874	10,733
	Jackson Independent School District	K-12 School	Lighting	1	\$875	14,063
	Maurices Incorporated	Retail/Service	Lighting	4	\$3,615	60,467
Cancelled	Aldi Inc.	Grocery	Refrigeration	1	\$690	8,901
	FOOD FAIR INC	Grocery	Lighting	1	\$1,118	0
	Grand Strand Beauty Salon	Retail/Service	Custom	1	\$242	3,023
	Hall Properties LLC	Office	HVAC	1	\$50	562
			Lighting	1	\$338	3,694
	Hazard Lion's Club Montessori School	K-12 School	HVAC	1	\$260	2,283
	Letcher County Public Schools	K-12 School	Lighting	5	\$360	3,372
	River Cities Harvest Inc		NONE	1	\$0	0
	Russell Independent School	K-12 School	Lighting	2	\$275	3,570
	Safe Harbor		Refrigeration	1	\$0	0
	Three Rivers Medical	Medical	HVAC	1	\$450	43,956

Of the projects paid in 2011:

- 1 was completed in November and 17 in December.
- 12 were prescriptive and 6 were custom.
- 6 were installed by contractors, 11 were self-installed and 1 was unknown.
- 10 were corporate and 8 were tax-exempt facilities.
- 50 percent were retail/service facilities and 33 percent were schools.
- The incentive covered, on average, 42 percent of the installed measure cost.

Table 5 presents the budget and budgeted cost per participant as compared to the actual expenditures and actual cost per participant. The actual 2011 expenditures were \$252,314 compared to the original approved budget of \$895,152. The actual cost per participant was higher than budgeted due to high fixed administrative costs, independent of program participation. Program administrative costs accounted for 88 percent of actual 2011 expenditures but were budgeted to account for 37 percent of the original approved budget.

Table 5 2011 Cost per Participant, Budgeted and Actual

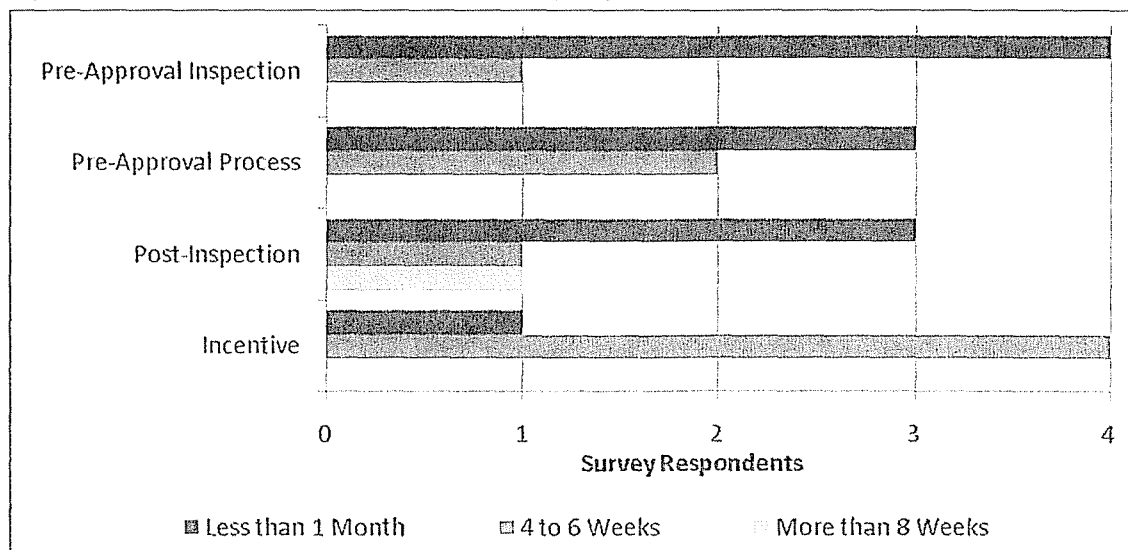
	Original Budget	Revised Budget	Actual
Contractor Administration	\$236,268	\$418,900	\$195,543
Customer Incentive	\$562,544	\$394,320	\$30,288
Promotion	\$60,000	\$60,000	\$9,294
Evaluation	\$37,340	\$37,340	\$17,189
Total Cost (\$)	\$896,152	\$910,560	\$252,314
Participation	88	88	18
Cost (\$) per Participant	\$10,184	\$10,347	\$14,017

Based on the project applications provided by KEMA:

- Pre-Approval Inspections
 - 50 percent were conducted before the pre-approval application was submitted, on average 35 days prior to the application submittal.
 - 6 percent of inspections were conducted on the same date.
- Post-Approval Inspections
 - 22 percent were conducted before the final application was submitted, on average 5 days prior to the application submittal.
 - 28 percent of inspections were conducted on the same date.

The participant survey separated the program processes into 4 categories. Figure 3 presents the length of time that each program process took based on the participant survey.

- 1) Pre-approval inspection: application submittal until the pre-approval inspection is conducted;
- 2) Pre-approval process: application submittal until the customer receives pre-approval confirmation;
- 3) Post-inspection: final application submittal until the post-installation inspection is conducted;
- 4) Incentive: final application submittal until the customer receives the rebate.

Figure 3 Program Processes, Length of Time (n=5)

4.3 Program Marketing

The Commercial Incentive Program was marketed as part of a broader initiative under Kentucky Power's GRID SMART® Programs. KEMA and Kentucky Power marketed the program to commercial customers as well as business organizations, contractors and local government officials. Marketing and promotional efforts increased when KEMA hired a local representative.

The Commercial Incentive Program was promoted through:

- **Direct Customer Contact.** KEMA's local representative had in-person meetings with eligible customers to discuss the program and application process. The representative targeted specific market segments, particularly the largest users such as schools, government buildings and large general service account holders.
- **Trade Ally Outreach.** The KEMA representative promoted the program to Trade Allies, businesses and individuals likely to have direct contact with eligible customers. In turn, the Trade Allies were encouraged to use the Kentucky Power program as a marketing tool. KEMA purchased lists of Kentucky-licensed HVAC contractors and received names from distributors and manufacturers. The representative promoted the program at the Commercial Incentive Program kick-off meeting and presentations at business/civic organizations and Chamber of Commerce meetings.
- **Customer Service.** KEMA received customer requests for information, services and other inquiries through their dedicated program email and customer service number.⁹ The KPCO Customer Services Group provided program information to eligible customers.

According to KEMA, the KPCO Customer Services Group has referred between 10 and 20 percent of program participants.

- **Newspaper Advertisements** were run over a four week period.
- **Internet.** Kentucky Power marketed the program through kentuckypower.com/save.

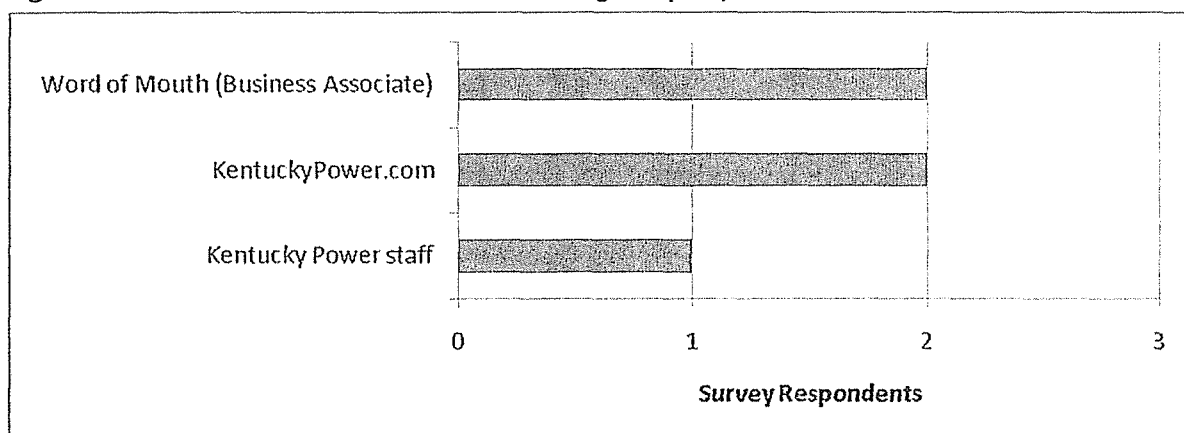
Table 6 Number of Trade Ally Presentations/Meetings by Month

	October 2011	November 2011	December 2011
Business and Civic Organizations	7	7	3
Commercial Accounts	12 Schools Fiscal Courts 6 Municipalities	16 Public Accounts 34 Private Accounts	6

4.3.1 Program Awareness

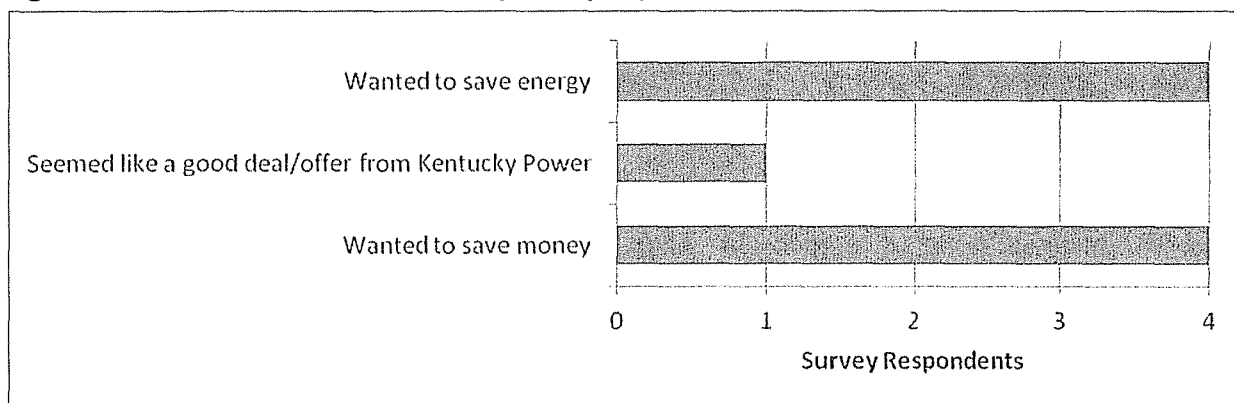
According to survey respondents, customers most often learned of the program from a business associate or the Kentucky Power website. Approximately 60 percent of participating customers met with the KEMA local representative prior to submitting the pre-approval application. The representative conducted a pre-approval inspection during 67 percent of the initial customer meetings.

⁹ Commercial Incentive Program customer service email is kpcommercialincentive@Kema.com and number is 1-855-878-6207.

Figure 4 How Customers First Learned of the Program (n=5)

4.3.2 Motivation for Participation

Participating customers surveyed cited that the primary reason for participating in the Commercial Incentive Program was saving energy and money. Additionally, 20 percent of participating customers noted that the program seemed like a good deal/offer from Kentucky Power.

Figure 5 Customer Motivation for Participation (n=5)

4.4 Program Tracking & Incentive Processing

Kentucky Power submitted bi-annual status reports to the Kentucky PSC with each program's progress to-date, including participation, estimated energy and demand savings, and budget. The utility also reviewed actual, projected and summary program data with the DSM Collaborative on a quarterly basis.

KEMA's in-house program tracking system is comprised of a single server database that contains 40 to 50 tables of customer application data. The system tracked the individual that reviewed, inspected and approved the application as well as the status of the project from pre-application through payment of the incentive. Kentucky Power program staff reviewed final customer applications and approved incentives through KEMA's Dashboard, a web-based interface of the tracking system. KEMA supplied KPCO with periodic updates and data extracts. Monthly operations reports summarized:

- The local representative promotional activities.

- Total projects, incentives, and energy and demand savings by project type (pending, paid and cancelled).
- Program performance (incentives, energy and demand savings) compared to the goal. Project performance was tracked by active, reserved, final, paid and cancelled projects.

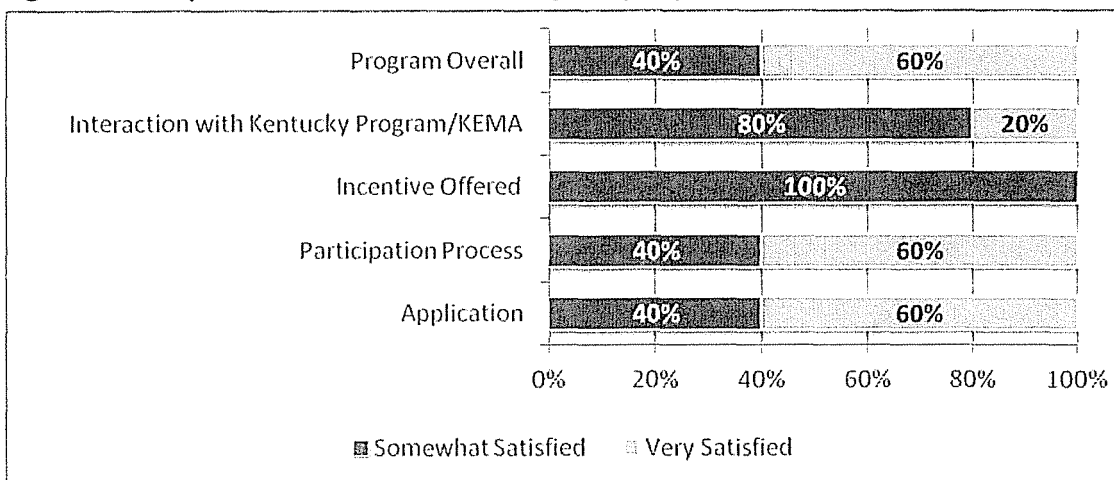
KEMA collects the following data on the customer application:

- Customer Information: business name, account number, address (mailing and installation), tax status, business type, tax status, square footage of building, building operating hours, owner/renter.
- Customer Contact: contact name, title, phone, fax, email.
- Contractor Information: company name, contact name, title, address, fax, email.
- Incentives Requested: total incremental cost, total incentives requested.
- Prescriptive Equipment Information: equipment type, number of units, total incentive, etc.
- Custom Equipment Information: existing equipment, new equipment, savings, measure cost, measure life, annual operating hours.

4.5 Program Satisfaction

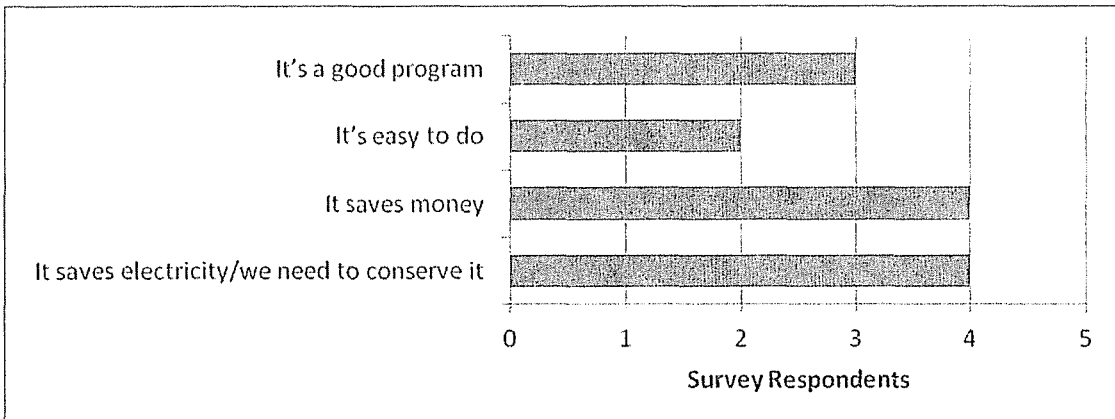
Overall, participants were satisfied with the Commercial Incentive Program. Based on the customer participant survey, the customer interaction with KEMA and Kentucky Power could be improved slightly.

Figure 6 Participant Satisfaction with the Program (n=5)



One-hundred (100) percent of participating customers surveyed would recommend the program to others. Forty (40) percent had already recommended the program. Participants noted that the Commercial Incentive Program saves electricity and money and that it is a good program. Participating customers surveyed noted that the KEMA representative was very helpful.

Figure 7 Reasons Participant Would Recommend the Program (n=5)



5. Impact Evaluation Findings

Impact evaluations assess the cost-effectiveness of a DSM program and verify the energy and demand savings directly associated with it.

5.1 Gross Energy and Demand Savings

AEG determined the gross energy and demand savings of each individual project based on the International Performance Measurement and Verification Protocols (IPMVP) Option A. Option A involves engineering calculations of gross savings using historical data. Engineering calculations referenced from the *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs*, using Kentucky Power specific inputs, were utilized to calculate gross energy and demand impacts.

The equations used to determine gross energy and demand impacts are:

$$\text{Gross Energy Impacts} = \text{units} \times \Delta \text{Watts} \times \text{Yearly Operating Hours}$$

$$\text{Gross Demand Impacts} = \text{units} \times \Delta \text{Watts} \times \text{Coincidence Factor}$$

Where:

Units = quantity of bulbs/fixtures

Δ Watts = wattage difference between efficient bulb/fixture installed and standard bulb/fixture

Yearly Operating Hours = number of hours lighting used per year, by building type

Coincidence Factor

Table 7 Total Gross Demand and Energy Savings, by Project

Measure	Gross Summer Savings (kW)	Gross Winter Savings (kW)	Gross Energy Savings (kWh)
T-12 to T-8 Conversion	16.64	16.64	127,695
LED Fixtures and Lamps	5.67	5.67	11,079
PSMH Conversion	9.70	9.70	21,214
HID to CDM Conversion	4.06	4.06	8,879
HID to LED Conversion	2.28	2.28	4,975
T-12 to T-8 Conversion	0.92	0.92	3,463
T-12 to T-8 Conversion	0.92	0.92	3,463
T-12 to T-8 Conversion	29.12	29.12	143,834
Halogen to LED Conversion	1.53	1.53	6,191
Halogen to LED Conversion	3.05	3.05	12,382
Halogen to LED Conversion	5.61	5.61	22,774
Halogen to LED Conversion	2.94	2.94	11,940
HID to CDM Conversion	1.12	1.12	2,449
T-12 to T-8 Conversion	0.07	0.07	272
T-12 to T-8 Conversion	0.17	0.17	690
T-12 to T-8 Conversion	0.11	0.11	462
PSMH Conversion	5.00	5.00	10,935
HID to T-5HO Conversion	8.30	8.30	18,161
Program Total	97.22	97.22	410,859

5.2 Net Energy and Demand Savings

Net energy and demand savings are the gross savings attributable to the Commercial Incentive Program, not accounting for impacts resulting from other influences such as free ridership or spillover. Net impacts were calculated by applying a net-to-gross ("NTG") factor to gross impacts.

$$NTG \text{ Ratio} = 1 - \text{Free Ridership} + \text{Spillover}$$

Free ridership and spillover calculations are described in the proceeding subsections. Based on the process evaluation survey results, AEG has determined the net-to-gross ratios to be 77 percent. Table 8 presents the net demand and energy savings achieved.

Table 8 2011 Net Demand and Energy Savings, by Project

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)
T-12 to T-8 Conversion	77%	12.81	12.81	98,325
LED Fixtures and Lamps	77%	4.37	4.37	8,531
PSMH Conversion	77%	7.47	7.47	16,335
HID to CDM Conversion	77%	3.13	3.13	6,837
HID to LED Conversion	77%	1.75	1.75	3,831
T-12 to T-8 Conversion	77%	0.71	0.71	2,667
T-12 to T-8 Conversion	77%	0.71	0.71	2,667
T-12 to T-8 Conversion	77%	22.42	22.42	110,752
Halogen to LED Conversion	77%	1.18	1.18	4,767
Halogen to LED Conversion	77%	2.35	2.35	9,534
Halogen to LED Conversion	77%	4.32	4.32	17,536
Halogen to LED Conversion	77%	2.27	2.27	9,194
HID to CDM Conversion	77%	0.86	0.86	1,886
T-12 to T-8 Conversion	77%	0.05	0.05	209
T-12 to T-8 Conversion	77%	0.13	0.13	531
T-12 to T-8 Conversion	77%	0.09	0.09	356
PSMH Conversion	77%	3.85	3.85	8,420
HID to T-5HO Conversion	77%	6.39	6.39	13,984
Program Total		74.86	74.86	316,362

5.2.1 Free Ridership

Free ridership estimates the efficient measures that would have been purchased and installed without the Kentucky Power incentive. Three participating customer questions were designed to determine the portion of a customer's savings that could be attributed to free ridership.

Question 1. If you had not received the Kentucky Power incentive, how likely is it you would have purchased the EXACT SAME equipment?

The more likely the customer was to have purchased and installed the exact same equipment without the Kentucky Power incentive, the higher the probability that the customer was a free rider. For example, if a customer responded 'Very likely,' free ridership probability ranged from 50 to 100 percent.

Question 2. If you had not received the Kentucky Power incentive, how likely is it you would have purchased the EXACT SAME QUANTITY of equipment?

The more likely the customer was to have purchased the exact same quantity of equipment without the Kentucky Power incentives, the higher the probability that the customer was a free rider.

Question 3. How important was the Kentucky Power incentive in your decision to purchase and install the efficient equipment?

A customer that places high importance on the Kentucky Power incentive in their decision to purchase and install efficient equipment was not a free rider. The higher the importance of the Kentucky Power

incentive on the customer's decision to purchase and install the efficient equipment, the lower the probability that the customer was a free rider.

Each customer was assigned a value based on the probability that there was free ridership. The customer survey responses for Question 2 validated the responses to Question 1. Therefore, Question 2 was not included in the probability scoring. Table 9 presents the free ridership probability scoring mechanism for Questions 1 and 3.

Table 9 Free Ridership Probability Scores, Questions 1 and 3

Q1 Response	Q3 Response	Min	Max	Estimate
Not Likely	Very Important	0%	0%	0%
Not Likely	Somewhat Important	0%	20%	10%
Not Likely	Slightly Important	0%	30%	15%
Not Likely	Not Important	0%	40%	20%
Somewhat likely	Very Important	20%	50%	35%
Somewhat likely	Somewhat Important	20%	60%	40%
Somewhat likely	Slightly Important	20%	70%	45%
Somewhat likely	Not Important	20%	80%	50%
Very likely	Very Important	50%	100%	75%
Very likely	Somewhat Important	60%	100%	80%
Very likely	Slightly Important	70%	100%	85%
Very likely	Not Important	80%	100%	90%

The weighted mean of the customer probabilities resulted in a free ridership estimate of 29 percent. Therefore, 29 percent of businesses that purchased and installed efficient equipment through the Commercial Incentive Program would have done so without the KPCO incentive.

Table 10 Free Ridership Weighted Probability

Free Rider Probability	Observations	Weight	Weighted Value
0%	1	0.20	0%
35%	3	0.60	21%
40%	1	0.20	8%
Free Ridership Estimate			29%

5.2.2 Spillover

Spillover estimates the additional efficient measures purchased and installed due to the influence of the Commercial Incentive Program. Two participating customer questions were designed to determine the portion of a customer's savings that could be attributed to spillover.

Question 1. Since receiving the Kentucky Power incentive, has your business purchased additional efficient equipment?

If a participating customer purchased additional efficient equipment since receiving the Kentucky Power incentive, there was participant spillover. Therefore, if a participating customer responded 'No,' the probability that there was spillover was 0 percent.

Question 2. What influence did the Kentucky Power program have on the decision?

If a participating customer purchased additional efficient equipment due to the influence of the Kentucky Power programs, there was participant spillover. The greater the influence of Kentucky Power program, the higher the participant spillover.

Each customer was assigned a value based on the probability that there was spillover. Table 11 presents the spillover probability scoring mechanism.

Table 11 Spillover Probability

Q1 Response	Q2 Response	Min	Max	Estimate
No		0%	0%	0%
Yes	Had no influence	0%	20%	10%
Yes	Had some influence	20%	40%	30%
Yes	Had a large influence	50%	70%	60%

The weighted mean of retailer probabilities resulted in a spillover estimate of 6 percent. Therefore, 6 percent of businesses that purchased and installed efficient equipment outside of the Commercial Incentive Program were influenced by the KPCO program.

Table 12 Spillover Weighted Probability

Spillover Probability	Observations	Weight	Weighted Value
0%	4	0.80	0%
30%	1	0.20	6%
Spillover Estimate			6%

5.3 Program Site Inspections and Performance Verification

AEG performed site inspections and installation verifications on eight fully installed projects to ensure proper installation, perform QA/QC and verify application information of the installed equipment.

Installations of lighting fixtures, lamps and controls were inspected with building types including high schools, medical centers, manufacturing facilities, exhibit halls, elementary schools, and retail space. The sites inspected provided a representative sample of all program projects. Proper installation verification was confirmed at all locations. Table 13 below describes the building type and general project description for sites visited.

Table 13 Installation Verification Site Visits, 2011

Building Type	Project Description
High School	Lighting: HID to T-5 HO
Medical Center	Lighting: T-12 to T-8 Conversion
Manufacturing	Lighting: T-12 to T-8 Conversion
High School	Lighting: HID to CDM Conversion
Exhibit	Lighting: LED Fixtures and Lamps
Retail	Lighting: T-12 to T-8 Conversion
Elementary School	Lighting: PSMH Conversion
Retail	Lighting: T-12 to T-8 Conversion

5.4 Program Cost-Effectiveness

Cost-effectiveness analysis compares the costs and benefits of efficient equipment with those of baseline (non-efficient) equipment. Cost-effectiveness analysis indicates whether the efficient technology(s) improve a customer's financial position, decrease overall energy costs to ratepayers, or raise society's well-being. A program is considered cost-effective if the benefit-cost ratio is greater than one (1.0).

AEG analyzed the cost-effectiveness of the Commercial Incentive Program utilizing four standard cost-effectiveness tests taken from the California Standard Practices Manual.¹⁰ Each test analyzes cost-effectiveness from a different perspective and answers a separate question:

- Participant Cost Test: Compares customer costs and benefits of installing the measure. Will the participant benefit over the life of the measure?
- Program Administrator Cost Test (Utility Cost Test): Comparison of program administrator costs to supply-side resource benefits. Will utility costs to save energy be less than utility costs to deliver the same amount of energy?
- Ratepayer Impact Measure: Measures the impact of the DSM program on utility rates if rates were to be adjusted to account for the program. Comparison of utility program costs and bill reductions associated with energy savings to supply-side resource benefits. Will customer rates increase?
- Total Resource Cost Test: Comparison of program administrator and customer costs to utility resource savings. Will the total costs of energy in the utility service territory decrease?

Results from the impact evaluation, utilizing IPMVP best practices, are utilized in the four cost-effectiveness tests taken from the California Standard Practices Manual.

Kentucky Power specific inputs, including avoided costs, discounts rates, participation and incentives, were used to conduct the cost-effectiveness analysis. Bencost, an updated version of a public domain model that AEG customized for Kentucky Power, was utilized to perform the cost-effectiveness modeling (see Appendix B). Bencost is an input-output model that calculates all four cost-effectiveness

¹⁰ The California Standard Practices Manual details cost-effectiveness guidelines and procedures for standardized cost-effectiveness evaluations.

tests. All program costs and benefits are discounted to present-day dollar values in order to accurately compare future benefits with current costs.

Table 14 Program Cost-Effectiveness Results

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	0.60	\$247,152	\$147,433	-\$99,718
Ratepayer Impact Measure Test	0.30	\$485,602	\$147,433	-\$338,169
Participant Test	15.52	\$12,563	\$195,024	\$182,461
Total Resource Cost Test	0.63	\$234,589	\$147,433	-\$87,156

It needs to be noted that very low avoided costs, especially the extremely low capacity costs in the Kentucky Power service territory, have a significant negative impact on the program's cost-effectiveness. The 2012 Kentucky Power capacity cost is \$6/kW-year, compared to a PJM average of over \$100/kW-year. This cost differential partially accounts for the low benefit-cost ratios.

The Commercial Incentive Program's cost-effectiveness was greatly affected by the low participation rates and comparatively high program administrative costs. In 2011, 18 projects were rebated and \$222,026 program administrative dollars were spent. 2011 participation goals were 88 and the program administrative budget (non-incentives) was \$333,608. If planned participation levels of 88 rebated projects were achieved and projects save an average of 25,000 kWh and 5.5 kW, the program would be cost-effective and pass the TRC test. Table 15 provides the cost-effectiveness if fully planned program participation was achieved, assuming actual 2011 expenditures.

Alternatively, if program administrative costs were set equal to the ratio of original approved incentive costs (for example, if program incentives were \$250,000 program administrative costs would be set at \$250,000) and projects save an average of 25,000 kWh and 5.5 kW, the program would be cost effective and pass the TRC test. The scenario assumes actual 2011 participation, but program participation would be irrelevant if administrative costs were capped to be equal to incentive costs. Table 16 provides the cost-effectiveness if program administration costs are reduced to equal incentive costs.

Going forward, it is vital that either participation goals be met or program administrative costs be reduced for the Commercial Incentive Program to reach acceptable cost-effectiveness levels.

Table 15 Cost-Effectiveness Results if Planned Participation Achieved, 2011

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	0.86	\$910,560	\$778,690	-\$131,870
Ratepayer Impact Measure Test	0.36	\$2,187,372	\$778,690	-\$1,408,682
Participant Test	6.61	\$197,160	\$1,304,060	\$1,106,900
Total Resource Cost Test	1.09	\$713,400	\$778,690	\$65,290

Table 16 Cost-Effectiveness Results if Program Administration Costs Reduced, 2011

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	0.99	\$788,640	\$778,690	-\$9,950
Ratepayer Impact Measure Test	0.38	\$2,065,452	\$778,690	-\$1,286,762
Participant Test	6.61	\$197,160	\$1,304,060	\$1,106,900
Total Resource Cost Test	1.32	\$591,480	\$778,690	\$187,210

Although the Commercial Incentive Program did not have a cost-effectiveness ratio greater than 1.0, the entire portfolio being evaluated is cost-effective in 2011.¹¹ Table 17 provides the cost-effectiveness for the 2010-2012 Demand Side Management Program Portfolio being evaluated by AEG.

Table 17 Kentucky Power Portfolio Cost-Effectiveness Results, 2011

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	2.13	\$720,104	\$1,533,730	\$813,626
Ratepayer Impact Measure Test	0.44	\$3,507,956	\$1,533,730	-\$1,974,227
Participant Test	5.13	\$486,703	\$2,499,101	\$2,012,397
Total Resource Cost Test	1.57	\$975,217	\$1,533,730	\$558,512

6. Key Findings and Recommendations

6.1 Summary of Key Findings

The primary objectives of the Commercial Incentive Program are to increase the market share of commercial grade high efficiency technologies sold through market channels, increase the installation rate of high efficiency technologies in commercial facilities, and improve operating efficiency of existing long life equipment to insure peak operating efficiency.

6.1.1 Program Performance Indicators

In 2011, eighteen (18) lighting projects were completed through the Commercial Incentive Program at a higher cost per participant than originally budgeted due to high fixed costs independent of program participation. Sixteen (16) projects were cancelled, primarily resulting from participants purchasing and/or installing equipment prior to beginning the participation process. Kentucky Power achieved approximately 20 percent of the 88 participant goal.

Table 18 2011 Actual versus Budgeted Participation and Expenditures

	Actual	Original Budget	Revised Budget
Participation	18	88	88
Expenditures	\$252,314	\$896,152	\$910,560

¹¹ The 2010-2012 Demand Side Management Program Portfolio being evaluated includes the Small Commercial Heat Pump/Air Conditioner Program, Residential Efficient Products Program, Commercial Incentive Program, and Residential and Small Commercial HVAC Diagnostic and Tune-Up Program.

The Commercial Incentive Program was approved in October 2010. KEMA implemented the program from its headquarters in Michigan until a local representative was hired in September 2011. Program participation was slow until October 2011, not long after the local representative was retained.

6.1.2 Program Tracking

The program tracking and monitoring system accurately tracks program data. However, based on the project applications provided by KEMA:

- 50 percent of pre-approval inspections were conducted before the pre-approval application was submitted, on average 35 days prior to the application submittal. 6 percent of inspections were conducted on the same date.
- 22 percent of post-installation inspections were conducted before the final application was submitted, on average 5 days prior to the application submittal. 28 percent of inspections were conducted on the same date.

6.1.3 Program Awareness and Marketing Strategies

The marketing strategy for the program included promoting the program directly to both eligible customers as well as business organizations, contractors and local government officials that were expected to promote the program to eligible customers.

KPCO Customer Services Group provided program information to eligible customers. According to KEMA, the Customer Services Group referred between 10 and 20 percent of program participants. The Trade Ally kick-off meetings held by KEMA were poorly attended. However, the KEMA representative met with numerous business and civic organizations as well as eligible customers in late 2011.

According to survey respondents, customers most often learned of the program from a business associate or the Kentucky Power website. Approximately 60 percent of participating customers met with the KEMA local representative prior to submitting the pre-approval application.

6.1.4 Best Practices

Kentucky Power's program design and processes are largely consistent with best practices for similar energy efficiency programs. Depending on the design of the commercial energy efficiency program, incentives may be direct (i.e. rebates and discounts) or indirect (i.e. manufacturer and/or retailer buy-downs). Direct incentives are typically a range per measure or a percentage of project costs. For example, incentives for fluorescent fixtures typically range between \$1 and \$200 per unit or between 30 and 50 percent of project cost. Custom incentives range between \$0.03 and \$0.75 per kWh saved, depending on the type and cost of the project. Incentives for large scale projects are typically capped at a percentage of the incremental cost.¹²

¹² National Action Plan for Energy Efficiency (2010). *Customer Incentives for Energy Efficiency Through Program Offerings*. Prepared by William Prindle, ICF International, Inc. <www.epa.gov/eeactionplan>

The challenges posed by lack of information are ubiquitous to energy efficiency programs. Investment in education and outreach will boost awareness of the potential benefits of energy efficiency. Successful marketing strategies can increase program participation.

6.1.5 Verify Program Impacts

The net-to-gross ratio for the Commercial Incentive Program is estimated 77 percent, with 29 percent free ridership and 6 percent spillover. Program cost-effectiveness was greatly affected by the low participation rates and high program administration, marketing and evaluation costs.

If the planned participation levels of 88 completed projects were achieved and projects save an average of 25,000 kWh and 5.5 kW, the program would be cost-effective and pass the TRC test, assuming actual 2011 expenditures. Alternatively, if program administrative costs were set equal to the ratio of original approved incentive to administrative costs and projects save an average of 25,000 kWh and 5.5 kW, the program would be cost effective and pass the TRC test, assuming actual 2011 participation. Going forward, it is vital that either participation goals be met or program administrative costs be reduced for the Commercial Incentive Program to reach acceptable cost-effectiveness levels.

Table 19 2011 Energy Savings

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)	TRC
Program Total	77%	74.86	74.86	316,362	0.63

Site inspections and installation verifications were performed on eight fully installed projects to ensure proper installation. Proper installation verification was confirmed at all locations.

6.2 Recommendations

AEG has several recommendations on how to improve the program. These include:

6.2.1 Implementation Contractor to Increase Local Staff

AEG recommends that KEMA increase the local staff by at least one employee. Four (4) KEMA staff members worked remotely from Michigan until the local representative was hired in September 2011. While participation increased significantly between October and December, the program was promoted primarily through direct customer contact and Trade Ally outreach. AEG recommends that KEMA continue to utilize direct customer contact and Trade Ally outreach as the primary promotional activities. However, these promotional activities require considerable amounts of time to be successful. Because of the large geographic area of the Kentucky Power service territory, KEMA needs on-site staff in both the northern and southern portion of Kentucky Power's territory. An additional local representative assisting with promotional efforts should increase participation and improve overall efficiency, particularly as the new program components are offered to customers.

6.2.2 Streamline Program Processes

AEG recommends that KEMA improve and streamline the participation process. The Commercial Incentive Program participation process was designed to include the following steps:

- 1) Customer/contractor submits the pre-approval application.
- 2) KEMA reviews the application and conducts a pre-approval inspection. If approved, the customer receives a letter confirming the funding reservation and detailing the terms and conditions of the program.
- 3) The approved equipment is installed and the customer/contractor submits the final application.
- 4) KEMA reviews the application and conducts a post-installation inspection. If approved, the customer incentive is processed.

The program does not operate as designed. In 2011, 50 percent of pre-approval inspections were conducted before the pre-approval application was submitted and 22 percent of post-installation inspections were conducted before the final application was submitted. KEMA is contracted to provide customer technical support to facilitate the pre-approval application, as needed. Therefore, the KEMA local representative may be conducting the pre-approval inspection while providing technical support.

AEG recommends that the pre-approval inspection be conducted no sooner than the day the pre-approval application is submitted to KEMA. The KEMA representative may provide technical assistance to the customer/contractor for the application and conduct the inspection on the same day, but the application must be submitted to KEMA that day. The post-installation inspection should be conducted after the final application has been received and reviewed by KEMA.

AEG recommends that the program be modified such that KEMA conducts random inspections of at least 15 to 20 percent of pre- and post-installation projects, to be adjusted depending upon the inspection findings. The inspections are to be random; the pre- and post-installation inspections are not necessarily to be conducted on the same project. Depending upon the inspection findings, Kentucky Power and KEMA should reassess the need for pre-installation inspections.

AEG recommends that Kentucky Power and KEMA examine the customer incentive reservation period. Currently, customer incentives are reserved for 180 days, during which time the project must be completed. Rather than one consistent reservation period, the length of the incentive reservation may be based on the type and difficulty of the project. For example, a simple lighting retrofit may have a reservation of 90 days while a project that undertakes lighting and HVAC may have 120 days.

6.2.3 Leverage Express Program

Program cost-effectiveness was greatly affected by low participation rates and high program administration, marketing and evaluation costs. Going forward, it is vital that either participation goals be met or program administrative costs be reduced for the Commercial Incentive Program to reach acceptable cost-effectiveness levels.

In 2012, the Commercial Incentive Program will consist of three programs: Prescriptive and Custom Incentives (current program), Express Program, and the New Construction Program. The Express Program provides incentives to non-residential customers with an average demand of less than 100 kW that have a participating contractor install efficient measures. The New Construction Program provides incentives to non-residential customers that are above the current building energy code for new additions, major renovations or new facilities.

AEG recommends that KEMA leverage the new Kentucky Power Express Program and New Construction Program to increase program awareness. KEMA should encourage sub-contractors involved in the Express Program to promote prescriptive and custom incentives to eligible customers. Additionally, KEMA should promote the prescriptive and custom incentives to customers that participate in the New Construction Program.

6.2.4 Express Program Incentives

AEG reviewed the Express Program, anticipated for mid-2012. The program will provide incentives to non-residential customers with an average demand of less than 100 kW that have a participating contractor install efficient measures. KPCO service territory comprises approximately 26,970 commercial and public authority accounts with a peak demand of 50 kW or less.¹³

AEG recommends that KPCO consider increasing incentives to 60 to 70 percent of the installed equipment costs. Incentives are currently capped at 50 percent of the incremental material costs, the same as the current Commercial Incentive Program prescriptive and custom incentives. However, direct install programs typically offer small non-residential customers higher incentives and, occasionally, financing for the remaining portion of the installation cost.

¹³ Case No. 2010-00198.

Appendix A. Participating Customer Survey Guide



Kentucky Power is conducting an evaluation of its Commercial Incentive Program. The program provides financial incentives to business customers who implement qualified energy-efficient improvements and technologies.

We would like to get your feedback and impressions of the program. The survey is for research purposes and all responses will remain confidential.

For the survey, click [HERE](#)

Please submit responses by the close of business Friday, March 30th.

Contact Erin Coughlin at (732) 447-1359 with any questions.

Thank you for your participation!

Business Name

Name

Phone Number

1. How would you classify your business?

- a) School **(2)**
- b) Office
- c) Medical
- d) Retail **(1)**
- e) Manufacturing
- Arena**
- Rebate Services**

Program Participation

2. What type of incentive did you receive?

- a) Prescriptive **(1)**
- b) Custom **(2)**
- c) Both **(1)**

3. What kind of efficient technology did you have installed?

- a) Lighting **(5)**
- b) HVAC
- c) Refrigeration

4. Did you hire a contractor to install the equipment?

- a) Yes **(1)**
b) No **(4)**
5. How did you first become aware of the Commercial Incentive Program?
a) Kentucky Power **(1)**
b) Program Implementer (KEMA)
c) KentuckyPower.com
d) gridSMART **(2)**
e) News Article
f) Word of Mouth (Business Associate) **(2)**
g) Chamber of Commerce
h) Community event/meeting/presentation
6. Why did you decide to participate in the program?
a) Contractor recommended it
b) Wanted to save money **(4)**
c) Seemed like a good deal/offer from Kentucky Power **(1)**
d) Wanted to save energy **(4)**
7. Did you meet with a Kentucky Power representative (KEMA) prior to submitting the pre-approval application?
a) Yes (continue to next question) **(3)**
b) No (skip to question 9) **(2)**
8. Did the Kentucky Power representative (KEMA) conduct the pre-approval inspection during the visit?
a) Yes **(2)**
b) No **(1)**
9. About how long did it take for the following activities:

	Less than 1 Month	4 to 6 Weeks	6 to 8 Weeks	More than 8 Weeks
a) Pre-approval inspection, from application submittal until you received the pre-approval inspection	4	1		
b) Pre-approval process, from application submittal until you received pre-approval confirmation	3	2		
c) Post-inspection, from final application submittal until you received the post-inspection	3	1		1
d) Receive the incentive, from final application submittal until you received the rebate?	1	4		

e) Comments

KEMA representative was and is very helpful

Customer Satisfaction

10. Please rate your satisfaction with the following program components on a five-point scale, where "5" means "Very Satisfied" and "1" means "Very Dissatisfied." How satisfied are you with the:

	Not Satisfied	2	3	4	Very Satisfied
a) Application				2	3
b) Participation Process				2	3
c) Incentive offered				5	
d) Interaction with Kentucky Power/KEMA				4	1
e) Program overall				2	3

11. Based on your experience with the program, would you recommend this program to others?

- a) Yes **(5)**
 - b) No
12. Why do you say that?
- a) It saves electricity/we need to conserve it **(4)**
 - b) It saves money **(4)**
 - c) It's easy to do **(2)**
 - d) It's a good program **(3)**
 - e) I have recommended it **(2)**
 - f) People I recommended it to haven't been able to get into the program

13. How could the program be improved?

It could be improved by offering very low or no interest loans to purchase the equipment needed in addition to the rebates.

Free Ridership/Spillover

14. Prior to learning about this program, did you have specific plans to install efficient equipment?

- a) Yes (continue to next question) **(5)**
- b) No (skip to question 17)

15. Was it necessary to change your plans to qualify for the program?

- a) Yes (continue to next question) **(1)**
- b) No (skip to question 17) **(3)**

16. What changes were made (for example: quantity and type of equipment, timing, etc)?

Florescent T12 to T8 8 Fixtures

Changed lighting in gyms and parking lots. Reduce the wattage of bulbs being used to a lesser wattage.

This program made the time span to accomplish the plans much shorter. The equipment and other purchases must be made in a shorter time span which puts an additional burden on budgets that are already stressed.

17. How important was the Kentucky Power incentive in your decision to purchase and install the efficient equipment?

- a) Very important **(4)**
- b) Somewhat important **(1)**
- c) Only slightly important
- d) Not important at all

18. If you had not received the Kentucky Power incentive, how likely is it you would have purchased the EXACT SAME equipment?

- a) Very likely
- b) Somewhat likely **(4)**
- c) Not likely **(1)**

19. If you had not received the Kentucky Power incentive, how likely is it you would have purchased the EXACT SAME QUANTITY of equipment?

- a) Very likely
- b) Somewhat likely **(4)**
- c) Not likely **(1)**

20. Since receiving the Kentucky Power incentive, has your business purchased additional efficient equipment?

- a) Yes (continue to next question) **(1)**
- b) No (skip to question 22) **(4)**

21. What type of equipment has your business purchased?

T8 Ballast and Lamps

22. What influence did the Kentucky Power program have on the decision?

- a) Had no influence **(1)**
- b) Had some influence **(4)**
- c) Had a large influence

Appendix B. Cost-Effectiveness Analysis Inputs

Table B1: General Bencost Model KPCO Rate Inputs

BENEFIT COST TEST FOR CONSERVATION PROGRAMS -- Cost-Effectiveness Analysis			
Company:		Kentucky Power Company	
General Inputs			
Input Data		Source	
Electric Retail Rate (\$/kWh) =	\$0.08599	Residential	Kentucky Power Cost & Rate
	\$0.07402	Commercial	Kentucky Power Cost & Rate
	\$0.08001	All Classes	
Variable O&M (\$/kWh) =	\$0.00000		
	Escalation Rate =	3.00%	
Environmental Damage Factor =	\$0.0097		
	Escalation Rate =	3.00%	
Participant Discount Rate =	15.00%		KPCO Data Request from AEP Load Research
Utility Discount Rate =	7.47%		KPCO Data Request from AEP Load Research
Social Discount Rate =	7.47%		KPCO Data Request from AEP Load Research
General Input Data Year =	2011		
Project Analysis Year 1 =	2011		
Primary Energy Line Losses	5.20%		KPCO Data Request from AEP Load Research
Primary Peak Line Losses	7.40%		KPCO Data Request from AEP Load Research
Kentucky Power NTG	0%		Kentucky Power Meeting
Residential and Small Commercial Energy Losses	8.7%		KPCO email dated 4/20/12 from Alan Graves
Residential and Small Commercial Peak Losses	10.7%		KPCO email dated 4/20/12 from Alan Graves

TABLE B2: BENCOST MODEL COMMODITY COST INPUTS¹⁴

Year	Avoided Energy Commodity Cost (\$/kWh)	Avoided Capacity Cost (\$/kW-year)	Avoided Electric Retail Rate (\$/kWh)
2011	\$0.0395	\$40.15	\$0.080
2012	\$0.0403	\$6.01	\$0.080
2013	\$0.0399	\$10.12	\$0.082
2014	\$0.0432	\$45.99	\$0.084
2015	\$0.0447	\$124.83	\$0.086
2016	\$0.0510	\$124.83	\$0.088
2017	\$0.0520	\$69.30	\$0.090
2018	\$0.0528	\$80.15	\$0.092
2019	\$0.0540	\$89.71	\$0.094
2020	\$0.0547	\$97.91	\$0.096
2021	\$0.0561	\$104.70	\$0.098
2022	\$0.0658	\$110.03	\$0.100
2023	\$0.0670	\$113.83	\$0.103
2024	\$0.0691	\$116.04	\$0.105
2025	\$0.0707	\$118.13	\$0.108
2026	\$0.0716	\$120.25	\$0.110
2027	\$0.0731	\$122.42	\$0.113
2028	\$0.0746	\$124.62	\$0.115
2029	\$0.0761	\$126.86	\$0.118
2030	\$0.0779	\$129.15	\$0.120
2031	\$0.0788	\$130.70	\$0.123
2032	\$0.0788	\$132.26	\$0.126
2033	\$0.0788	\$133.85	\$0.129
2034	\$0.0788	\$135.46	\$0.132
2035	\$0.0788	\$137.08	\$0.135

TABLE B3: BENCOST MODEL INPUTS

General Inputs	Specific-Project Inputs
Retail Rate (\$/kWh)	Utility Project Costs (\$)
Non-Electric Fuel Retail Rate (\$/Fuel Unit)	Administrative Costs (\$)
Commodity Cost (\$/kWh)	Incentive Costs (\$)
Demand Cost (\$/kW/Yr)	Total Utility Project Costs (\$)
Peak Reduction Factor (%)	Direct Participant Project Costs (\$/Participant)
Variable O&M (\$/kWh)	Participant Non-Energy Costs (Annual \$/Part)
Non-Electric Fuel Cost (\$/Fuel Unit)	Participant Non-Energy Savings (Annual \$/Part)
Non-Electric Fuel Loss Factor	Project Life (Years)
Electric Environmental Damage Factor (\$/kWh)	Avg. kWh/Participant Saved
Participant Discount Rate (%)	Avg. Non-Electric Fuel Units/Part. Saved
Utility Discount Rate (%)	Avg. Additional Non-Electric Fuel Units/Part. Saved
Societal Discount Rate (%)	Number of Participants
General Input Data Year	Total Annual kWh Saved
Project Analysis Year	Incentive/Participant
Growth and Escalation Factors (%)	

¹⁴ Avoided cost inputs provided by Kentucky Power (AEP) Load Forecasting Group through a data request.

TABLE B4: BENCOST MODEL OUTPUTS

General Outputs	Benefit-Cost Test Outputs (Per Test)
Coincident Utility Peak Demand Reduction	Net Present Value of Benefits - Costs
Annual Utility Energy Reduction	Benefit-Cost Ratio
Total Utility Demand Reduction	Total Benefits
Total Utility Energy Reduction	Total Costs
Levelized Costs per kWh	
Levelized Costs per kW	
Annual Participant Savings	
Simple Payback	



Kentucky Power Company
Residential and Small
Commercial HVAC Diagnostic
and Tune-Up Program
Process, Market and Impact Evaluation · July 2012

Submitted by

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Abstract

Kentucky Power Company retained Applied Energy Group to conduct a process, market and impact evaluation of its Residential and Small Commercial HVAC Diagnostic and Tune-Up Program. The HVAC Diagnostic and Tune-Up Program offers residential and small commercial (less than 100 kW) diagnostic performance check and tune-up services for their unitary air conditioning and heat pump systems. The services, performed by a participating KPCO HVAC dealer, include testing and correcting inefficiencies in unitary air conditioning and heat pump systems due to air-restricted indoor or outdoor coils and over or under refrigerant charges.

To arrive at the final recommendations of the evaluation, AEG reviewed program materials, assessed Kentucky Power's program tracking and conducted interviews with Kentucky Power program staff, participating customers and participating HVAC dealers. The results of the analysis, along with key findings and recommendations for program improvements, are included in this report.

Table of Contents

Abbreviations	i
Definitions	ii
Executive Summary	iv
1. Introduction.....	1
2. Program Description	1
3. Evaluation Methodology	3
4. Process and Market Evaluation Findings.....	6
4.1 Program Logic Model	6
4.1.1 Activities and Outputs	9
4.1.2 Outcomes	10
4.1.3 External Factors.....	11
4.1.4 Best Practices	11
4.2 Program Performance	12
4.3 Program Marketing	15
4.3.1 Program Awareness	16
4.3.2 Motivation for Participation.....	17
4.3.3 Customer Demographics	18
4.4 Program Tracking & Incentive Processing.....	19
4.5 Program Satisfaction	21
4.5.1 Participating Customer Satisfaction	21
4.5.2 Participating Dealer Satisfaction	23
5. Impact Evaluation Findings	25
5.1 Gross Energy and Demand Savings	25
5.2 Net Energy and Demand Savings	26
5.2.1 Free Ridership.....	27
5.2.2 Spillover	29
5.3 Program Site Inspections and Performance Verification	30
5.4 Program Cost-Effectiveness	30
6. Key Findings and Recommendations	33
6.1 Key Program Findings.....	33
6.1.1 Program Performance Indicators	33
6.1.2 Program Tracking	33
6.1.3 Program Awareness and Marketing Strategies.....	33
6.1.4 Best Practices	34
6.1.5 Verify Program Impacts.....	34
6.2 Recommendations	35
6.2.1 Hire Implementation Contractor.....	35
6.2.2 Consider Program Modifications.....	36
6.2.3 Engage Participating HVAC Dealers.....	36
Appendix A. Participating Dealer Survey Guide (a).....	38

Appendix B. Participating Dealer Survey Guide (b).....	41
Appendix C. Participating Residential Customer Survey Guide	43
Appendix D. Participating Small Commercial Customer Survey Guide	46
Appendix E. Cost-Effectiveness Analysis Inputs	50

List of Tables

Table ES1 Program Participation, Goals Originally Filed and Actual	v
Table ES2 2011 Energy Savings by Equipment Type, Residential	vi
Table ES3 2011 Energy Savings by Equipment Type, Small Commercial	vi
Table 1 Program Budget, 2010-2012	2
Table 2 Detailed Program Budget, 2010-2012	2
Table 3 Program Participation Goals, 2010-2012	3
Table 4 Anticipated Energy and Demand Savings per Participant	3
Table 5 Overview of IPMVP Options	5
Table 6 Program Participation, 2010-2011	12
Table 7 Budget and Participation Goals by Sector as Originally Filed, 2010-2011.....	14
Table 8 Actual Expenditures and Participation by Sector, 2010-2011	14
Table 9 Most Active Participating HVAC Dealers	15
Table 10 Residential Participant Satisfaction with the Program, n=58.....	22
Table 11 Small Commercial Participant Satisfaction with the Program, n=19.....	22
Table 12 2010-2011 Gross Savings per Unit, Residential.....	26
Table 13 2010-2011 Gross Savings per Unit, Small Commercial.....	26
Table 14 2010-2011 Total Gross Demand and Energy Savings, Residential	26
Table 15 2010-2011 Total Gross Demand and Energy Savings, Small Commercial	26
Table 16 2010-2011 Net Demand and Energy Savings, Residential.....	27
Table 17 2010-2011 Net Demand and Energy Savings, Commercial	27
Table 18 Free Ridership Probability Scores, Questions 1 and 2	28
Table 19 Free Ridership Probability Scores, Questions 3 and 4.....	28
Table 20 Free Ridership Weighted Probability, Residential	28
Table 21 Free Ridership Weighted Probability, Small Commercial.....	29
Table 22 Spillover Probability Scores	29
Table 23 Spillover Weighted Probability, Residential	29
Table 24 Spillover Weighted Probability, Small Commercial	30
Table 25 Program Cost-Effectiveness Results, Residential	31
Table 26 Program Cost-Effectiveness Results, Small Commercial	31
Table 27 Measure Cost-Effectiveness Results, Residential.....	31
Table 28 Measure Cost-Effectiveness Results, Small Commercial.....	31
Table 29 Program Cost-Effectiveness Results if Contractor Incentive Reduced & CAC Removed, Residential	32

Table 30 Program Cost-Effectiveness Results if Contractor Incentive Reduced & CAC Removed, Small Commercial	32
Table 31 Kentucky Power Portfolio Cost-Effectiveness Results, 2011	32
Table 32 Program Participation, Goals Originally Filed and Actual.....	33
Table 33 2011 Energy Savings by Equipment Type, Residential	34
Table 34 2011 Energy Savings by Equipment Type, Small Commercial	35

List of Figures

Figure 1 Program Logic Model	8
Figure 2 Length of Time between Submitting Application and Receiving Rebate Check	10
Figure 3 HVAC Systems Rebated by System Type by Sector, 2010-2011.....	12
Figure 4 HVAC Systems Rebated Monthly by System Type by Sector, 2010-2011	13
Figure 5 Newspaper Advertisement.....	16
Figure 6 How Customers First Learned of the Program	17
Figure 7 How Participating HVAC Dealers First Learned of the Program.....	17
Figure 8 Customer Motivation for Participation	18
Figure 9 Residential Participant Demographics, n=58	19
Figure 10 Small Commercial Participant Demographics, n=15	19
Figure 11 Reasons Participant Would Recommend their Contractor	21
Figure 12 Reasons Participant Would Recommend the Program.....	22
Figure 13 Participant Suggestions for Program Improvement.....	23
Figure 14 Likelihood of Non-Participating HVAC Dealer Submitting Rebate in 2012, n=8	24
Figure 15 Participating HVAC Dealer Preferred Contact Medium, n=7	24
Figure 16 Participating HVAC Dealer Satisfaction with the Program, n=7.....	25

Abbreviations

AEG	Applied Energy Group, Inc.
AEP	American Electric Power
EM&V	Evaluation Measurement and Verification
DSM	Demand Side Management
HVAC	Heating Ventilation & Air Conditioning
IPMVP	International Performance Measurement and Verification Protocols
KPCO	Kentucky Power Company
NTG	Net-To-Gross Ratio
PSC	Public Service Commission
QA/QC	Quality Assurance/Quality Control
EFLH	Equivalent Full Load Hours
EER	Energy Efficiency Ratio
SEER	Seasonal Energy Efficiency Ratio

Definitions

Benefit-Cost Ratio: The ratio of total benefits of a program to the total costs discounted over some specified time period. The benefit-cost ratio gives a rough measure of the participant rate of return and provides an indicator of program risk. A ratio above one indicates a beneficial program.

Participant Cost Test: Measures the quantifiable benefits and costs to the customer due to participation in a program.

Program Administrator Cost Test: Measures the net costs of a demand-side management program as a resource option based on the costs incurred by the program administrator (including incentive costs), excluding any net costs incurred by the participant. The benefits are similar to the Total Resource Cost benefits, but costs are more narrowly defined.

Ratepayer Impact Measure (RIM) Cost Test: Measures what happens to customer bills or rates due to changes in utility revenues and operating costs caused by the program. Rates will go down if the change in revenues from the program is greater than the change in utility costs. Conversely, rates or bills will go up if revenues collected are less than the total costs incurred by the utility. The RIM test indicates the direction and magnitude of the expected change in customer bills or rate levels.

Total Resource Cost (TRC) Test: Measures the net costs of a demand side management program as a resource option based on the total costs of the program, including both the participant and utility costs.

British thermal unit (Btu): The amount of heat needed to raise one pound of water at maximum density one degree Fahrenheit. Btu is used to describe the power of heating and cooling systems, such as furnaces, stoves, barbecue grills, and air conditioners. Air conditioners for household use typically produce between 5,000 and 15,000 Btu. 1 watt is approximately 3.41 Btu/h.

Coincidence Factor: The ratio, expressed as a numerical value or as a percentage, of the simultaneous maximum demand of a group of electrical appliances or consumers within a specified period to the sum of their individual maximum demands within the same period.

Cost-effectiveness: A criterion that specifies that a technology or measure delivers a good or service at equal or lower cost than current practice, or the lowest cost alternative for the achievement of a given target.

Demand Side Management (DSM): Programs designed to provide incentives to end-use customers or curtailment service providers to enhance the ability and opportunity for reduction of load during peak hours.

Energy Efficiency Ratio (EER): average efficiency of the equipment under peak conditions. A measure of the relative efficiency of a heating or cooling appliance, such as an air conditioner, that is equal to the unit's output in Btu's per hour divided by its consumption of energy, measured in watts.

Equivalent Full Load Hours (EFLH): The number of hours a system operates at full load during one year for cooling or heating purposes. Expressed as total annual energy use divided by total peak load.

Evaluation Measurement and Verification (EM&V): A set of analyses used to assess energy efficiency programs in terms of energy and demand savings and cost-effectiveness. There are several approaches to EM&V, some of which have been codified as best practices (see IPMVP). Most energy efficiency programs are subject to some type of EM&V.

GRIDSMART® Programs: An AEP energy efficiency initiative that includes over 100 energy efficiency programs across the AEP service territory. The programs feature smart grid technologies such as smart meters, voltage optimization equipment and smart appliances that can reduce energy use.

Gross Energy Savings: Energy and demand savings seen by the participant at the meter. These are the appropriate program impacts to calculate bill reductions for the Participant Test.

Impact Evaluation: A method of evaluation that assesses any changes, intended or unintended that are directly attributable to an energy efficiency program.

International Performance Measurement and Verification Protocols (IPMVP): Provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. It may also be used by facility operators to assess and improve facility performance. Energy conservation measures covered in the protocols include fuel saving measures, water efficiency measures, load shifting and energy reductions through installation or retrofit of equipment, and/or modification of operating procedures.

Kilowatt (kW): A unit of power that describes the rate at which energy is generated or used. It quantifies the electric power required by an appliance or device such as a light bulb.

Kilowatt Hour (kWh): A unit of energy that describes how much electricity is consumed over a period of time. For example, if you turn on a 100 watt light bulb all day for 24 hours the light bulb consumed 2.4 kWh of electricity.

Net Energy Savings: The energy and demand savings attributable to the program, adjusted for free riders and spillover.

Net-to-Gross (NTG) Ratio: The ratio of net energy savings to gross energy savings indicates the overall effectiveness of an energy efficiency program. As the NTG ratio approaches one, the magnitude of the program impact increases.

Free Riders: Customers who participate in energy efficiency programs who would have engaged in the efficient behavior in the absence of the program. As a result, the presence of free riders tends to overestimate the energy savings of the program.

Spillover: Customers who engage in energy efficient behavior, but do not participate in the program, due to some influence of the program.

Process Evaluation: A method of evaluation that uses empirical data to assess the delivery of energy efficiency programs, verify goals and determine whether the program is implemented as designed.

Program Logic Model: Graphic representation of an energy efficiency program and its processes. Logic models shows the causal relationships or linkages among the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders critical to a program's performance.

Seasonal Energy Efficiency Ratio (SEER): average efficiency of the equipment during a typical cooling-season at the location of the measure. Ratio of the cooling output (Btu) divided by the power consumption (total electric energy input in watt-hours) during the same period. The higher the SEER, the more efficient the unit.

Executive Summary

Applied Energy Group, Inc (“AEG”) was retained by Kentucky Power Company (“KPCO” or “Kentucky Power”) to conduct a process, market and impact evaluation of its Residential and Small Commercial HVAC Diagnostic and Tune-Up Program. The HVAC Diagnostic and Tune-Up Program offers residential and small commercial (less than 100 kW) diagnostic performance check and tune-up services for their unitary air conditioning and heat pump systems. The services, performed by a participating KPCO HVAC dealer, include testing and correcting inefficiencies in unitary air conditioning and heat pump systems due to air-restricted indoor or outdoor coils and over or under refrigerant charges. Repairs reduce energy and demand use, improve customer comfort and extend the serviceable life of the unit.

AEG designed the process and market evaluation to examine program processes and customer responses to the program. The evaluation identifies methods for gathering data and measuring program results, and makes recommendations for program improvements. To arrive at the final recommendations, AEG performed the following tasks:

- Reviewed program materials and data.
- Reviewed program tracking methods.
- Updated program logic model and assessed program flow.
- Conducted interviews with KPCO staff.
- Conducted surveys of participating customers.
- Conducted surveys and site visits with participating HVAC dealers.

AEG designed the impact evaluation to assess the gross and net demand savings, gross and net energy savings, and the cost-effectiveness of installed measures. The evaluation verifies gross and net savings and measure installation. To verify program impacts AEG performed the following tasks:

- Calculated the gross energy (kWh) and peak (kW) impacts by project using engineering calculations.
- Performed cost-effectiveness analysis using a benefit-cost analysis model.

Summary of Key Findings

The stated goal of the HVAC Diagnostic and Tune-Up Program is to reduce energy use by conducting a diagnostic performance check on residential and small commercial unitary air conditioning and heat pump units, air restricted indoor and outdoor coils, and over and under refrigerant charge.

Program Performance Indicators

In 2010 and 2011, Kentucky Power rebated 1,143 residential and small commercial diagnostic and tune-ups through the HVAC Diagnostic and Tune-Up Program. Sixty-six (66) percent of the systems were residential heat pumps, 20 percent residential central air conditioners, 9 percent small commercial heat pumps and 4 percent small commercial central air conditioners. The program was approved in August 2010, two months later than anticipated in the Kentucky PSC filing, and implemented in September.

KCPO achieved 22 percent of the 130 participant goal in 2010 at an actual cost per participant lower than originally budgeted. The program exceeded the 700 participant goal in 2011 by approximately 60 percent. However, small commercial cost per participant was higher than originally budgeted.

Table ES1 Program Participation, Goals Originally Filed and Actual

	2010		2011	
	Goal	Actual	Goal	Actual
Residential CAC	60	0	325	232
Residential HP	40	28	215	730
Small Commercial CAC	26	0	136	46
Small Commercial HP	4	1	24	106
Total	130	29	700	1,114

In 2010 and 2011, 23 out of 101 participating HVAC dealers participated in the HVAC Diagnostic and Tune-Up Program or Small Commercial Heat Pump/Air Conditioner Incentive Program. The three most active HVAC dealers performed 69 percent of the diagnostic and tune-up services. HVAC dealers surveyed noted that the KPCO dealer incentives and being listed on the KPCO website as a participating dealer were significant motivators for participation.

Program Tracking

The program tracking and monitoring system accurately tracks program data and processes rebates. However, participating customers surveyed noted that incentive processing times could be improved.

Program Awareness and Marketing Strategies

The marketing strategy for the program included a combination of Kentucky Power program staff and participating HVAC dealers. KPCO staff promoted the programs directly to HVAC dealers and, in turn, the participating dealers were expected to promote the program to eligible customers.

According to survey respondents, customers most often learned of the program from a Kentucky Power employee, followed closely by the heating and cooling contractor. Participating HVAC dealer recommendations were the primary reason for customer participation. Eight-five (85) to 95 percent of participating customers surveyed noted that information from the participating HVAC dealer was a crucial factor in their decision to have HVAC diagnostic and tune-up services. Participating customers and HVAC dealers surveyed noted that the program would benefit from increased publicity and advertising.

Best Practices

Kentucky Power's program design and processes are largely consistent with best practices for similar energy efficiency programs. In 2011, HVAC tune-ups or controls upgrades were featured in 39 percent of residential energy efficiency programs and 48 percent of commercial programs.¹

¹ Consortium for Energy Efficiency. (2011) *State of the Efficiency Program Industry*. See www.cee1.org/files/2011%20CEE%20Annual%20Industry%20Report.pdf

The challenges posed by lack of information are ubiquitous in energy efficiency programs. Investment in education and outreach typically boost awareness and increase program participation. Actively engaging key stakeholders, such as HVAC contractors or home/business owners, is crucial to the success of any energy efficiency program.

Many energy efficiency programs suffer from lack of staff resources. Additional staff personnel may be necessary to ensure that program goals are met and that the program delivers the intended results. The increased program costs of additional staff are often recouped by improved performance.

Verify Program Impacts

AEG has determined the net-to-gross ratio for the HVAC Diagnostic and Tune-Up Program is 78 percent for small commercial customers and 77 percent for residential customers. Participating small commercial customer probabilities free ridership was estimated at 27 percent and spillover at 5 percent. Residential customer free ridership was estimated at 60 percent and spillover at 37 percent. Tables ES2 and ES3 present the net energy savings and cost-effectiveness ratios for residential and small commercial, respectively.

Program cost-effectiveness was greatly affected by the incentives paid to participating HVAC dealers. The inclusion of central air conditioner tune-ups also drive the cost-effectiveness of the program down. With the reduction of the participating HVAC dealer incentive to \$25 and the removal of the central air conditioner tune-ups, both the residential and commercial programs would be cost-effective and pass the TRC test. Note that very low avoided costs, especially the extremely low capacity costs in the Kentucky Power service territory, have a significant negative impact on the program's cost-effectiveness.

Table ES2 2011 Energy Savings by Equipment Type, Residential

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)	TRC
Heat Pump Tune Up	77%	27.34	113.99	341,260	0.88
Central Air Conditioner Tune Up	77%	8.97	0.00	29,100	0.19
Program Total		36.30	113.99	370,360	0.71

Table ES3 2011 Energy Savings by Equipment Type, Small Commercial

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)	TRC
Heat Pump Tune Up	78%	5.86	24.93	74,255	0.96
Central Air Conditioner Tune Up	78%	3.28	0.00	10,655	0.25
Program Total		9.15	24.93	84,910	0.75

AEG accompanied participating HVAC dealers during the performance of the diagnostics and tune-ups for air conditioners and heat pumps. Proper performance verification was confirmed at all locations.

Recommendations

AEG has several recommendations on how to improve the program. These include:

Hire Implementation Contractor

AEG recommends that Kentucky Power hire an implementation contractor to implement Kentucky Power's residential and small commercial HVAC programs, including, but not limited to, the Residential and Small Commercial HVAC Diagnostic and Tune-Up Program, the Small Commercial Heat Pump/Air Conditioner Incentive Program, the Residential High Efficiency Heat Pump Program, Mobile Home High Efficiency Heat Pump, and Mobile Home New Construction.

Kentucky Power has a small staff to run and oversee Kentucky Power's numerous energy efficiency programs. Some of the KPCO programs have implementation contractors that perform the day-to-day operations for the program, but the residential and small commercial HVAC programs are run completely by KPCO staff. Therefore, KPCO staff is responsible for marketing and promotional activities, including visiting participating and potential HVAC dealers across the KPCO territory, processing rebate applications, tracking rebate applications and performing QA/QC inspections. Due to the limited resources, Kentucky Power has not yet conducted an inspection to ensure services are being performed properly.

The residential and small commercial HVAC programs share many similar components, including marketing and promotional activities and data tracking systems as well as the same participating HVAC dealers. Utilizing one implementation contractor to implement the HVAC programs will allow the programs to continue capitalizing on their similarities and increase the efficiency of program processes.

The implementation contractor will have, at a minimum, the following responsibilities:

- Develop program goals and budget.
- Develop marketing and promotional activities.
- Design and maintain a data tracking system.
- Process customer and contractor rebate applications.
- Engage and monitor participating HVAC dealers.
- Develop QA/QC procedures and conduct random inspections of completed work.

Consider Program Modifications

AEG recommends that Kentucky Power and the implementation contractor consider modifying the HVAC Diagnostic and Tune-Up Programs:

- Reduce the participating HVAC dealer incentives to \$25 (from the current \$50 incentive).
- Remove central air conditioner tune-ups from the program offering.
- Reduce the customer incentive to \$30 (from the current \$50 incentive).

Program cost-effectiveness was negatively affected by the incentives paid to HVAC dealers and the inclusion of central air conditioner tune-ups. The residential and commercial programs are cost-effective if the participating HVAC dealer incentive is reduced and central air conditioner tune-ups removed. Note that these modifications may not be necessary if there are program budgetary changes or changes to Kentucky Power's avoided costs.

Residential HVAC Diagnostic and Tune-Up Program free ridership is estimated at 60 percent. The program was designed such that the participating HVAC dealers promote the program to eligible customers. Therefore, participating HVAC dealers are likely to initially provide the diagnostic and tune-up services to existing clientele that may typically receive these services without an incentive, and then begin to promote the program to new clientele. Therefore, free ridership is anticipated to decrease as HVAC dealers promote the program to new clientele.

AEG recommends additional modifications to reduce free ridership:

- Modify customer eligibility. Customers are currently eligible for a rebate every 3 years, this should be extended to every 5 years to correspond with the measure life of the services.
- Require the customer to submit the rebate application. Other than receiving the diagnostic and tune-up service, the customer does not have to take any action to receive the incentive.
- KPCO market directly to residential customers and encourage HVAC dealers to market to customers that do not consistently receive these tune-up services.

Engage Participating HVAC Dealers

AEG recommends that Kentucky Power and the implementation contractor engage actively participating HVAC dealers and remove non-participating HVAC dealers from the participating HVAC dealer list if they have not actively participated in a KPCO HVAC program within the most recent 12 months.

HVAC dealer participation is crucial to the program; 92 percent of survey respondents noted that information from the contractor was a crucial factor in their decision to purchase and install efficient HVAC equipment. There are currently 101 HVAC dealers participating in the HVAC Diagnostic programs. In 2010 and 2011, only 23 dealers participated in the HVAC Diagnostic and Tune-Up Program or the Small Commercial Heat Pump/Air Conditioner Incentive Program.

AEG recommends collaboration between Kentucky Power and the implementation contractor to engage contractors and explore modifying the marketing and promotional activities. Kentucky Power and the implementation contractor should explore cooperative marketing with the participating contractors to potentially leverage contractor's marketing experience. Cooperative marketing would be offered on a temporary basis and the impact on participation reviewed before permanent changes were made to the program.

1. Introduction

Applied Energy Group, Inc. (“AEG”) was retained by Kentucky Power Company (“Kentucky Power” or “KPCO”) to conduct a comprehensive evaluation of its 2010-2012 Demand Side Management (“DSM”) Program Portfolio.² The 2010-2012 DSM Program Portfolio includes the Residential Efficient Products Program, Residential and Small Commercial HVAC Diagnostic and Tune-up Program, Commercial Incentive Program, Small Commercial High Efficiency Heat Pump and Air Conditioner Program, and the Residential and Small Commercial Load Management Pilot Program. The DSM programs will be evaluated concurrently and individual program Evaluation, Measurement and Verification (“EM&V”) reports will be filed with the Kentucky Public Service Commission (“PSC”) by the August 15, 2012 regulatory filing deadline.

Kentucky Power is an electric utility that serves approximately 175,000 customers in all or part of 20 eastern Kentucky counties.³ The utility is part of the American Electric Power (“AEP”) system, which is one of the largest electric utilities in the United States.⁴ The 2010-2012 DSM Program Portfolio was implemented to help Kentucky Power and AEP reduce electricity use and peak demand, help customers lower their electricity bills, and encourage long-term change in the market through the adoption of energy efficiency technologies and services.

The Residential and Small Commercial HVAC Diagnostic and Tune-Up Program offers residential and small commercial (less than 100 kW) diagnostic performance check and tune-up services for their unitary air conditioning and heat pump systems. HVAC systems with coil and refrigerant inefficiencies are marginally operational and experience long run times. Repairs reduce energy and demand use, improve customer comfort and extend the serviceable life of the unit.

This report describes the key findings from the process, market and impact evaluation and provides recommendations for improving program performance and operations. Section 2 provides a program description and Section 3 described the process, market and impact evaluation methodology. Sections 4 and 5 present the process, market and impact evaluation findings. Key findings and recommendations are described in Section 6.

2. Program Description

The HVAC Diagnostic and Tune-Up Program offers residential and small commercial (less than 100 kW) diagnostic performance check and tune-up services for their unitary air conditioning and heat pump systems. The services, performed by a participating HVAC dealer, include testing and correcting inefficiencies in unitary air conditioning and heat pump systems due to air-restricted indoor or outdoor coils and over or under refrigerant charges. HVAC systems with coil and refrigerant inefficiencies are

² Kentucky Power’s 2010-2012 DSM programs were approved in Case No. 2010-00095 and Case No. 2010-00198.

³ Kentucky Power. Facts, Figures & Bios. Accessed at www.kentuckypower.com/info/facts/

⁴ American Electric Power delivers electricity to more than 5 million customers in 11 states and ranks among the nation’s largest generators of electricity, with almost 38,000 megawatts of generating capacity in the U.S.

marginally operational and experience long run times. Repairs reduce energy and demand use, improve customer comfort and extend the serviceable life of the unit.

Residential and small commercial customers are eligible for a \$50 and \$75 incentive, respectively, for receiving services from a participating dealer. KPCO participating HVAC dealers must be state-licensed contractors. Dealers are eligible for a \$50 incentive for each service performed (dealer will only receive incentive if customer rebate application is approved). Customers are limited to one rebate every three years for each eligible unit.

The diagnostic and tune-up services ensure customer HVAC systems:

- Are running at peak efficiency to help reduce operating costs.
- Contain the correct amount of refrigerant.
- Maintain efficient operation of indoor and outdoor coils.
- Receive periodic inspection to minimize unexpected equipment repairs.

The stated goal of the HVAC Diagnostic and Tune-Up Program is to reduce energy use by conducting a diagnostic performance check on residential and small commercial unitary air conditioning and heat pump units, air restricted indoor and outdoor coils, and over and under refrigerant charge.

The Kentucky Public Service Commission ("PSC") approved a three-year budget and participation goals for the HVAC Diagnostic and Tune-Up Program. Tables 1 through 3 present the originally filed program budgets and participations goals for 2010 through 2012 by sector and system type. The 2011 participating goal was revised from the original filing to 680. The 2012 program budget and participation goal were revised from the original filing to \$158,640 and 1,170,, respectively.⁵ Table 4 shows the anticipated energy and demand savings per participant by sector and system type as originally filed.

Table 1 Program Budget, 2010-2012

	2010	2011	2012
Residential	\$16,700	\$63,780	\$89,400
Small Commercial	\$6,960	\$24,120	\$32,600
Total	\$23,660	\$87,900	\$122,000

Table 2 Detailed Program Budget, 2010-2012

	2010	2011	2012
Equipment/Vendor	\$6,500	\$35,000	\$45,000
Customer Incentive	\$7,250	\$39,000	\$50,000
Promotion	\$9,000	\$9,000	\$9,000
Program Development & Admin	\$910	\$4,900	\$6,300
Evaluation	\$0	\$0	\$11,700
Total	\$23,660	\$87,900	\$122,000

⁵ See Case No. 2010-00095, Case No. 2011-00300, Case No. 2012-00051.

Table 3 Program Participation Goals, 2010-2012

	2010	2011	2012
Residential CAC	60	325	420
Residential HP	40	215	280
Small Commercial CAC	26	136	170
Small Commercial HP	4	24	30
Total	130	700	900

Table 4 Anticipated Energy and Demand Savings per Participant

	Summer kW	Winter kW	kWh
Residential CAC	0.169	-	311
Residential HP	0.169	0.219	741
Small Commercial CAC	0.357	-	687
Small Commercial HP	0.357	0.507	1,638

3. Evaluation Methodology

AEG designed the process, market and impact evaluation to determine the efficacy of program procedures and systems, evaluate the achievement of program objectives, provide insight into and recommendations for program improvement and verify the direct impacts of program activities.

The process and market evaluation identifies whether key elements, such as incentive levels, program delivery, program tracking mechanisms and quality assurance/quality control ("QA/QC") procedures are performing as designed. The evaluation also identifies issues or opportunities to improve these key elements. The goals of the process and market evaluation are to:

- Examine key performance indicators to identify participation or program issues;
- Conduct a comprehensive review of program tracking;
- Determine awareness levels as a way to refine marketing strategies and reduce barriers to program participation;
- Assist program implementers and managers to structure programs and achieve cost-effective savings while maintaining high levels of customer satisfaction;
- Provide recommendations for changing the program's structure, management, administration, design, delivery, operations or goals; and
- Determine if specific best practices should be incorporated.

Impact evaluations verify the energy and demand savings directly associated with a program and assess the cost-effectiveness of the DSM program. The goals of the impact evaluation are to:

- Verify the annual energy and coincident peak capacity savings and total resource benefit claims made by Kentucky Power; and
- Provide verification and documentation of DSM program impacts.

To arrive at the final recommendations, AEG carried out the following research activities.

Review Program Materials

AEG reviewed current program materials, documents and processes, including the rebate applications and marketing and outreach materials. The review served as the basis for understanding whether the program has been implemented as planned. The review was particularly important for preparing the interview guides and survey instruments for other process evaluation tasks.

Program Logic Model

AEG developed a program logic model based on a review of program materials and discussions with Kentucky Power program staff. The model shows the linkages between the program components, including activities, outputs, outcomes and key stakeholders. The model also highlights potential external influences and program inputs.

Program Tracking and Database Review

AEG reviewed current Kentucky Power rebate application review and processing, program tracking and reporting, and tracking databases.

Kentucky Power Staff Interview

AEG conducted a comprehensive, group interview with Kentucky Power program staff in November 2011. The purpose of this interview was to get staff impressions of program implementation activities, program performance, marketing and customer awareness of the program, program data and tracking mechanisms, and opportunities for program improvements. Individual interviews with program staff, as well as informal discussions around program performance, were also conducted between December 2011 and March 2012. Individual interviews focused on program design and delivery issues, program performance, potential areas of improvements, and overall program effectiveness.

Participating Dealer Interview

AEG administered a 10 to 12 minute telephone survey to a sample of participating HVAC dealers to assess customer satisfaction, potential areas for improvement, customer awareness and attitudes regarding energy efficiency and conservation, marketing and coordination efforts, and application processes as well as ascertain the clarity of program rules and usefulness of support materials from Kentucky Power. The participating HVAC dealer survey guides can be found in Appendices A and B.

Currently, 101 HVAC dealers participated in the HVAC Diagnostic and Tune-Up Program and Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program. Twenty-one (21) HVAC dealers submitted a rebate for one or both of the programs. AEG conducted 17 surveys of participating HVAC dealers, 9 with dealers that submitted a rebate in 2011 and 8 with dealers that did not submit a rebate in 2011. Additionally, AEG accompanied two participating HVAC dealers to eight HVAC diagnostic and tune-up appointments to assess services rendered.

Participating Customer Surveys

AEG administered a 10 to 12 minute telephone survey to a sample of program participants to assess program experience and awareness, customer satisfaction, barriers to participation, free ridership and

areas for potential program improvement. The participating customer survey guides can be found in Appendix C (residential) and D (small commercial).

Kentucky Power provided data for 1,096 program participants who received rebates from November 2010 through December, 2011. The sample included 71 unique small commercial and 866 unique residential electric accounts, which were identified by the participant's account number and address. AEG calculated the sample size at a 90 percent confidence interval with an error margin of +/-10 percent. Participants were then randomly selected based on unique identifiers determined by Microsoft Excel's random number generator. Fifty-eight (58) residential and 19 small commercial surveys were completed.

Review Engineering or Deemed Savings Assumptions

AEG reviewed the engineering and/or deemed savings assumptions utilized by AEP to calculate program energy and demand impacts. Kentucky Power's initial program filing deemed savings assumptions were reviewed to ensure consistence with the impact evaluation results.

Gross Energy and Demand Impacts

AEG determined the gross energy and demand savings of a representative sample based on Option A of the International Performance Measurement and Verification Protocols ("IPMVP")⁶ outlined in Table 5.

Table 5 Overview of IPMVP Options

IPMVP M&V Option	Measure Performance Characteristics	Data Requirements
Option A: Engineering calculations using spot or short-term measurements, and/or historical data	Constant performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • Spot measurements • Run-time hour measurements
Option B: Engineering calculations using metered data.	Constant or variable performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • End-use metered data
Option C: Analysis of utility meter (or sub-meter) data using techniques from simple comparison to multivariate regression analysis.	Variable performance	<ul style="list-style-type: none"> • Verified installation • Utility metered or end-use metered data • Engineering estimate of savings input to SAE model
Option D: Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering	Variable performance	<ul style="list-style-type: none"> • Verified installation • Spot measurements, run-time hour monitoring, and/or end-use metering to prepare inputs to models • Utility billing records, end-use metering, or other indices to calibrate models

Engineering calculations referenced from the *New York Standard Approach for Estimating Energy savings from Energy Efficiency Programs* and *Illinois Technical Reference Manual*, using Kentucky Power specific inputs, were utilized to calculate gross energy and demand impacts for HVAC tune-ups for small commercial and residential customers.

⁶ IPMVP provides best practice techniques for verifying results of energy efficiency projects, i.e. verifying savings attributed to energy efficiency projects.

Net Energy and Demand Impacts

AEG adjusted the gross energy and demand savings to reflect estimates of free ridership and spillover. Free ridership and spillover were determined from the participating customer interviews; see Section 5 for a detailed explanation.

Cost-Effectiveness Analysis

AEG analyzed the cost-effectiveness of the HVAC Diagnostic and Tune-Up Program utilizing Bencost, an updated version of a public domain model that AEG customized for Kentucky Power. Bencost is an input-output model that calculates four standard California cost-effectiveness tests, the Total Resource Cost, Participant Test, Utility Test and Rate Impact Measure Test. The analysis was conducted using Kentucky Power specific inputs, including avoided costs, discount rates, participation and incentives. Cost-effectiveness inputs and outputs are detailed in Appendix E.

4. Process and Market Evaluation Findings

The process and market evaluation identifies whether key elements, such as incentive levels, program delivery, program tracking mechanisms and quality assurance/quality control (“QA/QC”) procedures are performing as designed. When potential deficiencies in these areas arise, the process and market evaluation identifies opportunities for improving these key elements.

4.1 Program Logic Model

Program logic models are graphic representations of an energy efficiency program and its processes. Logic models show the causal relationships or linkages between the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program’s impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders that are critical to a program’s performance.⁷

Key elements of a program logic model include:

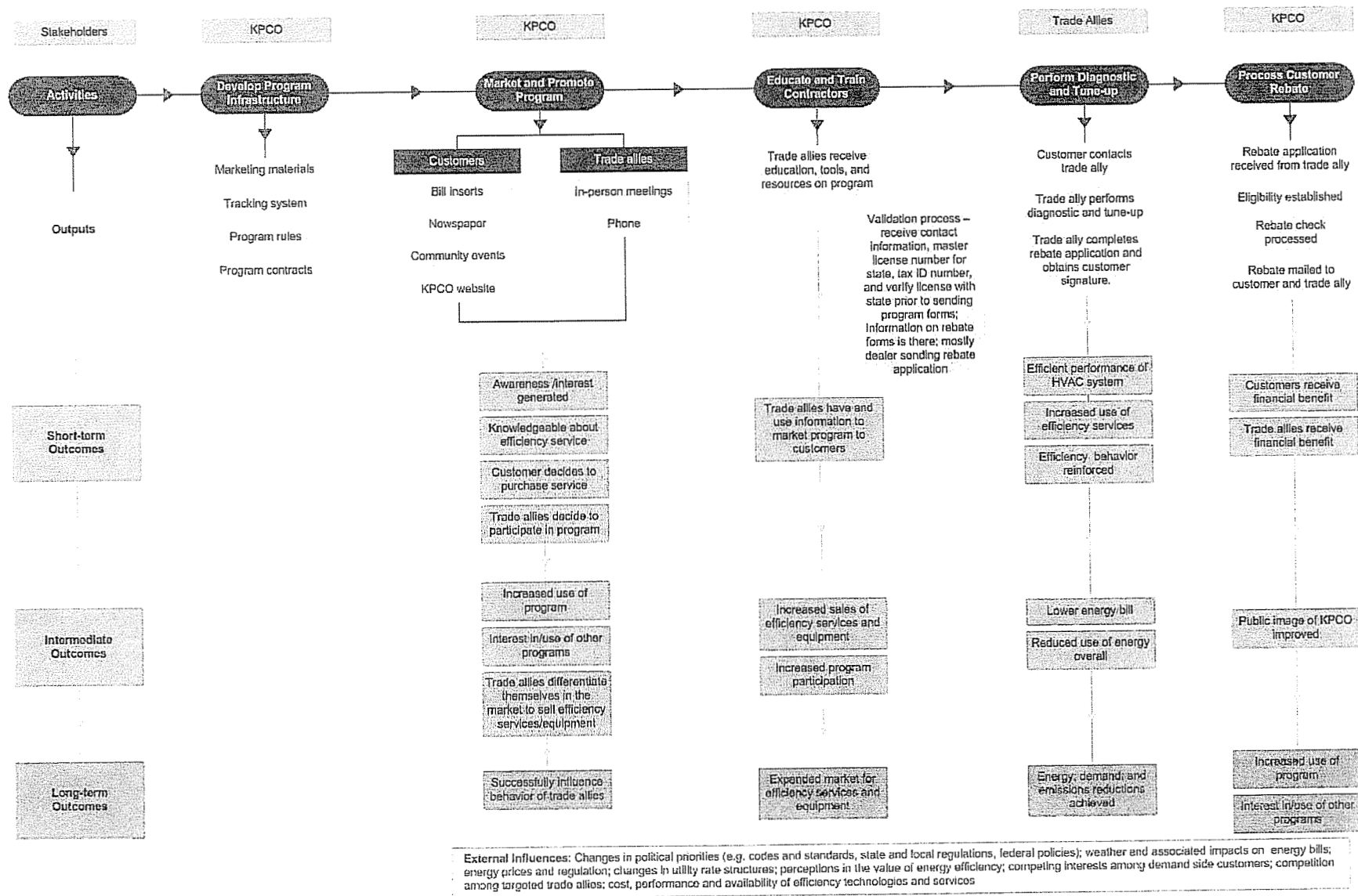
- **Inputs.** Resources that program stakeholders contribute to a program, such as knowledge, skills, expertise, finances or equipment.
- **Outputs.** Program activities and number of people reached, based on program goals.
- **Outcomes.** Short-term, intermediate or long-term results of the program outputs. Assists evaluators and program administrators in establishing program results.
- **External Influences.** Factors outside the utility’s control that may influence the program outcomes. They help to identify important program partnerships as well as the issue(s) the program can realistically influence. The factors help determine which evaluation measures will accurately reflect project outcomes or any other goals that must be met to address the problem or situation.

⁷ McCawley, P. (2001). *The Logic Model for Program Planning and Evaluation*. Moscow: University of Idaho Extension.

In the logic model presented in Figure 1, program activities are oriented sequentially across the top of the page from the left to the right. The sequence of program activities is important. For example, the program's infrastructure, including its advertising materials, tracking systems, program rules, and contracts must be developed before the program can be marketed and customers recruited. The performance outputs and outcomes are oriented vertically from top to bottom. The box on the bottom right contains the external factors outside the utility's control that may affect program performance.

Figure 1 Program Logic Model

Inputs: program funding, PSC goals and reporting requirements, Kentucky Power program staff, implementation contractor resources and expertise, evaluation contractor resources and expertise, existing awareness of Kentucky Power



4.1.1 Activities and Outputs

There are five main activities in the HVAC Diagnostic and Tune-Up Program. The program activities and their corresponding outputs help to establish linkages between the situation the program is designed to address and the program's intended outcomes. Therefore, activities and outputs are discussed together.

Develop Program Infrastructure

Activities included gathering market knowledge, setting program goals, designing the program, establishing program rules, developing marketing approaches and content, and establishing institutional and operating structures. Kentucky Power staff, with input from AEP, designed the program, including rebate applications, data tracking system and marketing materials.

Market and Promote Program

The marketing strategy for the program included a combination of Kentucky Power program staff and participating HVAC dealers. Kentucky Power staff promoted the programs directly to HVAC dealers, mailing program fact sheets as well as calling and meeting in-person with dealers to discuss the programs. Additional marketing activities included direct mail, fact sheets, bill inserts, newspaper advertisements and community events. Participating HVAC dealers were encouraged, and expected, to promote the program to eligible customers.

Educate and Train Contractors

Kentucky Power program staff developed relationships and maintained direct contact with participating HVAC dealers. Kentucky Power program staff educated dealers on the HVAC Diagnostic and Tune-Up Program, including the eligible customers, qualifying services, rebate forms and rebate processing. Program staff also provided guidance on KCPO tools and resources, such as program paperwork, KCPO website, as well as how to use energy efficiency as a sales tool. Kentucky Power maintains a list of participating dealers on the DSM Program website.

Perform Diagnostic and Tune-Up Services

The customer may have learned of the program directly from the participating dealer or from some other source, such as KPCO marketing or word of mouth. Kentucky Power maintained a list of participating dealers on the DSM Program website. The participating dealers performed the HVAC diagnostic and tune-up services, including testing and correcting inefficiencies in unitary air conditioning and heat pump systems due to air-restricted indoor or outdoor coils and over or under refrigerant charges.

After the services have been completed, the customer received the rebate application from the HVAC dealer. The dealer completed and faxed the paperwork to the KPCO program staff.

Eight out of nine participating HVAC dealers surveyed completed and submitted the rebate application for the customer. One HVAC dealer had the customer submit the rebate application.

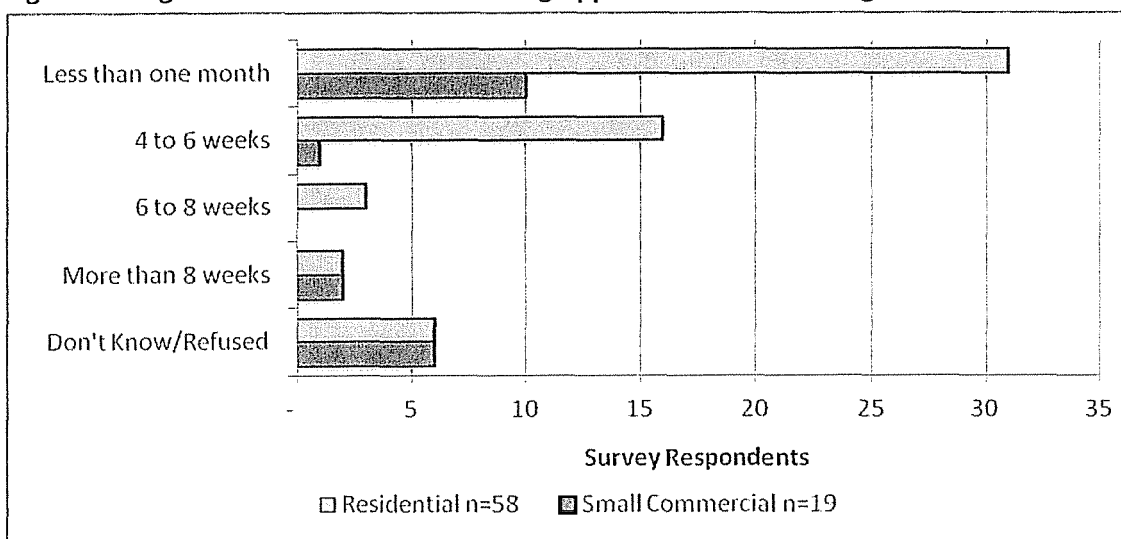
Process Customer Rebate

Customer rebates were processed by the Kentucky Power program staff. Staff reviewed the rebate applications to ensure the application is completed and the customer/dealer is eligible for an incentive. The application data was entered into the program tracking system and a payment request submitted for review and final approval. Once approved, the customer/dealer data was submitted to AEP's Accounting Group and a rebate check issued and mailed. According to Kentucky Power program staff,

It generally took one to two weeks for the customer to receive the rebate check, once the application was received by Kentucky Power.

As shown in Figure 2, participating customers surveyed noted that it often took less than one month to receive the rebate check from the time the application was submitted.

Figure 2 Length of Time between Submitting Application and Receiving Rebate Check



Kentucky Power maintained the right to conduct inspections on a sample of equipment that received diagnostic and tune-up services to ensure services are being performed properly and therefore the energy savings are being achieved. To-date no inspections have been conducted.

4.1.2 Outcomes

Outcomes are distinct from program outputs. When program partners or target audiences encounter program outputs, their reactions are referred to as program outcomes. The outcomes are divided into short-term, intermediate, and long-term outcomes are explained below.

Short-term Outcomes

When the program is marketed and promoted through events and literature, customers and HVAC dealers may become more aware of and interested in efficient lighting. Customers may also become knowledgeable about the efficiency services and costs associated with HVAC maintenance issues. Other short-term outcomes include the HVAC dealers having information to market the program to customers, increased maintenance of HVAC systems, and the financial benefit the customer and HVAC

dealer receives by participating in the program. The program may lead to an increased commitment to energy efficiency.

Intermediate Outcomes

Intermediate outcomes may include increased use of the program, interest in, and use of, other KPCO efficiency programs, increased sales of HVAC maintenance services and reduced energy consumption.

Long-term Outcomes

The long-term outcomes may include energy and demand savings, influence behavior of HVAC dealers, reduced utility emissions, fewer greenhouse gases emitted and an expanded market for HVAC maintenance services. Kentucky Power may enhance its public image as a utility that responds to customer needs without sacrificing consideration of environmental issues.

4.1.3 External Factors

Documenting external factors outside the control of Kentucky Power and its stakeholders improves program planning and evaluation by identifying important program partners, the activities the program can realistically influence, which evaluation measures will accurately reflect project outcomes, and other needs that must be met.

- Changes in political priorities (e.g. codes and standards, state and local regulations, federal policies, perceptions of energy and climate change);
- Weather and associated impacts on customer actions and energy bills;
- Energy prices and regulation;
- Changes in utility rate structures;
- Perceptions in the value of energy efficiency;
- Competing interests among demand side customers;
- Competition among targeted HVAC dealers;
- HVAC dealer business practices and interest in energy efficient technology; and
- Cost, performance and availability of efficient technologies and services.

4.1.4 Best Practices

Program administrators encounter common challenges that hinder energy efficiency programs from achieving maximum benefits, including, but not limited to:

- Lack of information and awareness of energy efficiency benefits.
- Limited resources / High initial costs energy efficient technologies.
- Competing priorities among customers and program administrators.
- Lack of clear, well-communicated program goals that correspond to overall organizational goals.

Best practices can provide ideas and/or tools to overcome these and other program barriers. Some key best practices include, but are not limited to, the following:

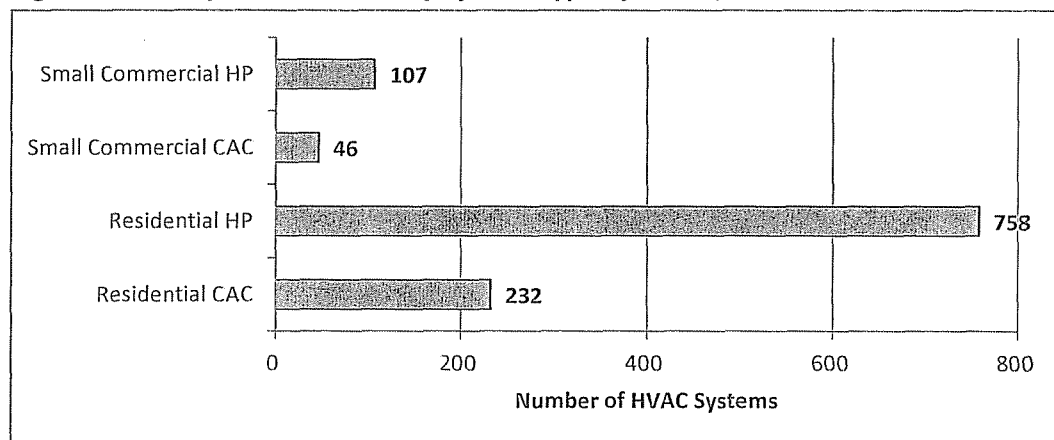
- Coordinate with other energy efficiency program administrators to overcome market barriers.
- Increase awareness by investing in education, outreach and marketing activities.

- Solicit stakeholder input and feedback to optimize program design and delivery.
- Develop reliable program tracking systems to support evaluation and implementation.

4.2 Program Performance

In 2010 and 2011, 1,143 customer HVAC systems were rebated under HVAC Diagnostic and Tune-Up Program. Sixty-six (66) percent of the systems were residential heat pumps, 20 percent residential central air conditioners, 9 percent small commercial heat pumps and 4 percent small commercial central air conditioners (see Figure 3).

Figure 3 HVAC Systems Rebated by System Type by Sector, 2010-2011



The HVAC Diagnostic and Tune-Up Program was expected to be approved by the Kentucky PSC in June 2010.⁸ However, the program was approved in August 2010 and implemented by Kentucky Power program staff in September. The first rebates were issued in November 2010.

Kentucky Power rebated 29 residential and small commercial diagnostic and tune-up services in 2010, achieving 22 percent of the 130 participant goal. This was likely due the fact that the program was approved by the Kentucky PSC in August 2010 but the participation goals were based on an approval date of February 2010. There were 1,114 participants in 2011, exceeding the 700 participant goal by approximately 60 percent.

Table 6 Program Participation, 2010-2011

	2010	2011	Total
Residential CAC	0	232	232
Residential HP	28	730	758
Small Commercial CAC	0	46	46
Small Commercial HP	1	106	107
Total	29	1,114	1,143

Energy efficiency programs that offer services for cooling measures typically experience increased participation during the summer months. When the outside temperature is hottest, cooling equipment is used on a consistent basis. During the summer, customers that use space cooling equipment may find

⁸ See Case No. 2010-00095.

the program essential. Therefore, a customer is more likely to receive diagnostic and tune-up services for their central air conditioner during the spring and summer months. The number of central air conditioners that received services was typical of a program that offers incentives for improving the efficient of cooling equipment, with participation spiking in the warmer months and falling during the colder months. Central air conditioner tune-ups were highest in the summer months (July through September).

Heat pumps provide cooling and heating to customers. Routine diagnostic and tune-up services typically occur year round, but generally follow a seasonal pattern. Customers primarily request diagnostic and tune-up services during the spring and fall seasons in preparation for the summer and winter seasons. Participation in the HVAC program reflects this seasonal pattern. Heat pump tune-ups spiked in the spring (March and April) and again in the fall (October to November).

Figure 4 presents the number of systems rebated by system type and sector. If the summer or winter months are mild, as compared to the historic temperature, customers will not be as likely to utilize their cooling and heating equipment and customer participation would decrease.

Figure 4 HVAC Systems Rebated Monthly by System Type by Sector, 2010-2011

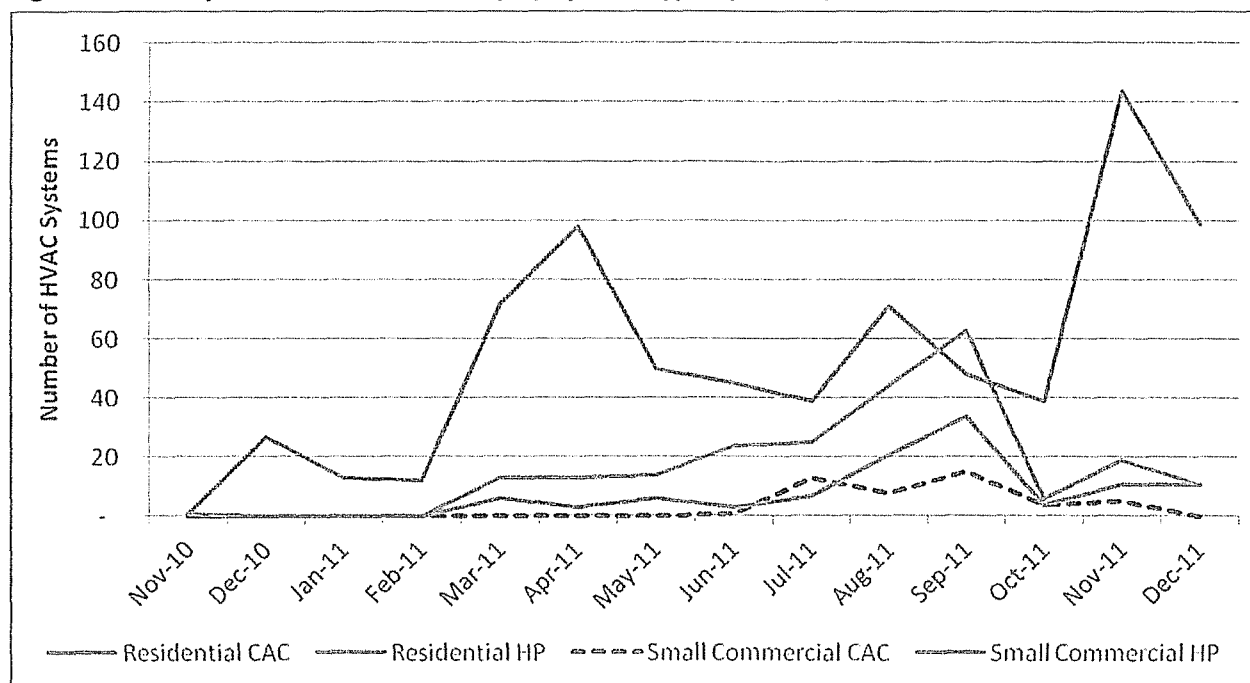


Table 7 presents the overall budget and budgeted cost per participant by sector and Table 8 presents the actual expenditures and actual cost per participant by sector. Actual 2010 expenditures and cost per participant were lower than originally budgeted, but the 2011 expenditures exceeded the original budget. The actual 2011 residential expenditures were \$100,224 compared to the original approved budget of \$63,780 and actual 2011 small commercial expenditures were \$27,093 compared to the original approved budget of \$24,120. However, the 2011 residential cost per participant was lower than budgeted while the small commercial cost per participant was higher than budgeted.

Table 7 Budget and Participation Goals by Sector as Originally Filed, 2010-2011

	Residential		Small Commercial	
	2010	2011	2010	2011
Equipment/Vendor	\$5,000	\$27,000	\$1,500	\$8,000
Customer Incentive	\$5,000	\$27,000	\$2,250	\$12,000
Promotion	\$6,000	\$6,000	\$3,000	\$3,000
Program Development & Admin	\$700	\$3,780	\$210	\$1,120
Evaluation	\$0	\$0	\$0	\$0
Total Budget	\$16,700	\$63,780	\$6,960	\$24,120
Participation Goal	100	540	30	160
Budgeted Cost (\$) per Participant	\$167	\$118	\$232	\$151

Table 8 Actual Expenditures and Participation by Sector, 2010-2011

	Residential		Small Commercial	
	2010	2011	2010	2011
Equipment/Vendor	\$1,450	\$45,350	\$50	\$7,300
Customer Incentive	\$1,400	\$45,300	\$75	\$10,875
Promotion	\$0	\$4,818	\$0	\$4,818
Program Development & Admin	\$0	\$0	\$0	\$0
Evaluation	\$0	\$4,756	\$0	\$4,100
Total	\$2,850	\$100,224	\$125	\$27,093

There were 101 HVAC dealers participating in the HVAC Diagnostic and Tune-Up Program and Small Commercial Heat Pump/Air Conditioner Incentive Program. In 2010 and 2011, 23 out of 101 participating HVAC dealers participated in at least one of the programs.⁹ Table 9 shows that 20 dealers received a rebate for diagnostic and tune-up services on 1,142 HVAC systems (one of the HVAC systems did not list the HVAC dealer that performed the work). The three most active HVAC dealers performed 69 percent of the diagnostic and tune-up services.

⁹ The 101 participating HVAC dealers may also participate in the Residential Heat Pump/Air Conditioner Program. However, the Residential Heat Pump/Air Conditioner Program was not evaluated and these results pertain only to the HVAC Diagnostic and Tune-up Program and Small Commercial Heat Pump/Air Conditioner Program.

Table 9 Most Active Participating HVAC Dealers

Contractor	HVAC Systems Rebated	% of Total
Appalachian Refrigeration	445	39.0%
Bobby Howard & Sons	209	18.3%
Breeding's Plumbing & Electric	135	11.8%
Aire Serv	105	9.2%
Big Sandy Heating & Cooling	95	8.3%
C&H Heating & Air Conditioning	56	4.9%
Ashland Furnace	30	2.6%
Breathitt Mechanical	15	1.3%
HELP Air Conditioning & Heating	13	1.1%
Cadco Heating & Air Conditioning	11	1.0%
Webb's Heating & Cooling	9	0.8%
Burchett's Heating & Cooling	6	0.5%
General Heating & Air Conditioning	5	0.4%
American Heating & Cooling	2	0.2%
Cox Commerical	1	0.1%
Elliot Supply & Glass, Inc	1	0.1%
Delta Supply Heating & Cooling	1	0.1%
Kentucky Wide Heating & Cooling	1	0.1%
Patterson Repair Service	1	0.1%
Scurlock Heating & Cooling	1	0.1%
Total	1,142	100%

4.3 Program Marketing

Kentucky Power marketed the HVAC Diagnostic and Tune-Up Program as part of a broader initiative under Kentucky Power's GRID SMART® Programs. Kentucky Power marketed the program to residential and small commercial customers as well as HVAC dealers within the KPCO service territory. Customers could search for participating HVAC dealers by geographic location on the KPCO SMART Programs website.

The participating dealers and potential participant pool were the same for both the Small Commercial HVAC Diagnostic and Tune-Up Program and the Small Commercial Heat Pump/Air Conditioner Incentive Program; therefore, these programs were marketed together.

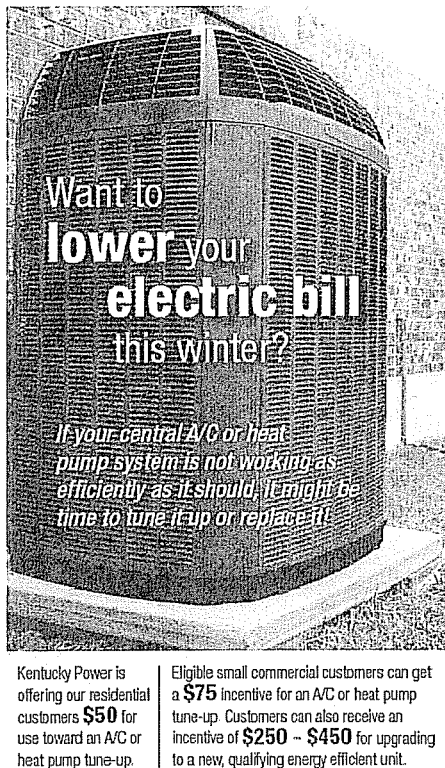
In 2010 and 2011, Kentucky Power marketed the program through the following program outputs:

- **HVAC Dealer Outreach.** Kentucky Power staff promoted the programs directly to HVAC dealers. Outreach included mailing program fact sheets and telephoning or personally meeting with prospective dealers to discuss the programs.
- **Bill Inserts** were included in residential and small commercial customer bills in July and November 2011.
- **Newspaper Advertisements** were run in fifty media outlets during the fall and summer of 2011.
- **Community Events.** KPCO staff members attended community events in multiple counties, promoting the DSM Programs and distributing program fact sheets and CFLs. Overall, these events were attended by 400 to 450 residential customers per event.

- **Internet.** Kentucky Power marketed the program online through the KPCO SMART Programs website at kentuckypower.com/save
- **KPCO Employee Communications.** Posters and email blasts were utilized to help KPCO employees become more familiar with the DSM Programs. KPCO employees were encouraged to promote programs in the local community.

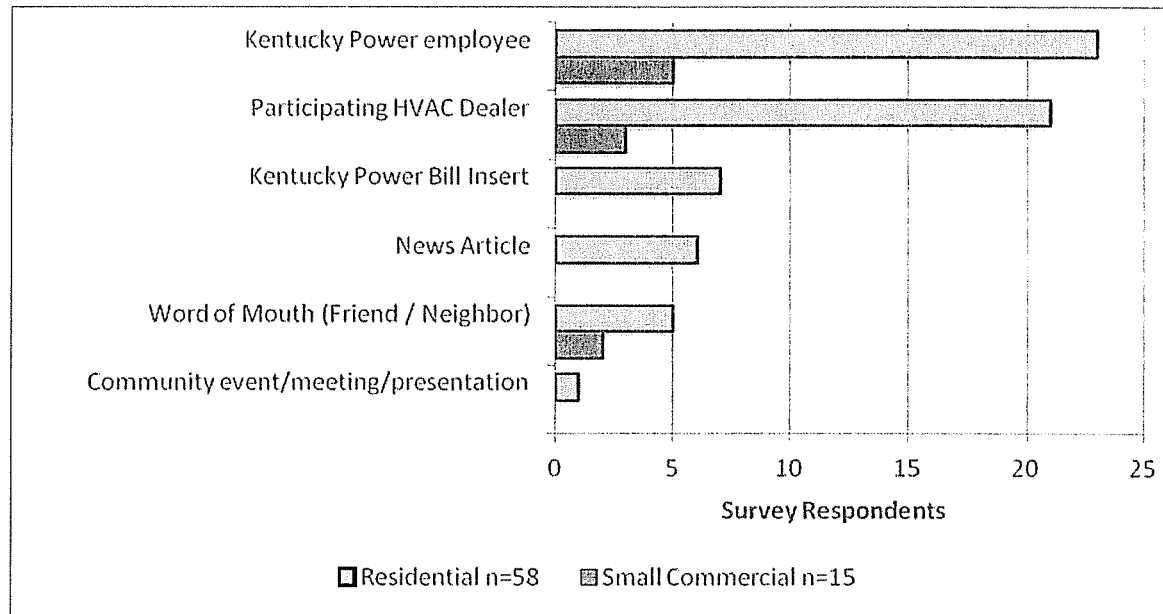
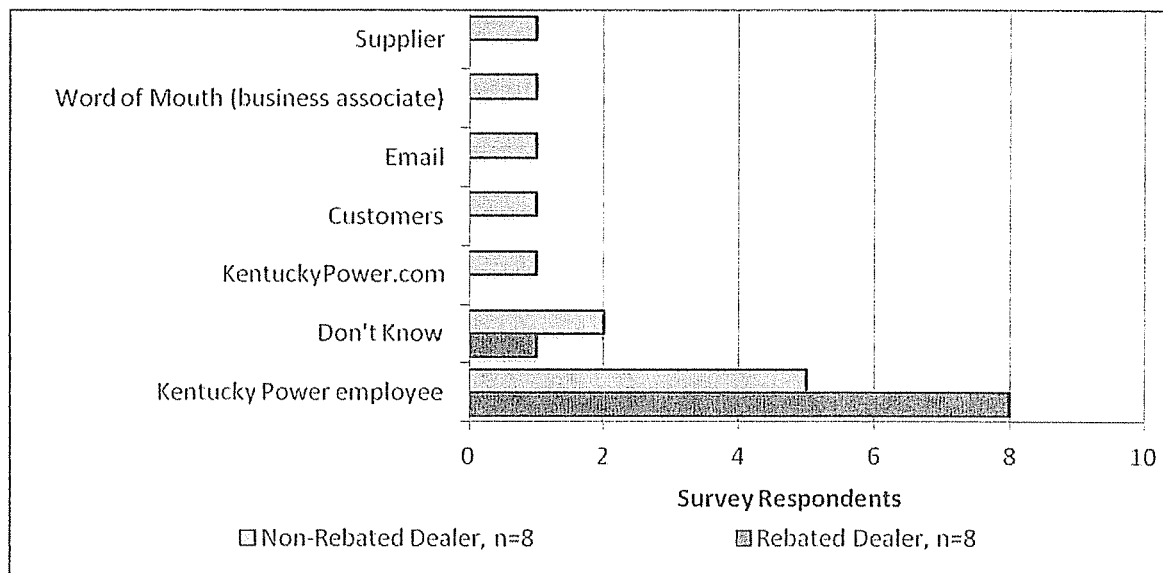
Participating HVAC dealers increased by approximately 10 percent after the newspaper advertisements were run due to customer interest in the program.

Figure 5 Newspaper Advertisement



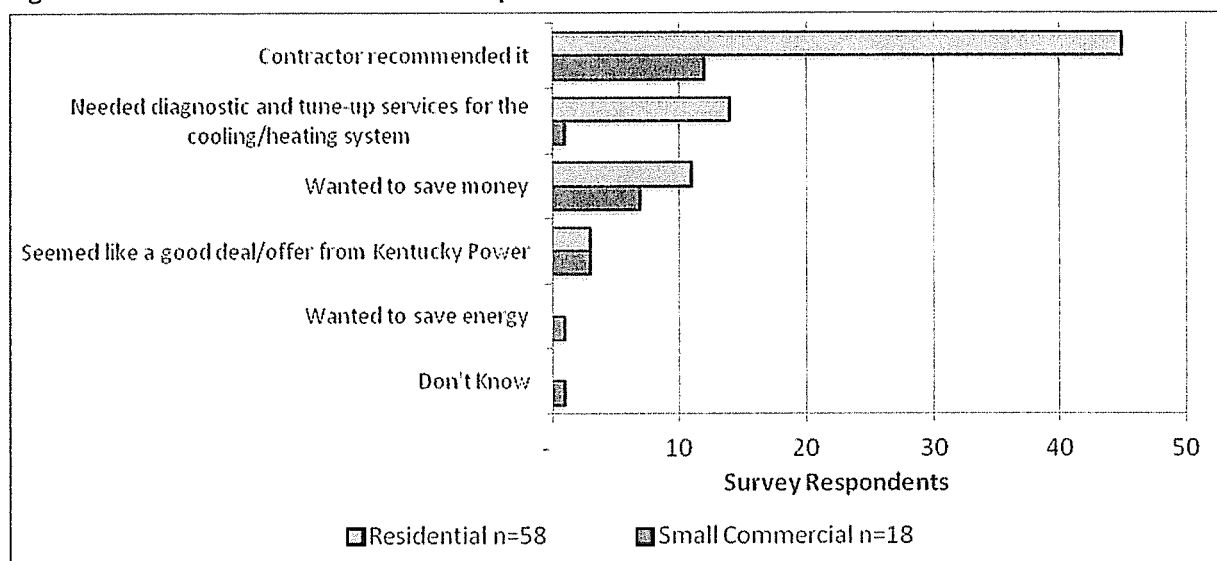
4.3.1 Program Awareness

According to survey respondents, customers most often learned of the program from a Kentucky Power employee, followed closely by the heating and cooling contractor. Participating HVAC dealers often learned about the program through a Kentucky Power employee. Participating dealers that did not receive a rebate in 2011 noted other means, such as word of mouth, email and KentuckyPower.com.

Figure 6 How Customers First Learned of the Program**Figure 7 How Participating HVAC Dealers First Learned of the Program**

4.3.2 Motivation for Participation

Seventy-eight (78) percent of residential and 67 percent of small commercial participating customers surveyed cited the contractor's recommendation as the primary reason for participating in the HVAC Diagnostic and Tune-Up Program. Additionally, 85 to 95 percent of participating customers noted that information from the contractor was a crucial factor in their decision to have HVAC diagnostic and tune-up services. The HVAC Diagnostic and Tune-Up Program was designed such that the Kentucky Power program staff marketed the program to HVAC dealers. In turn, the participating HVAC dealers were encouraged, and expected, to promote the program to eligible customers.

Figure 8 Customer Motivation for Participation

According to participating HVAC dealers surveyed (n=7), the main factors motivating customer participation were:

- Energy savings (38%)
- Bill savings (31%)
- Comfort (15%)
- Environmental issues (8%)
- The customer's bottom line (8%).¹⁰

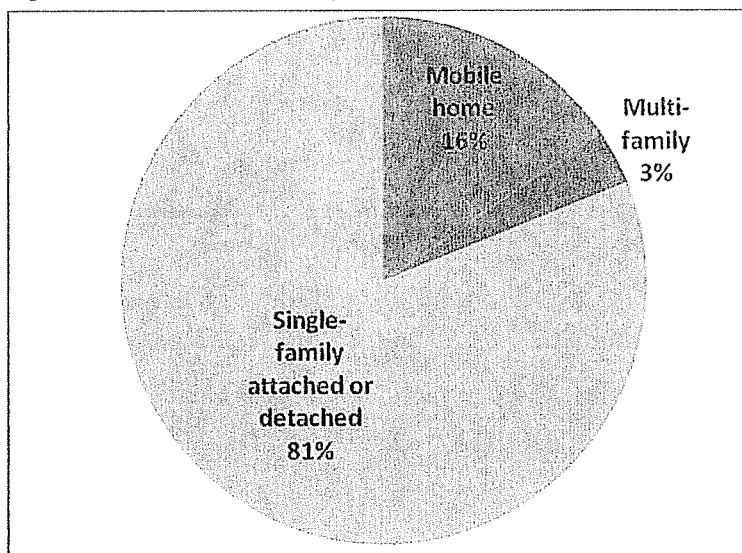
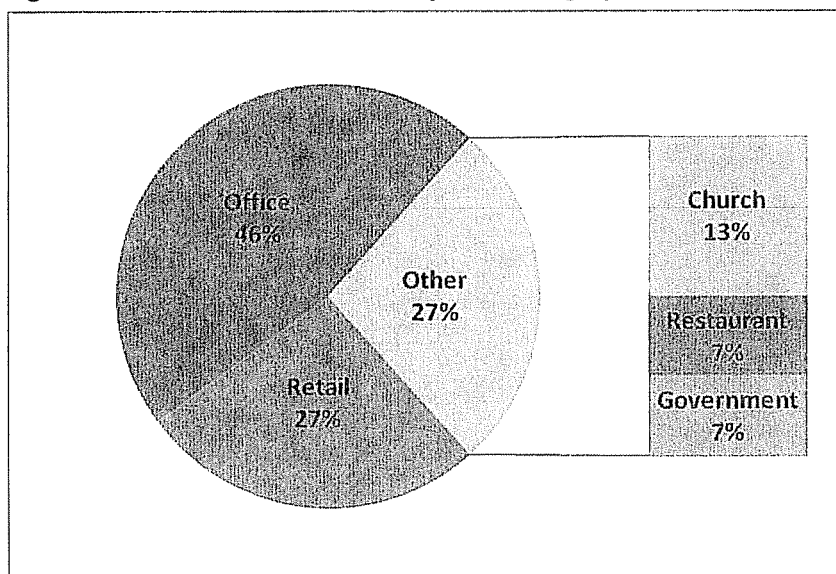
Ninety-two (92) percent of participating HVAC dealers surveyed stated that their primary reason for participating in both the KPCO Small Commercial Heat Pump/Air Conditioner Incentive Program and the HVAC Diagnostic and Tune-up Program was that the programs were good for customers. Participating HVAC dealer rebates were also a significant motivator.

According to the 7 participating HVAC dealers surveyed, 57 percent of HVAC dealers surveyed noted that the dealer incentive was very important in their decision to participate.

4.3.3 Customer Demographics

The residential participants surveyed were primarily homeowners (97 percent) that lived in a single-family attached or detached home, followed by mobile and multifamily units. The small commercial participants surveyed were primarily offices, followed by retail.

¹⁰ The customer's bottom line is financial (i.e. the financial benefit of the diagnostic and tune-up service and participation in the Kentucky Power program outweighed the cost of the service).

Figure 9 Residential Participant Demographics, n=58**Figure 10 Small Commercial Participant Demographics, n=15**

4.4 Program Tracking & Incentive Processing

Kentucky Power submitted bi-annual reports to the Kentucky PSC with each program's progress to-date, including participation, estimated energy and demand savings, and budget. The utility also reviewed actual, projected and summary program data with the DSM Collaborative on a quarterly basis.

Customer rebate applications were processed by Kentucky Power program staff. Staff reviewed the applications for completeness and eligibility of the customer/dealer based the date received. Each customer application was assigned a unique identifier. The hard-copy rebate applications were labeled with the assigned unique identifier and payment request number, then grouped and stored into a binder.

Kentucky Power's program tracking system was comprised of three databases:

KPCO Customer Records (MACCS) is an internal intranet-based database. A note is entered in the customer record with the DSM Program and the date the rebate application was received. KPCO Customer Service Representative's can access the note if a customer calls about their rebate status. Data from the rebate application is entered into the DEMO page, including the equipment type, tonnage, date, square footage of home. KPCO's load management team utilizes the data to monitor program performance.

Program Log is an Excel-based database containing data from the rebate application that is available on a shared drive and is only available to specific KPCO staff. Each KPCO DSM Program has its own program log. Kentucky Power collects the following data for the program log database:

- Customer Information: name, account number, address (service and mailing), phone number, sector (residential or commercial), peak billing demand, unique identification number.
- Dealer Name
- A/C Usage: total square footage of A/C equipment zone, number of days operated in a week, number of hours operated in a day.
- Programmable Thermostat: typical set point, setback temperature, time of setback.
- Cooling/Heating Unit Information
 - Inspection date and time.
 - Equipment type, size, efficiency level, brand, age and ARI reference number.
 - Model number of outdoor condenser, indoor evaporator and furnace.
 - Whether ductwork is installed in conditioned space.
- HVAC Performance Diagnostic and Tune-Up Data
 - Outdoor ambient temperature.
 - Discharge/suction pressure and line temperatures before and after tune-up.
 - Refrigerant type, quantity removed or added (reason), total system charge and manufacturer recommended charge.
 - Indoor blower volts.
 - Outdoor compressor volts.
 - Blower motor and compressor amps before and after tune-up.
 - Condenser fan amps before and after tune-up.

Electronic Payment Request (PeopleSoft). Each rebate application has two payment requests, one for the customer and one for the dealer. The payment request includes the accounting code, unique identification number, customer/dealer name and address, dealer Federal Tax ID and rebate amount.

Prior to approval, the Electronic Payment Request was reviewed by the Kentucky Power program coordinator. The coordinator ensured the account number, program account, rebate amount and unique identifier are correct. Once approved, the Electronic Payment Request was submitted electronically to the AEP Accounting Group in Canton, Ohio and a rebate check issued and mailed.

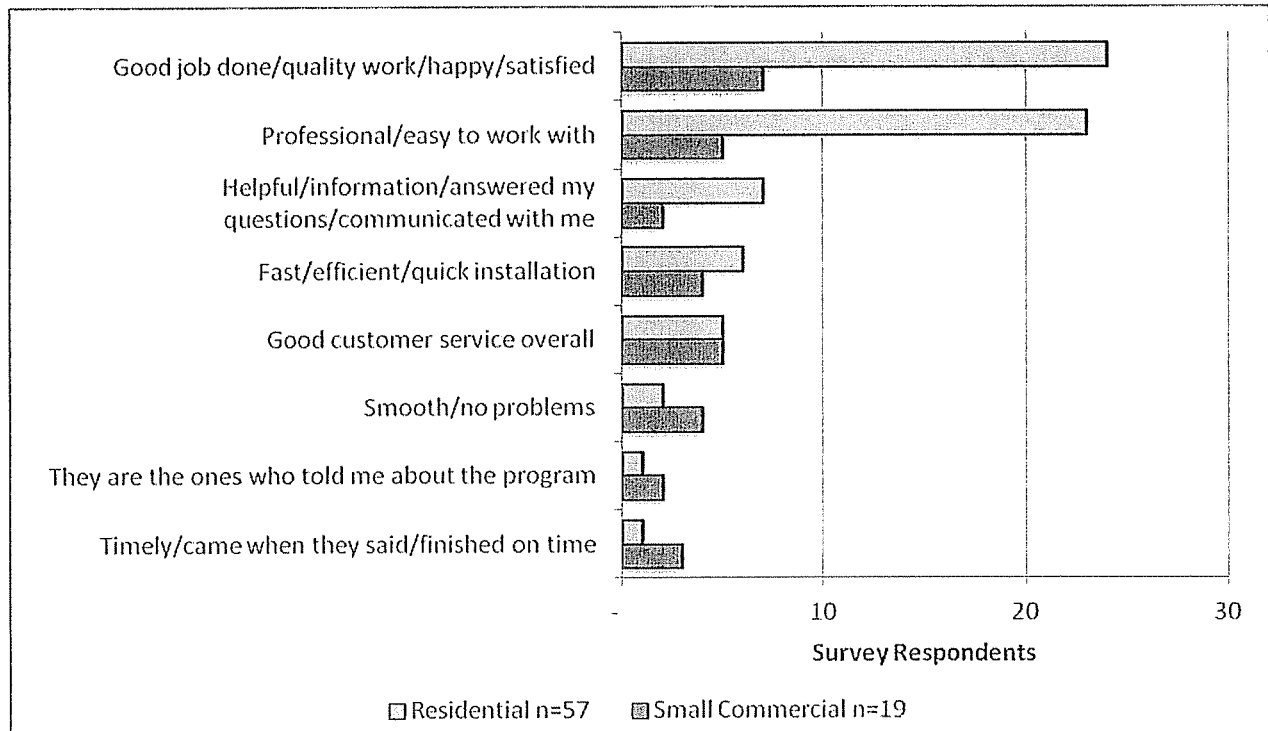
4.5 Program Satisfaction

Overall, participants and HVAC dealers were very satisfied with the HVAC Diagnostic and Tune-Up Program.

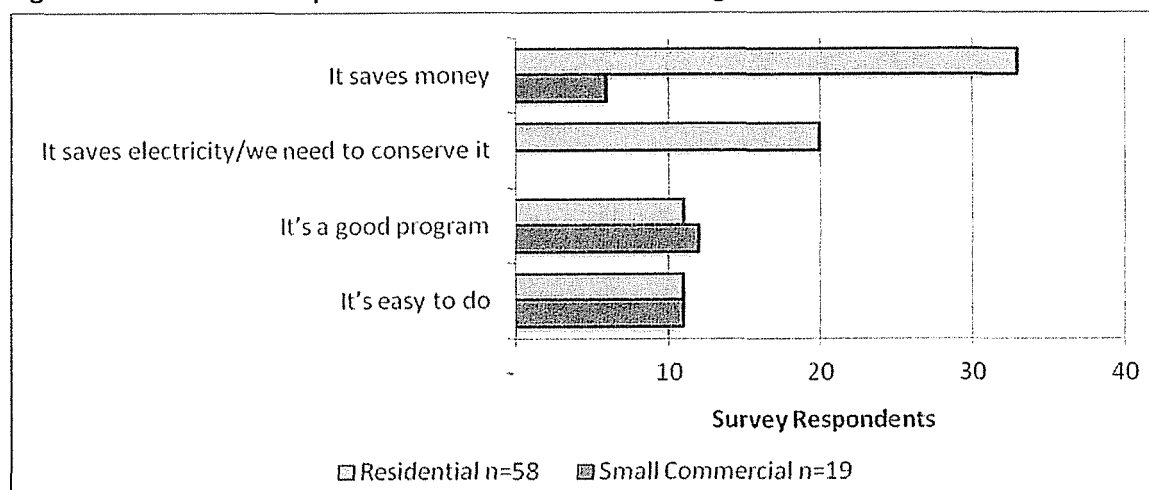
4.5.1 Participating Customer Satisfaction

The majority of participating customers surveyed (95 to 98 percent) would recommend their contractor to someone else. Forty-five (45) percent of residential and 21 percent of small commercial customers have already recommended them.

Figure 11 Reasons Participant Would Recommend their Contractor



One hundred (100) percent of residential and 95 percent of small commercial participating customers surveyed would recommend the program to others. Twenty (20) participating customers had already recommended the program. Participants noted that HVAC diagnostic and tune-up services save money and electricity.

Figure 12 Reasons Participant Would Recommend the Program

According to the participant survey, residential participating customers are the most satisfied with the program, particularly the contractor, incentive offered, interaction with Kentucky Power and response to requests for information/assistance on forms. Small commercial participating customers were somewhat or very satisfied with most aspects of the program. Based on the participant surveys, the areas that may be improved include:

- Residential and small commercial incentive processing time.
- Small commercial requests for information and assistance on forms.
- Small commercial interaction with Kentucky Power program staff.

Table 10 Residential Participant Satisfaction with the Program, n=58

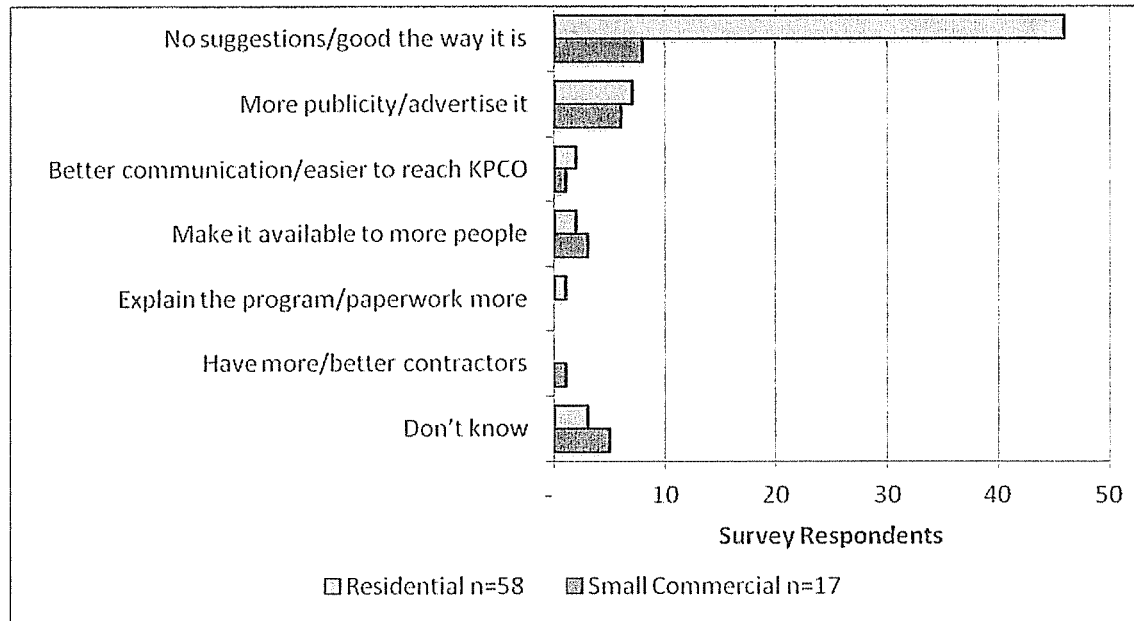
	N/A	Very Unsatisfied	Somewhat Unsatisfied	Neutral	Somewhat Satisfied	Very Satisfied
Contractor	0%	0%	0%	2%	2%	97%
Incentive processing time	7%	0%	0%	2%	14%	78%
Incentive offered	3%	0%	2%	0%	5%	90%
Interaction with KPCO staff	0%	0%	0%	0%	3%	97%
Response to requests for information/assistance on forms	3%	0%	0%	2%	2%	93%
Program overall	0%	0%	0%	0%	2%	98%

Table 11 Small Commercial Participant Satisfaction with the Program, n=19

	N/A	Very Unsatisfied	Somewhat Unsatisfied	Neutral	Somewhat Satisfied	Very Satisfied
Contractor	0%	0%	0%	5%	26%	68%
Incentive processing time	5%	5%	0%	5%	26%	58%
Incentive offered	0%	0%	0%	21%	32%	47%
Interaction with KPCO staff	37%	0%	5%	16%	5%	37%
Response to requests for information/assistance on forms	42%	5%	5%	5%	16%	26%
Program overall	0%	0%	0%	21%	37%	42%

Most participating customers surveyed felt that the HVAC Diagnostic and Tune-Up Program was good the way it is. However, some participants suggested increased publicity and advertising (see Figure 13). Small commercial customers recommended increasing the incentive.

Figure 13 Participant Suggestions for Program Improvement



4.5.2 Participating Dealer Satisfaction

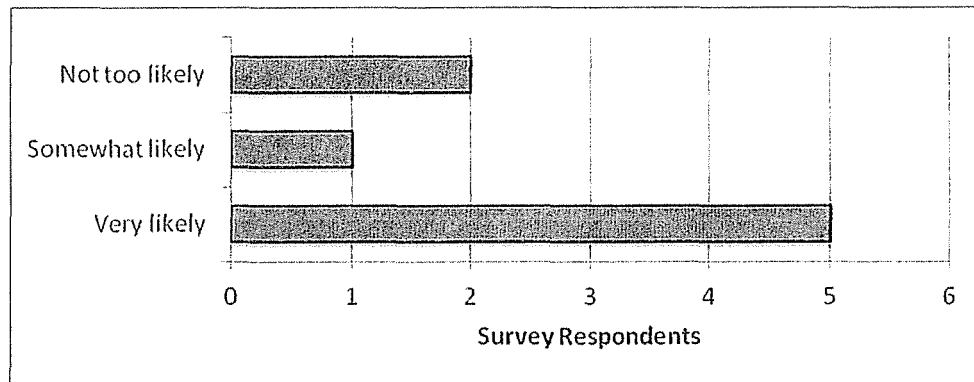
HVAC dealer participation was a key element to the HVAC Diagnostic and Tune-Up Program. Participating HVAC dealers promoted the program to eligible customers and performed the diagnostic and tune-up services on heat pumps/central air conditioners. Eighty to ninety (80 to 90) percent of participants surveyed noted that the HVAC dealer provided information that was a crucial factor in deciding to have HVAC diagnostic and tune-up services.

In 2010 and 2011, 23 out of 101 participating HVAC dealers received a rebate for participating in the HVAC Diagnostic and Tune-Up Program or the Small Commercial Heat Pump/Air Conditioner Program.¹¹ AEG conducted surveys of eight dealers that did not submit a rebate in 2011. According to these dealers, there were a variety of reasons for not submitting a rebate application, ranging from an illness causing a drop in work to not having many KPCO customers. Sixty-three (63) percent of these dealers think that it is very likely that they will submit a rebate application in 2012.

According to 86 percent of participating HVAC dealers surveyed, it is very likely that program participation will increase in 2012.

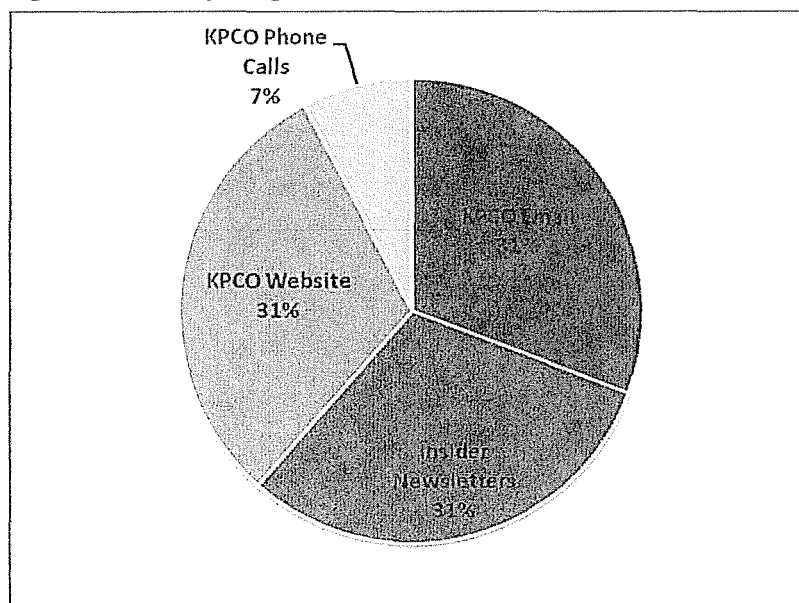
¹¹ The 101 participating HVAC dealers may also participate in the Residential Heat Pump/Air Conditioner Program. However, the Residential Heat Pump/Air Conditioner Program was not evaluated and these results pertain only to the HVAC Diagnostic and Tune-up Program and Small Commercial Heat Pump/Air Conditioner Program.

Figure 14 Likelihood of Non-Participating HVAC Dealer Submitting Rebate in 2012, n=8



It is very important to HVAC dealers that they are listed on the KPCO website as a participating dealer. Participating dealers prefer being notified of program updates via email, the KPCO program website and newsletters rather than via a phone call.

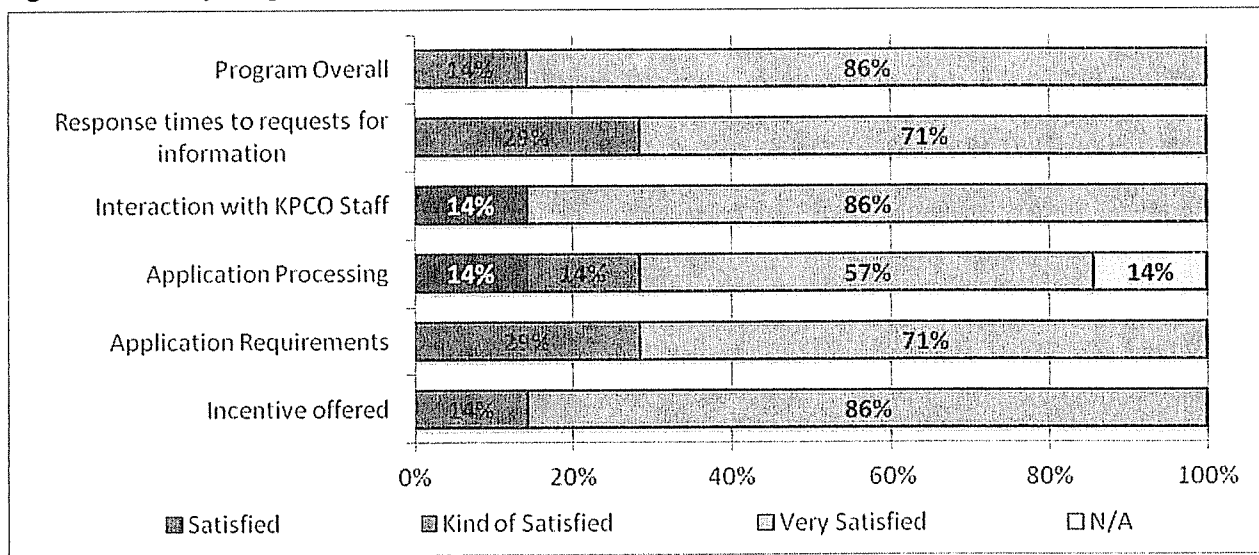
Figure 15 Participating HVAC Dealer Preferred Contact Medium, n=7



The participating HVAC dealers surveyed are satisfied with the program. The areas that may be improved include HVAC dealer interaction with KPCO program staff and application processing. Participating HVAC dealers recommended additional advertising and 'getting the information out.'

According to the HVAC dealers, the HVAC Diagnostic and Tune-Up Program was good for business.

Figure 16 Participating HVAC Dealer Satisfaction with the Program, n=7



5. Impact Evaluation Findings

Impact evaluations verify the energy and demand savings directly associated with a program and assess the cost-effectiveness of the DSM program.

5.1 Gross Energy and Demand Savings

AEG determined the gross energy and demand savings of a representative sample based on the International Performance Measurement and Verification Protocols ("IPMVP") Option A. Option A involves engineering calculations of gross savings using historical data. Engineering calculations referenced from the *State of Illinois Technical Reference Manual*, using Kentucky Power specific inputs, were utilized to calculate gross energy and demand impacts. Gross impacts were calculated for residential and small commercial central air conditioner and heat pump diagnostic and tune-up services. Unit characteristics (SEER, EER, HSPF, size, etc), collected from participating customers, were utilized to calculate the specific impacts for Kentucky Power participants.

The equations used to determine gross energy impacts are:

$$\text{Central Air Conditioner} = \frac{\text{EFLHcool} \times \frac{\text{Btu}}{\text{H}} \times \left(\frac{1}{\text{SEER}_{\text{cac}}} \right)}{1000} \times \text{MFe}$$

$$\text{Heat Pump} = \left(\frac{\text{EFLHheat} \times \frac{\text{Btu}}{\text{H}} \times \left(\frac{1}{\text{SEER}_{\text{hp}}} \right)}{1000} \times \text{MFe} \right) + \left(\frac{\text{EFLHheat} \times \frac{\text{Btu}}{\text{H}} \times \left(\frac{1}{\text{HSPF}_{\text{hp}}} \right)}{1000} \times \text{MFe} \right)$$

Where:

EFLHcool = annual cooling load hours

EFLHheat = annual heating load hours

Btu/H = size of equipment

$SEER$ = SEER efficiency of existing unit receiving maintenance

MFe = maintenance energy savings factor

The equations used to determine gross demand impacts for heat pumps are:

$$\text{Central Air Conditioner} = \frac{Btu}{H} \times \frac{1}{EER_{cac}} \times \frac{1}{1000} \times MFd \times \text{Coincidence Factor}$$

$$\text{Heat Pump} = \frac{Btu}{H} \times \frac{1}{EER_{hp}} \times \frac{1}{1000} \times MFd \times \text{Coincidence Factor}$$

Where:

Btu/H = size of equipment

EER = EER efficiency of existing unit receiving maintenance

MFd = maintenance demand savings factor

Coincidence Factor = 0.915

Table 12 2010-2011 Gross Savings per Unit, Residential

Measure	Gross Summer Savings per Unit (kW)	Gross Winter Savings per Unit (kW)	Gross Energy Savings per Unit (kWh)
Heat Pump Tune Up	0.05	0.20	607
Central Air Conditioner Tune Up	0.05	0.00	163

Table 13 2010-2011 Gross Savings per Unit, Small Commercial

Measure	Gross Summer Savings per Unit (kW)	Gross Winter Savings per Unit (kW)	Gross Energy Savings per Unit (kWh)
Heat Pump Tune Up	0.07	0.30	898
Central Air Conditioner Tune Up	0.09	0.00	297

Table 14 2010-2011 Total Gross Demand and Energy Savings, Residential

Measure	Gross Summer Savings (kW)	Gross Winter Savings (kW)	Gross Energy Savings (kWh)
Heat Pump Tune Up	35.50	148.04	443,195
Central Air Conditioner Tune Up	11.64	0.00	37,792
Program Total	47.15	148.04	480,987

Table 15 2010-2011 Total Gross Demand and Energy Savings, Small Commercial

Measure	Gross Summer Savings (kW)	Gross Winter Savings (kW)	Gross Energy Savings (kWh)
Heat Pump Tune Up	7.52	31.96	95,199
Central Air Conditioner Tune Up	4.21	0.00	13,661
Program Total	11.72	31.96	108,859

5.2 Net Energy and Demand Savings

Net energy and demand savings are the gross savings attributable to the HVAC Diagnostic and Tune-Up Program, not accounting for impacts resulting from other influences such as free ridership or spillover. Net impacts were calculated by applying a net-to-gross ("NTG") factor to gross impacts.

$$NTG \text{ Ratio} = 1 - \text{Free Ridership} + \text{Spillover}$$

Free ridership and spillover calculations are described in the following subsections. Based on the process evaluation survey results, AEG has determined the net-to-gross ratios to be 77 percent for residential participants and 78 percent for small commercial participants. Tables 16 and 17 present the net demand and energy savings achieved for residential and small commercial customers.

Table 16 2010-2011 Net Demand and Energy Savings, Residential

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)
Heat Pump Tune Up	77%	27.34	113.99	341,260
Central Air Conditioner Tune Up	77%	8.97	0.00	29,100
Program Total		36.30	113.99	370,360

Table 17 2010-2011 Net Demand and Energy Savings, Commercial

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)
Heat Pump Tune Up	78%	5.86	24.93	74,255
Central Air Conditioner Tune Up	78%	3.28	0.00	10,655
Program Total		9.15	24.93	84,910

5.2.1 Free Ridership

Free ridership estimates the HVAC diagnostic and tune-up services that would have occurred without the Kentucky Power incentive. Four questions in the participating customer survey were designed to determine the portion of a customer's savings that should be attributed to free ridership.

Question 1. If you had not received the Kentucky Power incentive, how likely is it you would have had this service performed on your equipment?

The more likely it was the participating customer would have performed the service on their equipment without the Kentucky Power incentive, the higher the probability that the customer was a free rider. For example, if a customer responded 'Very Likely,' free ridership probability ranged from 50 to 100 percent.

Question 2. How important was the Kentucky Power incentive in your decision to have this diagnostic and tune-up service performed on your _____ [central air conditioner/heat pump]?

The higher the importance of the Kentucky Power incentive on the customer's decision to have the diagnostic and tune-up service, the lower the probability that the customer was a free rider.

Question 3. Prior to learning about this program, did you have specific plans to schedule a diagnostic and tune-up of your _____ [central air conditioner/heat pump]?

Question 4. Was it necessary to change your plans to qualify for the program?

The final two questions indicate whether the customer had plans to have the service performed prior to participating in the HVAC Diagnostic and Tune-Up Program. Customers that had prior plans for tune-up services and did not have to change their plans to qualify for an incentive were likely to be free riders.

Each customer was assigned a value based on the probability that there was free ridership. Table 18 presents the free ridership probability scoring mechanism for Questions 1 and 2.

Table 18 Free Ridership Probability Scores, Questions 1 and 2

Q1 Response	Q2 Response	Min	Max	Estimate
Not Likely	Very Important	0%	0%	0%
Not Likely	Somewhat Important	0%	20%	10%
Not Likely	Slightly Important	0%	30%	15%
Not Likely	Not Important	0%	40%	20%
Somewhat likely	Very Important	30%	50%	40%
Somewhat likely	Somewhat Important	30%	60%	45%
Somewhat likely	Slightly Important	40%	70%	55%
Somewhat likely	Not Important	40%	80%	60%
Very likely	Very Important	50%	100%	75%
Very likely	Somewhat Important	60%	100%	80%
Very likely	Slightly Important	70%	100%	85%
Very likely	Not Important	80%	100%	90%

The retailer probability from Questions 1 and 2 was adjusted to account for whether the customer had plans to have the service performed prior to program participation (Questions 3 and 4).

Table 19 Free Ridership Probability Scores, Questions 3 and 4

Q3 Response	Q4 Response	Estimate
No		0%
Yes	Yes	5%
Yes	No	10%

$$\text{Free Ridership} = \text{Question 1\&2} + \text{Question 3\&4}$$

The weighted mean of the participant probabilities resulted in a free ridership estimate of 60 percent for residential customers (see Table 20) and 27 percent for commercial customers (see Table 21) and. Therefore, 27 percent of commercial customers and 60 percent of residential customers that received HVAC diagnostic and tune-up services through the HVAC Diagnostic Tune-Up Program would have received the services without the KPCO incentive.

Table 20 Free Ridership Weighted Probability, Residential

Free Rider Probability	Observations	Weight	Weighted Value
0%	10	0.17	0%
5%	1	0.02	0%
30%	1	0.02	1%
40%	4	0.07	3%
45%	6	0.10	5%
75%	5	0.09	6%
80%	7	0.12	10%
85%	14	0.24	21%
90%	7	0.12	11%
95%	1	0.02	2%
100%	2	0.03	3%
Free Ridership Estimate			61%

Table 21 Free Ridership Weighted Probability, Small Commercial

Free Rider Probability	Observations	Weight	Weighted Value
0%	8	0.42	0%
10%	3	0.16	2%
20%	1	0.05	1%
40%	1	0.05	2%
50%	1	0.05	3%
55%	1	0.05	3%
75%	2	0.11	8%
80%	1	0.05	4%
90%	1	0.05	5%
Free Ridership Estimate			27%

5.2.2 Spillover

Spillover estimates the additional diagnostic and tune-up services that were due to the influence of the HVAC Diagnostic and Tune-Up Program. One participating customer question was designed to determine the portion of a customer's savings that should be attributed to spillover.

Question 1. Since receiving your diagnostic and tune-up service have you replaced the air filter for the _____ [central air conditioner/heat pump]?

If participating customers replaced the air filter for their central air conditioner or heat pump, there was participant spillover. Therefore, if a participating customer responded 'No,' the probability that there was spillover was 0 percent.

Each customer was assigned a value based on the probability that there was spillover. Table 22 presents the spillover probability scoring mechanism.

Table 22 Spillover Probability Scores

Q1 Response	Min	Max	Estimate
No	0%	0%	0%
Yes	20%	60%	40%

The weighted mean of participant probabilities provided a spillover estimate of 37 percent for residential customers and 5 percent for small commercial customers (see Tables 23 and 24). Therefore, 37 percent of residential customers and 5 percent of small commercial that had HVAC diagnostic and tune-up services were influenced by the KPCO program to perform additional maintenance on their equipment.

Table 23 Spillover Weighted Probability, Residential

Spillover Probability	Observations	Weight	Weighted Value
0%	4	0.07	0%
40%	54	0.93	37%
Spillover Estimate			37%

Table 24 Spillover Weighted Probability, Small Commercial

Spillover Probability	Observations	Weight	Weighted Value
0%	15	0.88	0%
40%	2	0.12	5%
Spillover Estimate			5%

5.3 Program Site Inspections and Performance Verification

AEG accompanied participating HVAC dealers during the performance of the diagnostics and tune-ups for central air conditioners and heat pumps. The purpose was to conduct site inspections and performance verifications on eight projects to ensure proper diagnostic and tune-up performance, perform quality assurance/quality control, and verify application information of the rebated services.

The site inspections provided a representative sample of all program projects. Diagnostic and tune-ups of heat pumps and central air conditioners were conducted at all building types including residential, churches, and retail. Proper performance verification was confirmed at all locations.

5.4 Program Cost-Effectiveness

Cost-effectiveness analysis compares the costs and benefits derived from the program against a baseline of what could occur in the absence of the program. Cost-effectiveness analysis indicates whether the efficient technology(s) improve a customer's financial position, decrease overall energy costs to ratepayers, or raise society's well-being. A program is considered cost-effective if the benefit-cost ratio is greater than 1.0.

AEG analyzed the cost-effectiveness of the HVAC Diagnostic Program utilizing four standard cost-effectiveness tests taken from the California Standard Practices Manual.¹² Each test analyzes cost-effectiveness from a different perspective and answers a separate question:

- Participant Cost Test: Compares customer costs and benefits of installing the measure. Will the participant benefit over the life of the measure?
- Program Administrator Cost Test (Utility Cost Test): Comparison of program administrator costs to supply-side resource benefits. Will utility costs to save energy be less than utility costs to deliver the same amount of energy?
- Ratepayer Impact Measure: Measures the impact of the DSM program on utility rates if rates were to be adjusted to account for the program. Comparison of utility program costs and bill reductions associated with energy savings to supply-side resource benefits. Will customer rates increase?
- Total Resource Cost Test: Comparison of program administrator and customer costs to utility resource savings. Will the total costs of energy in the utility service territory decrease?

Results from the impact evaluation, utilizing IPMVP best practices, are utilized in the four cost-effectiveness tests taken from the California Standard Practices Manual.

¹² The California Standard Practices Manual details cost-effectiveness guidelines and procedures for standardized cost-effectiveness evaluations.

Kentucky Power specific inputs, including avoided costs, discounts rates, participation and incentives, were used to conduct the cost-effectiveness analysis. Bencost, an updated version of a public domain model that AEG customized for Kentucky Power, was utilized to perform the cost-effectiveness modeling (see Appendix E). Bencost is an input-output model that calculates all four cost-effectiveness tests. All program costs and benefits are discounted to present-day dollar values in order to accurately compare future benefits with current costs.

Table 25 Program Cost-Effectiveness Results, Residential

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	0.88	\$103,024	\$90,844	-\$12,180
Ratepayer Impact Measure Test	0.35	\$260,077	\$90,844	-\$169,234
Participant Cost Test	2.44	\$72,150	\$175,840	\$103,690
Total Resource Cost Test	0.71	\$127,074	\$90,844	-\$36,230

Table 26 Program Cost-Effectiveness Results, Small Commercial

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	0.75	\$27,618	\$20,645	-\$6,973
Ratepayer Impact Measure Test	0.32	\$63,625	\$20,645	-\$42,980
Participant Cost Test	3.57	\$11,400	\$40,686	\$29,286
Total Resource Cost Test	0.75	\$27,618	\$20,645	-\$6,973

Table 27 Measure Cost-Effectiveness Results, Residential

Test	Heat Pump Tune Up	Central Air Conditioner Tune Up	Program Total
Utility Cost Test	1.09	0.23	0.88
Ratepayer Impact Measure Test	0.38	0.16	0.35
Participant Cost Test	2.82	1.24	2.44
Total Resource Cost Test	0.88	0.19	0.71

Table 28 Measure Cost-Effectiveness Results, Small Commercial

Test	Heat Pump Tune Up	Central Air Conditioner Tune Up	Program Total
Utility Cost Test	0.96	0.25	0.75
Ratepayer Impact Measure Test	0.37	0.16	0.32
Participant Cost Test	4.22	2.07	3.57
Total Resource Cost Test	0.96	0.25	0.75

It needs to be noted that very low avoided costs, especially the extremely low capacity costs in the Kentucky Power service territory, have a significant negative impact on the program's cost-effectiveness. The 2012 Kentucky Power capacity cost is \$6/kW-year, compared to a PJM average of over \$100/kW-year. This cost differential partially accounts for the low benefit-cost ratios.

Program cost-effectiveness was also greatly affected by the incentive paid to participating contractors.¹³ The inclusion of central air conditioner tune-ups also drive the cost-effectiveness of the program down. With the reduction of contractor incentive to \$25 per tune-up and the removal of central air conditioner tune-ups, both the residential and commercial programs would be cost-effective and pass the TRC test. Tables 29 and 30 provide the cost-effectiveness if the contractor incentives are reduced to \$25 per tune-up and central air conditioner tune-ups are removed.

Table 29 Program Cost-Effectiveness Results if Contractor Incentive Reduced & CAC Removed, Residential

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	1.32	\$64,324	\$85,062	\$20,738
Ratepayer Impact Measure Test	0.41	\$209,037	\$85,062	-\$123,975
Participant Cost Test	2.82	\$54,750	\$154,203	\$99,453
Total Resource Cost Test	1.03	\$82,574	\$85,062	\$2,488

Table 30 Program Cost-Effectiveness Results if Contractor Incentive Reduced & CAC Removed, Small Commercial

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	1.10	\$16,819	\$18,528	\$1,709
Ratepayer Impact Measure Test	0.38	\$48,307	\$18,528	-\$29,780
Participant Cost Test	4.22	\$7,950	\$33,561	\$25,611
Total Resource Cost Test	1.10	\$16,819	\$18,528	\$1,709

Going forward, reducing contractor incentives in the HVAC Diagnostics and Tune-Up Program is vital to reaching acceptable cost-effectiveness levels. If the contractor incentives are reduced and central air conditioner tune-ups are removed, the program will be cost-effective and have a positive impact on the Kentucky Power service territory.

Although the HVAC Diagnostics and Tune-Up Program did not have a cost-effectiveness ratio greater than 1.0, the entire portfolio being evaluated is cost-effective in 2011. Table 16 provides the cost-effectiveness for the 2010-2012 Demand Side Management Program Portfolio being evaluated by AEG.¹⁴

Table 31 Kentucky Power Portfolio Cost-Effectiveness Results, 2011

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	2.13	\$720,104	\$1,533,730	\$813,626
Ratepayer Impact Measure Test	0.44	\$3,507,956	\$1,533,730	-\$1,974,227
Participant Test	5.13	\$486,703	\$2,499,101	\$2,012,397
Total Resource Cost Test	1.57	\$975,217	\$1,533,730	\$558,512

¹³ Contractors receive a direct payment of \$50 for every tune-up they perform.

¹⁴ The 2010-2012 Demand Side Management Program Portfolio being evaluated includes the Small Commercial Heat Pump/Air Conditioner Program, Residential Efficient Products Program, Commercial Incentive Program, and Residential and Small Commercial HVAC Diagnostic and Tune-Up Program.

6. Key Findings and Recommendations

6.1 Key Program Findings

The stated goal of the HVAC Diagnostic and Tune-Up Program is to reduce energy use by conducting a diagnostic performance check on residential and small commercial unitary air conditioning and heat pump units, air restricted indoor and outdoor coils, and over and under refrigerant charge.

6.1.1 Program Performance Indicators

In 2010 and 2011, Kentucky Power rebated 1,143 residential and small commercial diagnostic and tune-ups through the HVAC Diagnostic and Tune-Up Program. Sixty-six (66) percent of the systems were residential heat pumps, 20 percent residential central air conditioners, 9 percent small commercial heat pumps and 4 percent small commercial central air conditioners. The program was approved in August 2010, two months later than anticipated in the Kentucky PSC filing, and implemented in September.

KCPO achieved 22 percent of the 130 participant goal in 2010 at an actual cost per participant lower than originally budgeted. The program exceeded the 700 participant goal in 2011 by approximately 60 percent. However, small commercial cost per participant was higher than originally budgeted.

Table 32 Program Participation, Goals Originally Filed and Actual

	2010		2011	
	Goal	Actual	Goal	Actual
Residential CAC	60	0	325	232
Residential HP	40	28	215	730
Small Commercial CAC	26	0	136	46
Small Commercial HP	4	1	24	106
Total	130	29	700	1,114

In 2010 and 2011, 23 out of 101 participating HVAC dealers participated in the HVAC Diagnostic and Tune-Up Program or Small Commercial Heat Pump/Air Conditioner Incentive Program. The three most active HVAC dealers performed 69 percent of the diagnostic and tune-up services. HVAC dealers surveyed noted that the KPCO dealer incentives and being listed on the KPCO website as a participating dealer were significant motivators for participation.

6.1.2 Program Tracking

The program tracking and monitoring system accurately tracks program data and processes rebates. However, participating customers surveyed noted that incentive processing times could be improved.

6.1.3 Program Awareness and Marketing Strategies

The marketing strategy for the program included a combination of Kentucky Power program staff and participating HVAC dealers. KPCO staff promoted the programs directly to HVAC dealers and, in turn, the participating dealers were expected to promote the program to eligible customers.

According to survey respondents, customers most often learned of the program from a Kentucky Power employee, followed closely by the heating and cooling contractor. Contractor recommendations were

the primary reason for customer participation. Eight-five (85) to 95 percent of participating customers surveyed noted that information from the contractor was a crucial factor in their decision to have HVAC diagnostic and tune-up services. Participating customers and HVAC dealers surveyed noted that the program would benefit from increased publicity and advertising.

6.1.4 Best Practices

Kentucky Power's program design and processes are largely consistent with best practices for similar energy efficiency programs. In 2011, HVAC tune-ups or controls upgrades were featured in 39 percent of residential energy efficiency programs and 48 percent of commercial programs.¹⁵

The challenges posed by lack of information are ubiquitous in energy efficiency programs. Investment in education and outreach typically boost awareness and increase program participation. Actively engaging key stakeholders, such as HVAC contractors or home/business owners, is crucial to the success of any energy efficiency program.

Many energy efficiency programs suffer from lack of staff resources. Additional staff personnel may be necessary to ensure that program goals are met and that the program delivers the intended results. The increased program costs of additional staff are often recouped by improved performance.

6.1.5 Verify Program Impacts

AEG has determined the net-to-gross ratio for the HVAC Diagnostic and Tune-Up Program is 78 percent for small commercial customers and 77 percent for residential customers. Participating small commercial customer probabilities free ridership was estimated at 27 percent and spillover at 5 percent. Residential customer free ridership was estimated at 60 percent and spillover at 37 percent. Tables 32 and 33 present the net energy savings and cost-effectiveness ratios for residential and small commercial, respectively.

Program cost-effectiveness was greatly affected by the incentives paid to participating contractors. The inclusion of central air conditioner tune-ups also drive the cost-effectiveness of the program down. With the reduction of the contractor incentive to \$25 and the removal of the central air conditioner tune-ups, both the residential and commercial programs would be cost-effective and pass the TRC test. Note that very low avoided costs, especially the extremely low capacity costs in the Kentucky Power service territory, have a significant negative impact on the program's cost-effectiveness.

Table 33 2011 Energy Savings by Equipment Type, Residential

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)	TRC
Heat Pump Tune Up	77%	27.34	113.99	341,260	0.88
Central Air Conditioner Tune Up	77%	8.97	0.00	29,100	0.19
Program Total		36.30	113.99	370,360	0.71

¹⁵ Consortium for Energy Efficiency. (2011) *State of the Efficiency Program Industry*. See www.cee1.org/files/2011%20CEE%20Annual%20Industry%20Report.pdf

Table 34 2011 Energy Savings by Equipment Type, Small Commercial

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)	TRC
Heat Pump Tune Up	78%	5.86	24.93	74,255	0.96
Central Air Conditioner Tune Up	78%	3.28	0.00	10,655	0.25
Program Total		9.15	24.93	84,910	0.75

AEG accompanied participating HVAC contractors during the performance of the diagnostics and tune-ups for air conditioners and heat pumps. Proper performance verification was confirmed at all locations.

6.2 Recommendations

AEG has several recommendations on how to improve the program. These include:

6.2.1 Hire Implementation Contractor

AEG recommends that Kentucky Power hire an implementation contractor to implement Kentucky Power's residential and small commercial HVAC programs, including, but not limited to, the Residential and Small Commercial HVAC Diagnostic and Tune-Up Program, the Small Commercial Heat Pump/Air Conditioner Incentive Program, the Residential High Efficiency Heat Pump Program, Mobile Home High Efficiency Heat Pump, and Mobile Home New Construction.

Kentucky Power has a small staff to run and oversee Kentucky Power's numerous energy efficiency programs. Some of the KPCO programs have implementation contractors that perform the day-to-day operations for the program, but the residential and small commercial HVAC programs are run completely by KPCO staff. Therefore, KPCO staff is responsible for marketing and promotional activities, including visiting participating and potential HVAC dealers across the KPCO territory, processing rebate applications, tracking rebate applications and performing QA/QC inspections. Due to the limited resources, Kentucky Power has not yet conducted an inspection to ensure services are being performed properly.

The residential and small commercial HVAC programs share many similar components, including marketing and promotional activities and data tracking systems as well as the same participating HVAC dealers. Utilizing one implementation contractor to implement the HVAC programs will allow the programs to continue capitalizing on their similarities and increase the efficiency of program processes.

The implementation contractor will have, at a minimum, the following responsibilities:

- Develop program goals and budget.
- Develop marketing and promotional activities.
- Design and maintain a data tracking system.
- Process customer and contractor rebate applications.
- Engage and monitor participating HVAC dealers.
- Develop QA/QC procedures and conduct random inspections of completed work.

6.2.2 Consider Program Modifications

AEG recommends that Kentucky Power and the implementation contractor consider modifying the HVAC Diagnostic and Tune-Up Programs:

- Reduce the participating HVAC dealer incentives to \$25 (from the current \$50 incentive).
- Remove central air conditioner tune-ups from the program offering.
- Reduce the customer incentive to \$30 (from the current \$50 incentive).

Program cost-effectiveness was negatively affected by the incentives paid to HVAC dealers and the inclusion of central air conditioner tune-ups. The residential and commercial programs are cost-effective if the participating HVAC dealer incentive is reduced and central air conditioner tune-ups removed. Note that these modifications may not be necessary if there are program budgetary changes or changes to Kentucky Power's avoided costs.

Residential HVAC Diagnostic and Tune-Up Program free ridership is estimated at 60 percent. The program was designed such that the participating HVAC dealers promote the program to eligible customers. Therefore, participating HVAC dealers are likely to initially provide the diagnostic and tune-up services to existing clientele that may typically receive these services without an incentive, and then begin to promote the program to new clientele. Therefore, free ridership is anticipated to decrease as HVAC dealers promote the program to new clientele.

AEG recommends additional modifications to reduce free ridership:

- Modify customer eligibility. Customers are currently eligible for a rebate every 3 years, this should be extended to every 5 years to correspond with the measure life of the services.
- Require the customer to submit the rebate application. Other than receiving the diagnostic and tune-up service, the customer does not have to take any action to receive the incentive.
- KPCO market directly to residential customers and encourage HVAC dealers to market to customers that do not consistently receive these tune-up services.

6.2.3 Engage Participating HVAC Dealers

AEG recommends that Kentucky Power and the implementation contractor actively engage participating HVAC dealers and remove non-participating HVAC dealers from the participating HVAC dealer list if they have not actively participated in a KPCO HVAC program within the most recent 12 months.

HVAC dealer participation is crucial to the program; 92 percent of survey respondents noted that information from the HVAC dealer was a crucial factor in their decision to purchase and install efficient HVAC equipment. There are currently 101 HVAC dealers participating in the HVAC Diagnostic programs. In 2010 and 2011, only 23 dealers participated in the HVAC Diagnostic and Tune-Up Program or the Small Commercial Heat Pump/Air Conditioner Incentive Program.

AEG recommends collaboration between Kentucky Power and the implementation contractor to engage HVAC dealers and explore modifying the marketing and promotional activities. Kentucky Power and the implementation contractor should explore cooperative marketing with the participating HVAC dealers to

potentially leverage their marketing experience. Cooperative marketing would be offered on a temporary basis and the impact on participation reviewed before permanent changes were made to the program.

Appendix A. Participating Dealer Survey Guide (a)

Good morning/afternoon/evening, I'm _____ with Applied Energy Group. We are conducting a survey of Kentucky Power's HVAC Diagnostic and Tune-Up Program and Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program. I'd like to talk with you about your experience with the programs and get some feedback. This is NOT a sales effort, but for research purposes only. The survey should take about 10 minutes. All comments will remain confidential.

According to our records, you ARE currently participating in one or both of these programs as a participating dealer. Is that correct?

- Yes 1 (CONTINUE)
 No 2 (THANK THEM FOR THEIR TIME AND END CALL)
 Don't Know 3 (ASK TO SPEAK WITH SOMEONE KNOWLEDGEABLE ABOUT THE PROGRAM, THEN REPEAT INTRO)

If the dealer does not recall the program(s): "These programs provide incentives to residential and small business customers to purchase and install energy efficient HVAC equipment and/or receive diagnostic and tune-up service for their heating or cooling equipment."

Program Awareness and Participation

1. Which Kentucky Power program is your company involved with?
 - a) HVAC Diagnostic and Tune-Up Program **(3)**
 - b) Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program
 - c) Both **(4)**
2. How did you first learn about the program(s)? Mark all mentioned
 - a) Kentucky Power employee **(7)**
 - b) KentuckyPower.com
 - c) gridSMART
 - d) News Article
 - e) Customers
 - f) Email
 - g) Word of Mouth (business associates)
 - h) Trade Association
 - i) Supplier
 - j) Community event/meeting/presentation
 - k) Don't Know **(1)**
3. Why did you decide to participate in the program(s)?

"Good for customers" (6)

"It's a good way to help the customers." (1)

"Good outreach to customers (helps sell)" (1)

"Good for business." (1)
4. How long have you been involved in the program(s)? Read answer categories
 - a) Less than 1 Month
 - b) 1 – 3 Months
 - c) 4 – 6 Months **(1)**
 - d) More than 6 Months **(4)**
 - e) Unsure **(2)**

Program Performance

5. About how many projects have you completed for the....
- HVAC Diagnostic and Tune-Up Program **(n/a)**
 - Small Commercial High Efficiency Heat Pump/Air Conditioner Program **(n/a)**
6. What type of equipment is installed/serviced *most frequently* under the....
- HVAC Diagnostic and Tune-Up Program **("Heat Pump" 4)**
 - Small Commercial High Efficiency Heat Pump/Air Conditioner Program **("Heat Pump" 1)**
7. How influential have the customer program incentives been in moving projects forward in 2011?
Read answers
- Very influential **(2)**
 - Somewhat influential **(5)**
 - Not too influential
 - Not at all influential
8. About what percentage of your 2011 business can be attributed to the Kentucky Power programs?
"15 to 20 percent." (2)
9. Besides the customer incentive, what are the main factors driving program participation for customers? Read answers, mark all that apply
- Energy savings **(5)**
 - Comfort **(2)**
 - Environmental issues **(1)**
 - The bottom line **(1)**
 - Other **"Bill Savings" (4)**
10. Thinking about the future, how likely is it that program participation will increase among customers in 2012? Read answer categories
- Very likely **(6)**
 - Somewhat likely
 - Not too likely **(1)**
 - Not at all likely
11. Do you usually complete and submit the customer rebate form on the customer's behalf?
- Yes **(6)**
 - No
"Not all the time"

Program Satisfaction

12. Please rate your satisfaction with the following program components on a five-point scale, where "1" means "Not at all satisfied" and "5" means "Very satisfied." How satisfied are you with the:

	1	2	3	4	5	Don't Know/Refused
a) Incentive offered				1	6	
b) Application Requirements				2	5	
c) Application Processing			1	1	4	
d) Interaction with Kentucky Power			1		6	
e) Response times to requests for information				2	5	
f) Program overall				1	6	

Comments (verbatim)

"Kentucky Power staff is hard to get in touch with"

13. How important was the dealer incentive in getting you to participate in the program? Read answers

- a) Very important **(4)**
- b) Somewhat important **(2)**
- c) Not too important **(1)**
- d) Not at all important

14. What changes should be made to the program to make it more attractive to customers?

"Getting the information out."

"Less time to requalify, as of now there is a 3 year wait between services."

"Overall look at house instead of just heat pump."

Communication with Kentucky Power

15. How important is it to you that your company is listed on the Kentucky Power website as a participating program dealer? Read answers

- a) Very important **(6)**
- b) Somewhat important
- c) Not too important **(1)**
- d) Not at all important

16. What other types of marketing assistance from Kentucky Power would be helpful to your company in selling energy efficient equipment or services?

"Mail box stuffer" (1)

17. What is your preferred medium of contact from Kentucky Power for program updates or information about program? Read answers

- a) Emails from Kentucky Power **(4)**
- b) Insider newsletters **(4)**
- c) Kentucky Power website **(4)**
- d) Calls from Kentucky Power **(1)**

18. What are your primary sources of information on energy efficiency equipment and services?

- a) Online **(5)**
- b) Publications **(2)**
- c) Trade shows **(1)**
- d) Other ***"Magazines"*** **(1)**

Dealer Demographics

Finally, I'd like to ask you a couple of questions about your business.

19. How long have you been in business?

20. How many employees do you have?

Thank you for taking the time to answer my questions.

Appendix B. Participating Dealer Survey Guide (b)

Good morning/afternoon/evening, I'm _____ with Applied Energy Group. We are conducting a survey of Kentucky Power's HVAC Diagnostic and Tune-Up Program and Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program. I'd like to talk with you about your experience with the programs and get some feedback. This is NOT a sales effort, but for research purposes only. The survey should take about 10 minutes. All comments will remain confidential.

According to our records, you ARE a Kentucky Power participating dealer. Is that correct?

- Yes 1 (CONTINUE)
 No 2 (THANK THEM FOR THEIR TIME AND END CALL)
 Don't Know 3 (ASK TO SPEAK WITH SOMEONE KNOWLEDGEABLE ABOUT THE PROGRAM, THEN REPEAT INTRO)

If the dealer does not recall the program(s): "These programs provide incentives to residential and small business customers to purchase and install energy efficient HVAC equipment and/or receive diagnostic and tune-up service for their heating or cooling equipment."

Program Awareness and Participation

1. How did you first learn about the program(s)? Mark all mentioned
 - a) Kentucky Power employee (5)
 - b) KentuckyPower.com (1)
 - c) gridSMART
 - d) News Article
 - e) Customers (1)
 - f) Email (1)
 - g) Word of Mouth (business associates) (1)
 - h) Trade Association
 - i) Supplier (1)
 - j) Community event/meeting/presentation
 - k) Don't Know (2)
2. Why did you decide to participate in the program(s)?

"Good program/good program for customers" (6)
"Rebates" (1)
3. How long have you been involved in the program(s)? Read answer categories
 - a) Less than 1 Month
 - b) 1 – 3 Months
 - c) 4 – 6 Months
 - d) More than 6 Months (8)

Program Performance

4. Do you perform HVAC diagnostic and tune-up services for residential or small commercial customers in Kentucky Power service territory?
 - a) Yes (7)
 - b) No (1)
5. Do you install energy efficient heat pumps or central air conditioners for small commercial customers in Kentucky Power service territory?
 - a) Yes (7)
 - b) No (1)

Continue If answered 'YES'toQ4 or Q5. Otherwise, go to Q8.

6. Why have you not submitted any rebate applications?

"Not many accounts with Kentucky Power." (1)

"The tune-ups are hard to do. The people do not feel like doing the paperwork."(1)

"Haven't had anyone who has wanted it yet." (1)

"We have" (2)

"Sick" (2)

"Not Sure" (1)

7. How likely do you think it is that your company will submit a rebate application in 2012? READ ANSWERS

a) Very likely **(5)**

b) Somewhat likely **(1)**

c) Not too likely **(2)**

d) Not at all likely

Dealer Demographics

Finally, I'd like to ask you a couple of questions about your business.

8. How long have you been in business?

9. How many employees do you have?

Appendix C. Participating Residential Customer Survey Guide

Good morning/afternoon/evening, I'm _____ with Applied Energy Group. We are conducting a survey of Kentucky Power's HVAC Diagnostic and Tune-Up Program. I'd like to talk with you about your impression of the program and get some feedback. This is NOT a sales effort, but for research purposes only. The survey should only take 10 minutes. All comments will remain confidential.

According to our records, you participated in the HVAC Diagnostic and Tune-Up Program. Were you involved with the decision to participate in this program or is there someone else in your household who made that decision?

Involved with/made decision 1 (CONTINUE)

Someone else decided 2 (ASK TO SPEAK TO THAT PERSON, REPEAT INTRO)

If the customer does not recall the program: "The program provides rebates to customers who receive diagnostic and tune-up service for their heating or cooling equipment."

Program Participation

1. Did you receive a tune-up and diagnostic service for your:
 - a) Central air conditioner (go to Q2) **(5)**
 - b) Heat Pump (go to Q3) **(25)**
 - c) Both (ask Q2 & Q3) **(28)**
2. How many incentives did you receive for your air conditioner diagnostic and tune-up service?
 - a) 1 **(31)**
 - b) 2 **(1)**
3. How many incentives did you receive for your heat pump diagnostic and tune-up service?
 - a) 1 **(48)**
 - b) 2
4. How did you first become aware of the HVAC Diagnostic and Tune-Up Program? *First mention*
 - a) Participating HVAC Dealer **(21)**
 - b) Kentucky Power employee **(23)**
 - c) KentuckyPower.com
 - d) Email
 - e) News Article **(6)**
 - f) Kentucky Power Bill Insert **(7)**
 - g) Word of Mouth (Friend / Neighbor) **(5)**
 - h) Community event/meeting/presentation **(1)**
 - i) Don't Know/refused **(1)**

Free Ridership/Spillover

5. Prior to learning about this program, did you have specific plans to schedule a diagnostic and tune-up of your _____ [central air conditioner/heat pump]?
 - a) Yes **(34)**
 - b) No (go to Q8) **(24)**
6. Was it necessary to change your plans to qualify for the program?
 - a) Yes **(44)**
 - b) No (go to Q8) **(14)**
7. What changes were made? *Probe for timing and quantity/type of service*

"Compressors were put in."

"A valve was broken on the heat pump, so that was fixed."

"Found black mold in unit so they put a lot that kills bacteria."

8. If you had not received the Kentucky Power incentive, how likely is it you would have had this service performed on your equipment? Read answer categories
 - a) Very likely **(36)**
 - b) Somewhat likely **(10)**
 - c) Not likely **(11)**
 - d) Don't know/refused **(1)**
9. How important was the Kentucky Power incentive in your decision to have this diagnostic and tune-up service performed on your _____ [central air conditioner/heat pump]? Read answer categories
 - a) Very important **(38)**
 - b) Somewhat important **(15)**
 - c) Not too important **(1)**
 - d) Not important at all **(4)**
10. Since receiving your diagnostic and tune-up service have you replaced the air filter for the _____ [central air conditioner/heat pump]?
 - a) Yes **(54)**
 - b) No **(4)**

Program Awareness

11. Why did you decide to participate in this program? Mark all that apply – DO NOT READ
 - a) Contractor recommended it **(45)**
 - b) Needed diagnostic and tune-up services for the cooling/heating system **(14)**
 - c) Wanted to save money **(11)**
 - d) Seemed like a good deal/offer from Kentucky Power **(3)**
 - e) Wanted to save energy
12. Was the information you received from an HVAC dealer [contractor] a crucial factor in the decision to have diagnostic and tune-up service performed at the time you did?
 - a) Yes **(48)**
 - b) No **(9)**
13. About how long did it take to receive the incentive, from the time the diagnostic and tune-up service was performed until you received the rebate? Read answer categories
 - a) Less than one month **(31)**
 - b) 4 to 6 weeks **(16)**
 - c) 6 to 8 weeks **(3)**
 - d) More than 8 weeks **(2)**
 - e) Don't know/refused **(6)**

Customer Satisfaction

14. Please rate your satisfaction with the following program components on a five-point scale, where "5" means "Very Satisfied" and "1" means "Very Dissatisfied." How satisfied are you with the:

	1	2	3	4	5	Don't Know	N/A
a) Contractor who performed the work			1	1	56		
b) Incentive processing time			1	8	45		4
c) Incentive offered		1		3	52		2
d) Interaction with Kentucky Program staff				2	56		

e) Response times to requests for information/assistance on forms			1	1	54		2
f) Program overall			1	1	57		

15. Would you recommend this contractor to someone else?

- a) Yes **(57)**
- b) No **(1)**

16. Why do you say that? Mark all that apply

- a) Good job done/quality work/happy/satisfied **(24)**
- b) Professional/easy to work with **(23)**
- c) Helpful/information/answered my questions/communicated with me **(7)**
- d) Fast/efficient/quick installation **(6)**
- e) Smooth/no problems **(2)**
- f) Timely/came when they said/finished on time **(1)**
- g) Good customer service overall **(5)**
- h) Have already recommended them **(26)**
- i) They are the ones who told me about the program **(1)**
- j) Don't know/refused **(1)**

17. Based on your experience, would you recommend this program to others?

- a) Yes **(57)**
- b) No

18. Why do you say that? Mark all that apply

- a) It saves electricity/we need to conserve it. **(20)**
- b) It saves money. **(33)**
- c) It's easy to do. **(11)**
- d) It's a good program. **(11)**
- e) I have recommended it. **(19)**
- f) People I recommended it to haven't been able to get into the program.
"Good rebate."

19. How could the Kentucky Power program be improved?

- a) Make it available to more people **(2)**
- b) More publicity/advertise it **(7)**
- c) Have more/better contractors on your list
- d) Faster processing of applications
- e) Explain the program/paperwork more **(1)**
- f) Better communication/easier to reach people at Kentucky Power **(2)**
- g) No suggestions/good the way it is **(46)**
- h) Don't know/refused **(3)**

Customer Demographics

Finally, I'd like to ask you a few questions for demographic purposes only.

20. Do you live in a _____ Read List

- a) Single family attached or detached building **(47)**
- b) Multifamily building with two or more units **(2)**
- c) Mobile home **(9)**

21. Do you own or rent your home?

- a) Own **(56)**
- b) Rent **(1)**

Thank you for taking the time to answer my questions!

Appendix D. Participating Small Commercial Customer Survey Guide

Good morning/afternoon/evening, I'm _____ with Applied Energy Group. We are conducting a survey of Kentucky Power's HVAC Diagnostic and Tune-Up Program. I'd like to talk with you about your impression of the program and get some feedback. This is NOT a sales effort, but for research purposes only. The survey should only take 10 minutes. All comments will remain confidential.

According to our records, you participated in the HVAC Diagnostic and Tune-Up Program. Were you involved with the decision to participate in this program or is there someone else in your business that made that decision?

Involved with/made decision 1 (CONTINUE)

Someone else decided 2 (ASK TO SPEAK TO THAT PERSON, REPEAT INTRO)

If the customer does not recall the program: "The program provides rebates to customers who receive diagnostic and tune-up service for their heating or cooling equipment."

1. How would you classify your type of business? Read answer categories

- a) Big Box
- b) Restaurant **(1)**
- c) Hotel
- d) Office **(7)**
- e) Retail **(4)**

Government

Independent Company

Rental

Church

Program Participation

2. Did you receive a tune-up and diagnostic service for your:

- a) Central air conditioner (go to Q3) **(2)**
- b) Heat Pump (go to Q4) **(3)**
- c) Both (ask Q3 & Q4) **(14)**

3. How many incentives did you receive for your air conditioner diagnostic and tune-up service?

- a) 1 **(14)**
- b) 2 **(2)**

4. How many incentives did you receive for your heat pump diagnostic and tune-up service?

- a) 1 **(10)**
- b) 2 **(4)**

5. How did you first become aware of the HVAC Diagnostic and Tune-Up Program? Indicate first mention

- a) Participating HVAC Dealer **(3)**
- b) Kentucky Power employee **(5)**
- c) KentuckyPower.com
- d) News Article
- e) Email
- f) Kentucky Power Bill Insert
- g) Word of Mouth **(2)**
- h) Community event/meeting/presentation
- i) Don't Know/refused **(6)**

American Standard**Free Ridership/Spillover**

6. Prior to learning about this program, did you have specific plans to schedule a diagnostic and tune-up of your _____ [central air conditioner/heat pump]?
 - a) Yes **(2)**
 - b) No (go to Q9) **(17)**
7. Was it necessary to change your plans to qualify for the program?
 - a) Yes
 - b) No (go to Q9) **(5)**
8. What changes were made? Probe for timing and quantity/type of service
9. If you had not received the Kentucky Power incentive, how likely is it you would have had this service performed on your equipment? Read answer categories
 - a) Very likely **(4)**
 - b) Somewhat likely **(3)**
 - c) Not likely **(12)**
10. How important was the Kentucky Power incentive in your decision to have this diagnostic and tune-up service performed on your _____ [central air conditioner/heat pump]? Read answer categories
 - a) Very important **(12)**
 - b) Somewhat important **(5)**
 - c) Only slightly important **(1)**
 - d) Not important at all **(1)**
11. Since receiving your diagnostic and tune-up service have you replaced the air filter for the _____ [central air conditioner/heat pump]?
 - a) Yes **(2)**
 - b) No **(15)**
 - c) Don't know/refused **(2)**

Program Awareness

12. Why did you decide to participate in the program? Mark all that apply – DO NOT READ
 - a) Contractor recommended it **(12)**
 - b) Needed diagnostic and tune-up services for the cooling/heating system **(1)**
 - c) Wanted to save money **(7)**
 - d) Seemed like a good deal/offer from Kentucky Power **(3)**
 - e) Wanted to save energy **(1)**
 - f) Don't Know **(1)**
13. Was the information you received from an HVAC dealer [contractor] a crucial factor in the decision to have diagnostic and tune-up service performed at the time you did?
 - a) Yes **(17)**
 - b) No
 - c) Don't Know/refused **(1)**
14. About how long did it take to receive the incentive, from the time the diagnostic and tune-up services were performed until you received the rebate? Read answer categories
 - a) Less than one month **(10)**
 - b) 4 to 6 weeks **(1)**
 - c) 6 to 8 weeks
 - d) More than 8 weeks **(2)**

- e) Don't know/refused **(6)**

Customer Satisfaction

15. Please rate your satisfaction with the following program components on a five-point scale, where "5" means "Very Satisfied" and "1" means "Very Dissatisfied." How satisfied are you with the:

	1	2	3	4	5	Don't Know	N/A
a) Contractor who performed the work			1	5	13		
b) Incentive processing time			1	5	11		1
c) Incentive offered			4	6	9		
d) Interaction with Kentucky Program staff		1	3	1	7		7
e) Response times to requests for information/assistance on forms		1	1	3	5		8
f) Program overall			4	7	8		

16. Would you recommend the contractor to someone else?

- a) Yes **(18)**
 b) No
 c) Don't know/refused **(1)**

17. Why do you say that? Mark all that apply

- a) Good job done/quality work/happy/satisfied **(7)**
 b) Professional/easy to work with **(5)**
 c) Helpful/information/answered my questions/communicated with me **(2)**
 d) Fast/efficient/quick installation **(4)**
 e) Smooth/no problems **(4)**
 f) Timely/came when they said/finished on time **(3)**
 g) Good customer service overall **(5)**
 h) Have already recommended them
 i) They are the ones who told me about the program **(2)**
 j) Don't know/refused **(1)**
"More reasonable with the price"

18. Based on your experience, would you recommend this program to others?

- a) Yes **(18)**
 b) No
 c) Don't know/refused **(1)**

19. Why do you say that?

- a) It saves electricity/we need to conserve it.
 b) It saves money. **(6)**
 c) It's easy to do. **(11)**
 d) It's a good program. **(12)**
 e) I have recommended it. **(1)**
 f) People I recommended it to haven't been able to get into the program.
 g) Don't know/refused **(3)**

20. How could the program be improved?

- a) Make it available to more people **(3)**
 b) More publicity/advertise it **(6)**
 c) Have more/better contractors on your list **(1)**
 d) Faster processing of applications
 e) Explain the program/paperwork more
 f) Better communication/easier to reach people at Kentucky Power **(1)**
 g) No suggestions/good the way it is **(8)**

"If it was cheaper."

"Bigger incentives."

Thank you for taking the time to answer my questions!

Appendix E. Cost-Effectiveness Analysis Inputs

Table E1: General Bencost Model KPCO Rate Inputs

BENEFIT COST TEST FOR CONSERVATION PROGRAMS -- Cost-Effectiveness Analysis			
Company:		Kentucky Power Company	
General Inputs			
Input Data		Source	
Electric Retail Rate (\$/kWh) =	\$0.08599	Residential	Kentucky Power Cost & Rate
	\$0.07402	Commercial	Kentucky Power Cost & Rate
	\$0.08001	All Classes	
Variable O&M (\$/kWh) =	\$0.00000		
	Escalation Rate =	3.00%	
Environmental Damage Factor =	\$0.0097		
	Escalation Rate =	3.00%	
Participant Discount Rate =	15.00%		KPCO Data Request from AEP Load Research
Utility Discount Rate =	7.47%		KPCO Data Request from AEP Load Research
Social Discount Rate =	7.47%		KPCO Data Request from AEP Load Research
General Input Data Year =	2011		
Project Analysis Year 1 =	2011		
Residential and Small Commercial Energy Losses	8.7%		KPCO email dated 4/20/12 from Alan Graves
Residential and Small Commercial Peak Losses	10.7%		KPCO email dated 4/20/12 from Alan Graves

TABLE E2: BENCOST MODEL COMMODITY COST INPUTS¹⁶

Year	Avoided Energy Commodity Cost (\$/kWh)	Avoided Capacity Cost (\$/kW-year)	Avoided Electric Retail Rate (\$/kWh)
2011	\$0.0395	\$40.15	\$0.080
2012	\$0.0403	\$6.01	\$0.080
2013	\$0.0399	\$10.12	\$0.082
2014	\$0.0432	\$45.99	\$0.084
2015	\$0.0447	\$124.83	\$0.086
2016	\$0.0510	\$124.83	\$0.088
2017	\$0.0520	\$69.30	\$0.090
2018	\$0.0528	\$80.15	\$0.092
2019	\$0.0540	\$89.71	\$0.094
2020	\$0.0547	\$97.91	\$0.096
2021	\$0.0561	\$104.70	\$0.098
2022	\$0.0658	\$110.03	\$0.100
2023	\$0.0670	\$113.83	\$0.103
2024	\$0.0691	\$116.04	\$0.105
2025	\$0.0707	\$118.13	\$0.108
2026	\$0.0716	\$120.25	\$0.110
2027	\$0.0731	\$122.42	\$0.113
2028	\$0.0746	\$124.62	\$0.115
2029	\$0.0761	\$126.86	\$0.118
2030	\$0.0779	\$129.15	\$0.120
2031	\$0.0788	\$130.70	\$0.123
2032	\$0.0788	\$132.26	\$0.126
2033	\$0.0788	\$133.85	\$0.129
2034	\$0.0788	\$135.46	\$0.132
2035	\$0.0788	\$137.08	\$0.135

TABLE E3: BENCOST MODEL INPUTS

General Inputs	Specific-Project Inputs
Retail Rate (\$/kWh)	Utility Project Costs (\$)
Non-Electric Fuel Retail Rate (\$/Fuel Unit)	Administrative Costs (\$)
Commodity Cost (\$/kWh)	Incentive Costs (\$)
Demand Cost (\$/kW/Yr)	Total Utility Project Costs (\$)
Peak Reduction Factor (%)	Direct Participant Project Costs (\$/Participant)
Variable O&M (\$/kWh)	Participant Non-Energy Costs (Annual \$/Part)
Non-Electric Fuel Cost (\$/Fuel Unit)	Participant Non-Energy Savings (Annual \$/Part)
Non-Electric Fuel Loss Factor	Project Life (Years)
Electric Environmental Damage Factor (\$/kWh)	Avg. kWh/Participant Saved
Participant Discount Rate (%)	Avg. Non-Electric Fuel Units/Part. Saved
Utility Discount Rate (%)	Avg. Additional Non-Electric Fuel Units/Part. Saved
Societal Discount Rate (%)	Number of Participants
General Input Data Year	Total Annual kWh Saved
Project Analysis Year	Incentive/Participant
Growth and Escalation Factors (%)	

¹⁶ Avoided cost inputs provided by Kentucky Power (AEP) Load Forecasting Group through a data request.

TABLE E4: BENCOST MODEL OUTPUTS

General Outputs	Benefit-Cost Test Outputs (Per Test)
Coincident Utility Peak Demand Reduction	Net Present Value of Benefits - Costs
Annual Utility Energy Reduction	Benefit-Cost Ratio
Total Utility Demand Reduction	Total Benefits
Total Utility Energy Reduction	Total Costs
Levelized Costs per kWh	
Levelized Costs per kW	
Annual Participant Savings	
Simple Payback	



**Kentucky Power Company
Residential and Small Commercial
Load Management Pilot Program
Process and Market Evaluation • July 2012**

Submitted by

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Abstract

Kentucky Power Company retained Applied Energy Group to conduct a process and market and impact evaluation of its Residential and Small Commercial Load Management Pilot Program. The program provides residential and small commercial customers with central air conditioners, heat pumps or electric water heaters a free programmable thermostat, a gateway meter, device controller, and access to an online energy management tool. During periods of high electricity demand, a wireless signal is sent to the smart meter. The smart meter signals to the device controller to turn off power to the electric water heater and/or to the programmable thermostat to increase the target temperature. There may be up to 15 scheduled events and 10 additional emergency events per year. Once the event ends, the electric water heater and thermostat temperature are restored to the scheduled customer settings.

To arrive at the final recommendations of the process and market evaluation, AEG reviewed program materials, assessed program processes and conducted interviews with Kentucky Power program staff, the third-party program implementation contractor and participating customers. The results of the analysis, along with key findings and recommendations for program improvements, are included in this report.

Table of Contents

Abbreviations	i
Definitions	ii
Executive Summary	iii
1. Introduction.....	1
2. Program Description	2
3. Evaluation Methodology	3
4. Process and Market Evaluation Findings.....	5
4.1 Program Logic Model	5
4.1.1 Activities and Outputs	8
4.1.2 Outcomes	11
4.1.3 External Factors.....	11
4.2 Program Performance	12
4.3 Program Marketing	17
4.3.1 Program Awareness	19
4.3.2 Motivation for Participation.....	20
4.4 Program Tracking	21
4.5 Customer Satisfaction	24
5. Key Findings and Recommendations	27
5.1 Key Program Findings.....	28
5.1.1 Program Performance Indicators	28
5.1.2 Program Awareness and Marketing Strategies.....	30
5.1.3 Program Tracking	30
5.1.4 Customer Satisfaction	31
5.2 Recommendations	31
5.2.1 Encourage Online Enrollment	31
5.2.2 Consider Program Modifications.....	31
5.2.3 Modify Marketing.....	32
Appendix A. Customer Survey.....	34

List of Tables

Table ES1 Residential Participation and Device Installation	iv
Table ES2 Residential Participation as of May 31, 2012	iv
Table 1 Participant Bill Credits	2
Table 2 Residential Budget, 2010-2012.....	3
Table 3 Residential Budget, 2010-2012.....	3
Table 4 Small Commercial Budget, 2010-2012	3
Table 5 Program Installation Goals, 2010-2012	3
Table 6 Cellular Provider Customer Counts within Kentucky Power Service Territory.....	13
Table 7 Residential Participation and Device Installation	13
Table 8 Residential Participation as of May 31, 2012	15
Table 9 2011 Cost per Participant, Budgeted and Actual	15
Table 10 2012 Cost per Participant, Budgeted and Actual	16
Table 11 Residential and Small Commercial Targeted Marketing	18
Table 12 Marketing Activities To-Date	18
Table 13 Residential Participation and Device Installation	28
Table 14 Residential Participation as of May 31, 2012	29

List of Figures

Figure 1 Program Logic Model	7
Figure 2 Residential Customer Solution Center Calls and Contract Submittals.....	14
Figure 3 Length of Time for Thermostat and Device Controller Installation (n=15).....	16
Figure 4 Initial Thermostat Programming (n=15).....	17
Figure 5 Phone Blast Text.....	19
Figure 6 Direct Mail.....	19
Figure 7 How Customers Heard of the Program, Enrollment Form.....	20
Figure 8 How Customers First Learned of the Program, Survey Response (n=15)	20
Figure 9 Customer Motivation, Enrollment Form	21
Figure 10 Customer Motivation (n=15).....	21
Figure 11 Customer Satisfaction (n=15)	25
Figure 12 Ease of Programmable Thermostat and Device Controller Installation (n=15)	25
Figure 13 Participant Suggested Additional Training (n=15).....	26
Figure 14 How Participants Adjust Temperature Settings (n=15).....	26
Figure 15 Program Improvements (n=15).....	27

Abbreviations

AEG	Applied Energy Group, Inc.
AEP	American Electric Power
EM&V	Evaluation Measurement and Verification
DSM	Demand Side Management
HAN	Home Area Network
KPCO	Kentucky Power Company
PSC	Public Service Commission
QA/QC	Quality Assurance/Quality Control
UCMS	Utility Campaign Management System

Definitions

Demand Side Management (DSM): Programs designed to provide incentives to end-use customers or curtailment service providers to enhance the ability and opportunity for reduction of load during peak hours.

Evaluation Measurement and Verification: A set of analyses used to assess energy efficiency programs in terms of energy and demand savings and cost-effectiveness. Most energy efficiency programs are subject to some type of EM&V.

Event: Periods of high electricity demand when KPCO signals to the Smart Meter to temporarily raise the target temperature on customer thermostats and/or turn off the power connected to customer electric water heaters.

GRIDSMA[®]RT Programs: An AEP energy efficiency initiative that includes over 100 energy efficiency programs across the AEP service territory. The programs feature smart grid technologies such as smart meters, voltage optimization equipment and smart appliances that can reduce energy use.

Home Area Network (HAN): network within a home that connects digital devices. For example, the programmable thermostat communicates with the gateway meter through the HAN.

Device Controller: Device placed on the central air conditioner, heat pump or electric water heater that communicates with the HAN equipment and adjusts the settings during a load control event.

Phone Blast: Marketing technique. Pre-recorded telephone messages are issued to a designated list of customers.

Process Evaluation: A method of evaluation that uses empirical data to assess the delivery of energy efficiency programs, verify goals and determine whether the program is implemented as designed.

Program Logic Model: Graphic representation of an energy efficiency program and its processes. Logic models shows the causal relationships or linkages among the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders critical to a program's performance.

Smart Meter: Digital electric meter that is equipped with wireless communications technology that provides near real-time collection and secure transfer of customer electric usage information. The Smart Meter communicates with the customer thermostat and energy control device.

Executive Summary

Applied Energy Group, Inc ("AEG") was retained by Kentucky Power Company ("KPCO" or "Kentucky Power") to conduct process, market and impact evaluations of its Residential and Small Commercial Load Management Pilot Program. An impact evaluation was not completed at this time due to a lack of full winter and full summer season load program data to determine energy and demand savings.

The Load Management Pilot Program provides residential and small commercial customers with central air conditioners, heat pumps or electric water heaters a free programmable thermostat, a gateway meter, device controller, and access to an online energy management tool. During periods of high electricity demand, a wireless signal is sent to the smart meter. The smart meter signals to the device controller to turn off power to the electric water heater and/or to the programmable thermostat to increase the target temperature. There may be up to 15 scheduled events and 10 additional emergency events per year. Once the event ends, the electric water heater and thermostat temperature are restored to the scheduled customer settings.

AEG designed the process and market evaluation to examine program processes and customer responses to the program. The evaluation identifies methods for gathering data program results and makes recommendations for program improvements. To arrive at the final recommendations, AEG performed the following tasks:

- Reviewed program materials and data.
- Updated program logic model and assessed program flow.
- Conducted interviews with KPCO staff, the program implementer and participating customers.

Key Program Findings

The objective of the Residential and Small Commercial Load Management Pilot Program is to determine whether peak demand can be effectively reduced through the installation of device controllers on residential and small commercial central air conditioners, heat pumps and/or electric water heaters.

Program Performance Indicators

As of May 31, 2012, 35 residential customers had 73 device controllers fully installed, 39 central air conditioner/heat pump devices and 34 electric water heater devices. Sixty-one (61) residential customers signed the agreement to participate in the program, 66 percent submitted the online form, 23 percent mailed/faxed the Customer Agreement and 11 percent were Kentucky Power employees. The majority (91 percent) of the 2011 expenditures were administrative costs. The cost per device controller is decreasing, from \$10,350 in 2011 to \$1,353 through May 2012.

Table ES1 Residential Participation and Device Installation

	2011			2012 (Jan to May)		
	Actual	Goal	% of Goal	Actual	Goal	% of Goal
Load Management Devices	10	950	1.1%	63	1,000	6.3%
AC/HP	6	475	1.3%	33	500	6.6%
Water Heater	4	475	0.8%	30	500	6.0%
Participants	5			30		

Fifty-five (55) customers contacted Kentucky Power customer solution center, 12 customers mailed/faxed the Customer Agreement and 6 completed the online form. Eighteen (18) customers signed the agreement to participate in the program, 11 had a smart meter installed and 10 had HAN equipment installed. Sixty-seven (67) percent of customers did not complete the agreement to participate and did not receive follow-up.

Forty (40) customers submitted the online form, 26 had a smart meter installed and 21 had HAN equipment installed. Three (3) customers are scheduled for installation and the status of 3 customers is unclear based on the UCMS database. Seven (7) employees enrolled in the Load Management Program and 2 customers mailed/faxed the Customer Agreement but had not contacted the KPCO customer solution center.

Eleven (11) participants were disqualified and 6 withdrew from the program. Six (6) participants had the gateway meter installed prior to disqualification, requiring follow-up and replacement with standard KPCO meters. Of the 6 participants, one did not meet the National Electrical Code electric wiring standards for homes, two were elderly with health issues (one of whom did not have internet access), and three had inadequate cellular coverage.

In May 2012, Consort modified the smart meter installation procedure. Going forward, the installer would remove any smart meters with inadequate cellular coverage (i.e. not communicating with Consort's system) during the initial installation appointment.

Table ES2 Residential Participation as of May 31, 2012

	KPCO Employee	Online Form	Mailed Customer Agreement	Total
Enrolled via Customer Solution Center	0	6	12	18
Signed Participation Contract	7	40	14	61
Smart Meter Installation	7	26	11	44
HAN Installation	7	21	10	38
Installation Scheduled	0	3	2	5
Unknown	0	3	0	3

The Load Management Pilot Program was approved in October 2010 and the tariff in December 2010. Kentucky Power solicited an implementation contractor and awarded the contract to Consort in December 2010. Consort began working with KPCO staff in January 2011 to establish the program infrastructure while the contract terms were negotiated and equipment testing was being conducted. A contract was signed in July 2011. AEP conducted rigorous testing of the device controller, gateway meter and Consort technology security. AEP Dolan Laboratory approved the HAN (energy management)

equipment in April 2011 and AEP Canton Meter Laboratory approved the gateway meter, Rev. A model 200 ampere rating, in July 2011. The AEP Canton Meter Laboratory tested a new gateway meter, Rev. B model, and approved usage for the 320 ampere and 200 ampere rated meter in January 2012. Automated billing for program participants was completed in February 2012.

In November 2011, Consert issued an RFP to solicit licensed electricians to perform the equipment installations. Two installation contractors were selected, one in the northern region and one in the southern region of the KPCO service territory. The installation contractor in the southern territory elected to back out of the program in April 2012.

The load management technology can only be utilized within a network that carries the Verizon Wireless signal. The new gateway meters (Rev. B model) are capable of working with other providers and Consert's future plans include working with other providers. Approximately 65 percent of the KPCO service territory is within the Appalachian Wireless network, with the Verizon network primarily covering five counties in the southern region and the Ashland District in the north. Consert received detailed coverage data from Verizon Wireless. The Appalachian Wireless network carries the Verizon Wireless signal and reported that the system was 95 percent reliable, but did not provide detailed coverage data. In February 2012, Consert made the decision to begin installations within the Appalachian Wireless network.

The program was initially offered to KPCO employees beginning September 2011 and later to KPCO customers in the Ashland District beginning January 2012. The first employee installation occurred in September 2011 utilizing Consert certified technicians and the first external customer installation occurred in February 2012 utilizing the Consert installation contractor. The first load event occurred on February 29, 2012.

Participants have multiple avenues for program assistance, including Kentucky Power customer solution center, the installer and Consert. The KPCO program website provides Kentucky Power customer solution center contact information while the program paperwork, including the Welcome Packet and the online portal, provide Consert customer service contact information.

Program Awareness and Marketing Strategies

Kentucky Power utilizes targeted marketing to customers likely to be eligible for the program. Marketing activities included phone blasts, emails, direct mail, program brochures and the KPCO website. According to participating customers surveyed, customers most often learned of the program from KPCO direct mail. The primary reason for participating was saving money and energy.

Targeted marketing to customers within the Ashland District began in January 2012. Targeted marketing to customers in Pike, Perry and Letcher counties was anticipated to begin in April 2012 but was cancelled due to issues with Consert installation contractors.

Program Tracking

Consert manages and tracks all customer information and load event data as well as customer usage data for the HVAC equipment, water heater, programmable thermostat settings and room temperature.

An online management system, the Utility Campaign Management System ("UCMS"), is utilized to track customer information and status within the program. An online portal, the Utility Portal, is utilized to manage the load management data, including monitoring energy consumption, starting and stopping load control events and managing customer energy management accounts.

Consert provides weekly status reports summarizing the contracts received, installations scheduled, meter installs, complete installs, disqualified customers and the number of accounts in the scheduling queue. The data is manually pulled from UCMS and some inputs are estimated based on recent installation activities. Therefore, discrepancies occasionally appear in the reports. Consert anticipates automating the UCMS reports utilized to provide the weekly and monthly status reports to KPCO within the next 3 to 6 months.

Within three business days of an event, Consert provides load control event data including, but not limited to, energy and demand shed during the event, number of HVAC units and water heaters, and number of customers that opted-out. Consert will not initiate more than 15 scheduled load events, up to 150 hours, during a season. Consert anticipates incorporating load event data into the weekly status reports within the next 3 to 6 months, including the number of participants per event, number of load events, number of load event hours and the demand reduced during the event.

Consert databases and system snapshots are backed-up on a nightly basis and the system would be restored within 12 hours of any technical issue. The smart meters contain 3-days of energy usage data and customer programmable thermostat settings. However, Consert does not have the ability to restore/recreate customer programmable thermostat settings if an account is reset or cancelled. Consert plans to develop this capability by Spring 2013.

The UCMS system contains a number of reports and a database of potentially eligible KPCO customers, searchable by customer name or address. However, the UCMS reports contain varying levels of information; a few only contain customer counts with no identifiable customer information (i.e. customer name or account number). Additionally, the database may contain multiple entries for the same customer.

Customer Satisfaction

Participants are generally satisfied with the pilot program, particularly the online energy management services. However, there may be a lack of understanding on how to program the thermostat. According to the participant survey,

- 60% of program participants contacted customer service to get a better understanding of how to set/adjust the thermostat settings.
- Participants recommended the program provide additional training on how to operate the programmable thermostat, especially how to set/adjust the temperature and access the online web application.
- 87% had adjusted the temperature settings, primarily using the online portal (60%) followed by the programmable thermostat itself (33%).

Recommendations

AEG has several recommendations on how to improve the program. These include:

AEG recommends an impact evaluation commence after a full summer and winter season of load data is available to determine energy and demand savings. Data from a full year of control events must be collected before a meaningful impact evaluation can be conducted. An evaluation of the load impacts and program cost-effectiveness could be conducted in Fall 2013.

Encourage Online Enrollment

AEG recommends that KPCO modify customer enrollment options to encourage online enrollment. Participants must have internet access and be an experienced internet user to properly program the thermostat and make modifications to the thermostat settings. KPCO should limit mailed/faxed Customer Agreement applications to renters. The Customer Agreement application should be removed from the program website. Customers can be provided the KPCO customer solution center contact if there are enrollment issues or they need to be mailed/faxed a Customer Agreement.

AEG recommends that the Customer Agreements are submitted directly to Consert rather than to Kentucky Power staff. Currently, KPCO receives the applications submitted via mail or fax, and can upload the file to the UCMS customer record indicating the date the contract was received. Additionally, the Customer Agreements should consistently be uploaded to the UCMS customer record.

Consider Program Modifications

AEG recommends that Kentucky Power work with Consert to engage an installation contractor for the southern territory. The installation contractor in the southern territory elected to back out of the program in April 2012 and Consert has been unable to find another contractor located within that territory. Preferably, an installation contractor within the southern territory would conduct the installations and provide response to service calls. However, if this is not possible, the installation contractor in the northern territory is willing to conduct the installations. Consert needs to ensure that the travel will not negatively impact the program or the services provided by the installation contractor and that the contractor can provide adequate response to customer service and/or equipment maintenance calls.

AEG recommends that the Consert representative review the program with the customer when scheduling the installation appointment. In an effort to minimize disqualifications and withdrawals after the gateway meter has been installed, the representative should remind the customer that the load management equipment adjusts household temperature and the thermostat is operated via the internet.

AEG recommends that the personal energy management account log-in webpage provide Consert's customer service contact information.

AEG recommends that the installation contractor provide a basic overview of the programmable thermostat online capabilities at the time of the installation. Approximately 60 percent of survey

respondents contacted customer service, primarily to receive a better understanding of the thermostat temperature settings and how to adjust the settings. Additionally, survey respondents recommended additional training on how to operate the programmable thermostat, especially how to adjust the temperature and access the online web application.

AEG recommends that Consort improve the reporting process and automate some reporting functions, as anticipated. Manually counting the number of entries in UCMS can lead to discrepancies and it is necessary for Kentucky Power to have accurate program data. The UCMS system contains a number of reports and a database of potentially eligible KPCO customers. However, the UCMS reports contain varying levels of information; a few only contain customer counts with no identifiable customer information (i.e. customer name or account number). Additionally, the database may contain multiple entries for the same customer. The UCMS system should contain a downloadable report of all participating customers, including customer contact information (name, address and account number) as well as their status in the program. The UCMS systems should also contain a database of customers enrolled in the program, separate from the database of eligible customers. The database should list all enrolled customers and provide a link to the customer record as well as have a search function by customer name, address or account number.

Modify Marketing

AEG recommends that Kentucky Power work with Consort to modify marketing materials and activities.

1. Materials should emphasize online enrollment. For example, materials should direct customers to the Load Management Program website rather than provide the KPCO customer solution center telephone number.
2. Materials should highlight the ability for the customer to control their energy use from the internet. According to Consort, emphasizing online capabilities may attract a different type of customer to the program. For example, an experienced internet-user interested in the convenience of online temperature management.
3. Redefine marketing responsibilities. Of the 55 customers that contacted Kentucky Power customer solution center, 67 percent did not sign the agreement to participate in the program. There was no follow-up to determine why these customers did not sign the agreement.

1. Introduction

Applied Energy Group, Inc. ("AEG") was retained by Kentucky Power Company ("Kentucky Power" or "KPCO") to conduct a comprehensive evaluation of its 2010-2012 Demand Side Management ("DSM") Program Portfolio.¹ The 2010-2012 DSM Program Portfolio includes the Residential Efficient Products Program, Residential and Small Commercial HVAC Diagnostic and Tune-up Program, Commercial Incentive Program, Small Commercial High Efficiency Heat Pump and Air Conditioner Program, and the Residential and Small Commercial Load Management Pilot Program. The DSM programs will be evaluated concurrently and individual program Evaluation, Measurement and Verification ("EM&V") reports will be filed with the Kentucky Public Service Commission ("PSC") by the August 15, 2012 regulatory filing date.

Kentucky Power is an electric utility that serves approximately 175,000 customers in all or part of 20 eastern Kentucky counties.² The utility is part of the American Electric Power ("AEP") system, which is one of the largest electric utilities in the United States.³ The 2010-2012 DSM Program Portfolio was implemented to help Kentucky Power and AEP reduce electricity use and peak demand, help customers lower their electricity bills, and encourage long-term change in the market through the adoption of energy efficiency technologies and services.

The Residential and Small Commercial Load Management Pilot Program provides residential and small commercial customers with central air conditioners, heat pumps or electric water heaters a free programmable thermostat, a gateway meter, device controller, and access to an online energy management tool. During periods of high electricity demand, a wireless signal is sent to the smart meter. The smart meter signals to the device controller to turn off power to the electric water heater and/or to the programmable thermostat to increase the target temperature. There may be up to 15 scheduled events and 10 additional emergency events per year. Once the event ends, the electric water heater and thermostat temperatures are restored to the scheduled customer settings.

This report describes the key findings from the process and market evaluation and provides recommendations for improving program performance and operations. An impact evaluation was not completed at this time due to a lack of full winter and full summer season load program data to determine energy and demand savings. Data from a full year of control events must be collected before a meaningful impact evaluation can be conducted. As the first control event took place in February 2012, AEG recommends an impact evaluation commence after a full summer and winter season (Fall 2013). Section 2 provides a program description. Section 3 provides the process and market evaluation methodology and Section 4 presents the evaluation findings. Key findings and recommendations are described in Section 5.

¹ Kentucky Power's 2010-2012 DSM programs were approved in Case No. 2010-00095 and Case No. 2010-00198.

² Kentucky Power. Facts, Figures & Bios. Accessed at www.kentuckypower.com/info/facts/

³ American Electric Power delivers electricity to more than 5 million customers in 11 states and ranks among the nation's largest generators of electricity, with almost 38,000 megawatts of generating capacity in the U.S.

2. Program Description

The Residential and Small Commercial Load Management Pilot Program offers residential and small commercial customers with central air conditioners, heat pumps or electric water heaters the opportunity to participate in a pilot energy management program. Participants receive a free programmable thermostat, a gateway meter, device controller and access to an online energy management tool. A KPCO contractor installs the equipment and ensures the equipment is communicating correctly.

During periods of high electricity demand, a wireless signal is sent to the smart meter. The smart meter signals to the device controller to turn off power to the electric water heater and/or to the programmable thermostat to increase the target temperature. The target temperature of the programmable thermostat is raised no more than 4 degrees and the electric water heater may be turned off for up to 6 hours during the summer season, between the hours of 12 p.m. and 8 p.m., and 4 hours during the winter season, between the hours of 7 a.m. and 11 a.m. and 6 p.m. and 10 p.m. There may be up to 15 scheduled events and 10 additional emergency events per year. Emergency events can only occur on weekdays during the summer season between the 12 p.m. and 8 p.m. Once the event ends, the electric water heater and thermostat temperature are restored to the scheduled customer settings.

Participants must be located in an area with adequate cell service and have good credit with Kentucky Power. Customers that do not own their residence or facility must obtain the building owner's written consent. Participating customers enter into a one year agreement with Kentucky Power and are eligible for bill credits.

Table 1 Participant Bill Credits

Equipment	Season	Bill Credit
Programmable Thermostat	Summer (June – September)	\$20 (\$5 per month) per cooling unit
Electric Water Heater	Summer (June – September)	\$8 (\$1 per month) per water heater
	Winter (November – February)	

The objective of the program is to determine whether peak demand can be effectively reduced through the installation of device controllers on residential and small commercial central air conditioners, heat pumps and/or electric water heaters. Program objectives include:

- Educate customers about energy management and the benefits of energy efficiency.
- Collect actual energy and demand savings from the use of device controllers.
- Reduce peak demand, thereby lowering costs and delaying future generating requirements.
- Test the concept of such a program for consideration as a full scale offering.

The Kentucky Public Service Commission ("PSC") approved a three-year budget and installation goals for the Residential and Small Commercial Load Management Pilot Program. Tables 2 through 4 present the

residential and small commercial program budgets for 2010 through 2012. Table 5 presents the installation goals by sector.⁴

Table 2 Residential Budget, 2010-2012

	2010	2011	2012
Residential	\$149,405	\$552,775	\$579,890
Small Commercial	\$20,970	\$60,640	\$61,960
Total	\$170,375	\$613,415	\$641,850

Table 3 Residential Budget, 2010-2012

	2010	2011	2012
Incentives	\$75	\$14,000	\$28,000
Promotion	\$15,000	\$35,000	\$35,000
Equipment	\$9,300	\$176,700	\$186,000
Equipment Installation	\$3,275	\$62,225	\$65,500
Switch Maintenance	\$250	\$4,780	\$5,030
Administrative	\$115,305	\$230,610	\$230,610
Evaluation	\$6,200	\$29,460	\$29,750
Total	\$149,405	\$552,775	\$579,890

Table 4 Small Commercial Budget, 2010-2012

	2010	2011	2012
Incentives	\$30	\$1,540	\$2,800
Promotion	\$1,000	\$3,000	\$3,000
Equipment	\$4,690	\$21,105	\$21,105
Equipment Installation	\$1,320	\$5,940	\$5,940
Switch Maintenance	\$120	\$540	\$540
Administrative	\$12,810	\$25,625	\$25,625
Evaluation	\$1,000	\$2,890	\$2,950
Total	\$20,970	\$60,640	\$61,960

Table 5 Program Installation Goals, 2010-2012

	2010	2011	2012
Residential	50	950	1,000
Air Conditioner/Heat Pump	25	475	500
Water Heater	25	475	500
Small Commercial	20	90	90
Air Conditioner/Heat Pump	10	45	45
Water Heater	10	45	45
Total	70	1,040	1,090

3. Evaluation Methodology

AEG designed the evaluation to determine the efficacy of program procedures and systems, evaluate the achievement of program objectives and provide insight into and recommendations for program

⁴ Participation may not match installations because customers can have more than one device installed.

improvement. The process and market evaluation identifies whether key elements, such as incentive levels and program delivery are performing as designed and identifies issues or opportunities to improve these key elements. The goals of the evaluation are to:

- Examine key performance indicators to identify participation or program issues;
- Determine awareness levels as a way to refine marketing strategies;
- Assist program implementers and managers to structure programs and achieve cost-effective savings while maintaining high levels of customer satisfaction; and
- Provide recommendations for changing the program's structure, management, administration, design, delivery, operations or goals.

To arrive at the final recommendations, AEG carried out the following activities:

Review Program Materials

AEG reviewed current program materials, documents and processes, including the program enrollment applications and marketing and promotional materials. The review served as the basis for understanding whether the program has been implemented as planned. The review was particularly important for preparing the survey instruments for other process evaluation tasks.

Program Logic Model

AEG developed a program logic model based on the review of program materials and discussions with KPCO program staff. The model shows the linkages among the program's activities, outputs, key program stakeholders and outcomes and highlights potential external influences and program inputs.

Kentucky Power Staff Interview

AEG conducted a comprehensive group interview with Kentucky Power program staff in November 2011. The purpose of the interview was to get staff impressions of program implementation activities, program performance, marketing and opportunities for program improvements. Individual interviews with program staff were conducted between December 2011 and March 2012. Individual interviews focused on program design and delivery issues, program performance and potential areas of improvements.

Third-Party Implementer Interview

The Load Management Pilot Program is implemented by Consort. Consort duties include:

- Develop, track and administer services to achieve completion of program goals and budget.
- Provide training to Kentucky Power personnel on the program procedures.
- Review and verify application forms and customer eligibility, finalize customer agreements, and manage online customer enrollment.
- Contract and train installation contractor(s) that will install, replace, and maintain operation of all load management equipment.
- Execute load management events.
- Provide call center support, maintain a secure customer database, provide web-based portal for participant energy profile management.

- Program reporting.
- Perform QA/QC.

AEG interviewed Consort in November 2011 as well as January and June 2012. The interview provided information on implementation activities, program data and barriers to increased participation. AEG also obtained detailed information on program performance.

Participating Customer Surveys

AEG administered a 10 to 12 minute telephone survey to a sample of program participants to assess program experience and awareness, customer satisfaction and areas for potential program improvement. Kentucky Power provided data for 23 program participants that have the load management equipment fully installed. AEG calculated the sample size at a 90 percent confidence interval with an error margin of +/-10 percent. Participants were then randomly selected based on unique identifiers determined by Microsoft Excel's random number generator. Fifteen (15) customer surveys were completed (see Appendix A for the survey guide).

4. Process and Market Evaluation Findings

The evaluation identifies whether key elements, such as incentive levels and program delivery are performing as designed. When potential deficiencies in these areas arise, the evaluation identifies opportunities for improving these key elements.

4.1 Program Logic Model

Program logic models are graphic representations of an energy efficiency program and its processes. Logic models show the causal relationships between the situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (outcomes). A logic model helps identify partnerships and stakeholders critical to a program's performance.⁵

Key elements of a program logic model include:

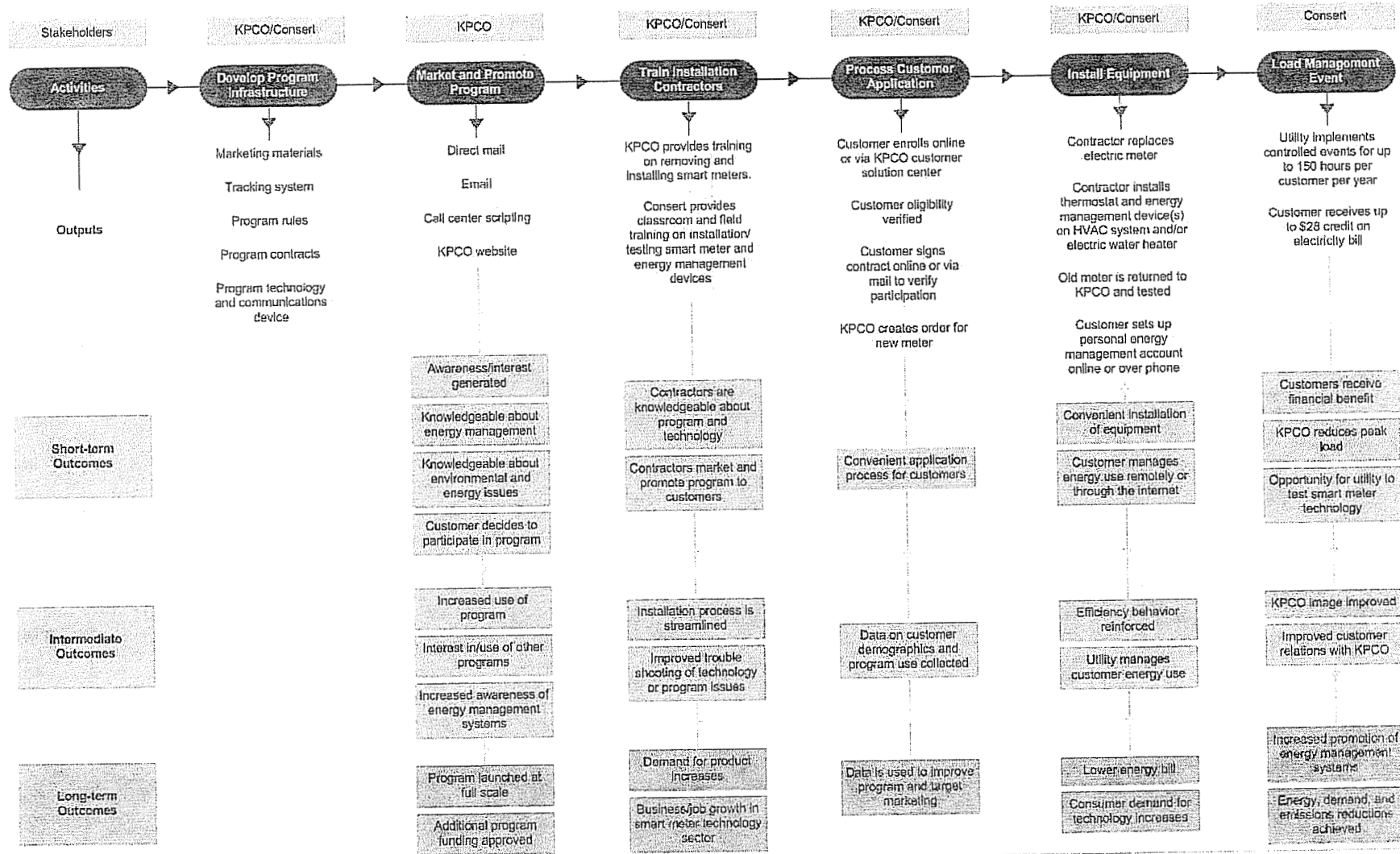
- **Inputs.** Resources that program stakeholders contribute to a program, such as knowledge, skills, expertise, finances or equipment.
- **Outputs.** Program activities and number of people reached, based on program goals.
- **Outcomes.** Short-term, intermediate or long-term results of the program outputs. Assists evaluators and program administrators in establishing program results.
- **External Influences.** Factors outside the utility's control that may influence the program outcomes. They help to identify important program partnerships as well as the issue(s) the program can realistically influence. The factors help determine which evaluation measures will accurately reflect project outcomes or any other goals that must be met to address the problem or situation.

⁵ McCawley, P. (2001). *The Logic Model for Program Planning and Evaluation*. Moscow: University of Idaho Extension.

In the logic model presented in Figure 1, program activities are oriented sequentially across the top of the page from the left to the right. For example, the program's infrastructure, including its advertising materials, tracking systems, program rules, and contracts must be developed before the program can be marketed and customers recruited. Performance outputs and outcomes are oriented vertically from top to bottom. The box on the bottom right contains the external factors outside the utility's control that may affect program performance.

Figure 1 Program Logic Model

Inputs: program funding, PSC goals and reporting requirements, Kentucky state energy goals, Kentucky Power program staff, implementation contractor resources and expertise, evaluation contractor resources and expertise, existing awareness of Kentucky Power



External Influences: Changes in political priorities (e.g. codes and standards, state and local regulations, federal policies); weather and associated impacts on customer actions and energy bills; energy prices and regulation; changes in utility rate structures; perceptions of the value of energy efficiency and load management; competing interests among demand side customers; cost, performance and availability of smart meter technologies; cellular service

4.1.1 Activities and Outputs

There are five main activities in the Residential and Small Commercial Load Management Pilot Program. The program activities and their corresponding outputs establish linkages between the situation the program is designed to address and the program's intended outcomes. Therefore, activities and outputs are discussed together.

Develop Program Infrastructure

Activities included gathering market knowledge, setting program goals, designing the program, establishing program rules, developing marketing approaches and content, establishing institutional and operating structures, and selecting the program technology and communications device. As the implementation contractor, Consert worked with Kentucky Power program staff to design the program and develop marketing materials.

Market and Promote Program

The marketing strategy for the program included targeted marketing to customers likely to have electric cooling and water heating, service for at least 12 months, low credit risk level, sufficient cellular service and non-demand meters. Marketing activities included phone blasts, emails to KPCO employees, postcards, letters, program brochures and the KPCO website.

Train Installation Contractors

Consert selected state-based installation contractors to install the load management equipment, including the gateway meter, programmable thermostat and device controller(s). Kentucky Power provided training on removal and installation of gateway meters. Consert training included four hours of classroom training and two days of hands-on field training.

Process Customer Application

A customer enrolls in the Load Management Pilot Program by completing an online form, submitting the Customer Agreement or contacting Kentucky Power's customer solution center.

The online form, available at www.kentuckypower.com/save, is a basic program contract, listing the program terms and conditions as well as the program tariff. The customer provides their contact information, KPCO electric account number and answers a few basic questions, including:

- Are you renting/leasing your home?
- What type of cooling system is installed in the home?
- Does the home have an electric water heater?
- Where did you hear about SMART Energy Management?
- If you received a mailing, what was the customer code on the mailing?
- What is the main reason for signing up for the program: save money, reduce energy usage, help the environment, help my community, free programmable thermostat, etc?

The customer provides an electronic signature agreeing to the program terms and conditions. The customer information is entered into Consert's online management system, the Utility Campaign Management System ("UCMS"). UCMS automatically screens customer applications for eligibility using

a database provided by Kentucky Power which contains customers with eligible credit rating, length of service and type of service (i.e. customer rate class).

If the customer does not own the property, they can print the online form, obtain the property owner's signature and mail the completed documents to Kentucky Power or complete the Customer Agreement. The Customer Agreement is available for download at www.kentuckypower.com/save. The customer provides their contact information, KPCO electric account number and signature, agreeing to the program terms and conditions. The agreement is submitted to Kentucky Power staff. Kentucky Power staff attaches a copy of the signed agreement to the customer record in UCMS and indicates the date the contract was received.

The customer may also enroll by contacting Kentucky Power's customer solution center at 1-85KENTUCKY (855-368-8259). A representative collects the customer's KPCO electric account number and contact information and asks a few basic questions (same as the online form). The customer information is automatically uploaded to UCMS and screened for eligibility. The representative will be notified by the system during enrollment if the customer is not eligible due to credit rating, length of service, type of service or cellular service. The representative encourages customers to sign the customer agreement online or have a Customer Agreement mailed/faxed to them. If mailed/faxed, the customer completes the paperwork and submits it to KPCO staff. Kentucky Power staff updates the customer record in UCMS to indicate the date the contract was received and may attach a copy of the signed agreement to the customer record.

Install Equipment

The KPCO Meter Revenue Operation Group (MRO) monitors UCMS for new participants and creates the meter replacement order. Kentucky Power orders the electric meters and gateway equipment (assembled at a facility in Florida) while Consert orders the HAN equipment for the device controllers. KPCO MRO monitors UCMS and tracks applicable equipment data. Customer billing credits are activated by the MRO after utility meter orders are processed and the energy management equipment (HAN) is installed. The installation contractor coordinates with KPCO MRO and Consert on equipment inventories and equipment installation.

Consert schedules the customer installation. The installation contractor installs the equipment over two visits:

- 1) Replace electric meter with a gateway meter. Replacement of the meter takes approximately 2 to 2.5 hours. The customer does not need to be present as long as the meter is located outside the home/building. The installer ensures the meter has adequate cellular service (i.e. communicating properly with Consert's system) prior to leaving. Old meters are returned to KPCO.
- 2) Install programmable thermostat and device controller(s) at least 24 hours after the gateway meter is installed to ensure the customer has adequate cellular service to the meter (the meter must communicate 98 percent of the time). Installation takes, on average, 1 to 2 hours. The

installer verifies that the HVAC system and electric water heater are operating. The customer is given the old thermostat.

After the installation is completed, the installer leaves the customer with a 'Welcome Packet.' The Welcome Packet includes:

- Welcome letter
- Answers to frequently asked questions
- Quick Start Guide with instruction on setting-up the personal online account
- Energy Management Device Quick Reference Guide
- Copy of Customer Agreement form
- Maintenance and ownership information of the thermostat and device controllers

Customers are instructed to create a personal energy management account and develop program settings for the programmable thermostat and electric water heater via the online portal or Consort customer service at 1-855-851-5271.⁶ The customer creates a personal account at kpsmartenergy.consert.com by inputting their utility account number, zip code and address number and agreeing to the terms and conditions. Once the account is created, the customer completes the 'Program Wizard,' a 13-question questionnaire to create a profile with two basic program modes: Work Day and Weekend Day. Two additional program modes, Work from Home and Vacation Energy Saver, may also be scheduled. The thermostat temperature and electric water heater adjust to coordinate with the customer profile. Customers can modify their profile anytime through the online portal or calling Consort customer service. Temporary changes can be made directly to the programmable thermostat.

Load Management Event

During periods of high electricity demand, when peak demand is anticipated to exceed 92.5 percent of the seasonal peak, a load control event is reviewed and, if approved, a wireless signal is sent to the customer's smart meter. The smart meter is a digital electric meter that is equipped with wireless two-way communication technology (also referred to as a gateway meter). The smart meter signals to the device controller to turn off power to the electric water heater and/or to the programmable thermostat to raise the target temperature. The target temperature of the programmable thermostat is raised no more than 4 degrees, depending on several factors including the temperature setting prior to the event, average indoor temperature, outdoor temperature and the length of the event. The electric water heater may be turned off for up to 6 hours during the summer season and 4 hours during the winter season between the hours of 7 a.m. and 11 a.m. and 6 p.m. and 10 p.m. There may be up to 15 scheduled events and 10 additional emergency events. Emergency events can only occur on weekdays during the summer season between the 12 p.m. and 8 p.m. Once the event ends, power to the electric water heater is restored and the thermostat setting is restored to the scheduled customer setting.

The customer can determine if an event is in progress through the online portal or the programmable thermostat. A customer may opt-out of an event through the online portal or may reset the thermostat

⁶ If a customer does not set-up a personal online account and program settings, the thermostat temperature and water heater settings are managed according to a default setting.

settings by touching the programmable thermostat display. Customers may not opt-out during emergency critical control events.

Programmable thermostat bill credits are applied during the bill periods of July through October for credits received from customer participation during June through September. Electric water heater bill credits are applied during the bill periods of July through October for credits received from June through September and during the bill periods of December through March for credits received from November through February. The amount of the customer bill credit is dependent on the equipment installed, not the load control events the customer participated in.

The installation contractor's head electrician will conduct inspections of 10 percent of completed installations every quarter. Consort will review the inspection reports and take action as necessary.

4.1.2 Outcomes

Outcomes are distinct from program outputs. Target audiences (customers) respond to the program outputs resulting in program outcomes. The outcomes are divided into short-term, intermediate, and long-term outcomes.

Short-term Outcomes

When the program is marketed and promoted, awareness and interest in energy management may increase among customers and contractors. Customers and contractors become more knowledgeable about energy management and load management technology. Customers receive a financial benefit from participating in the KPCO program. The program may lead to an increased commitment to energy management.

Intermediate Outcomes

Intermediate outcomes may include increased use of the program, interest in and use of other KPCO efficiency programs, increased promotion and awareness of energy management systems, and improved data on customer energy use.

Long-term Outcomes

The long-term outcomes may include increased customer demand for advanced and efficient technology, improved load management program, customer bill reductions, reduced utility emissions, and fewer greenhouse gases emitted. Kentucky Power may enhance its public image as a utility that responds to customer needs without sacrificing consideration of environmental issues.

4.1.3 External Factors

Documenting external factors outside the control of Kentucky Power and its stakeholders improves program planning and evaluation by identifying important program partners, the activities the program can realistically influence, which evaluation measures will accurately reflect project outcomes, and other needs that must be met. External factors include:

- Changes in political priorities (e.g. codes and standards, state and local regulations, federal policies, perceptions of energy and climate change);

- Weather and associated impacts on customer actions and energy bills;
- Energy prices and regulation;
- Changes in utility rate structures;
- Perceptions of the value of energy efficiency and load management;
- Competing interests among demand side customers;
- Cost, performance and availability of smart meter technology; and
- Cellular service.

4.2 Program Performance

The Residential and Small Commercial Load Management Pilot Program was approved in October 2010, two months later than anticipated, and the Residential and Small Commercial Load Management tariff was approved in December 2010. Kentucky Power solicited an implementation contractor and awarded the contract to Consert on December 8, 2010. Consert began working with KPCO staff in January 2011 to establish the program infrastructure while the contract terms were negotiated and equipment testing was being conducted. A contract was signed in July 2011. Automated billing for program participants was completed in February 2012.

AEP conducted rigorous testing of the device controller, gateway meter and Consert technology security.

- December 2010 – April 2011: AEP Dolan Laboratory tested and approved the device controller and HAN equipment with one antenna.
- December 2010 – July 2011: AEP Canton Laboratory tested and approved the gateway meter, Rev. A model 200 ampere rating.
- October 2011 – January 2012: Consert notified KPCO that the HAN equipment had been updated and that the version currently in stock was no longer manufactured. AEP Canton Laboratory tested and approved HAN equipment with two antennae (Rev. B model 320 ampere and 200 ampere rating), which provided additional features and reliability than the prior version.

Consert issued an RFP to solicit licensed electricians to perform the equipment installations. Two installation contractors were selected in November 2011 to perform installations in the Kentucky Power service territory, one in the northern region and one in the southern region. The installation contractor in the southern territory elected to back out of the program in April 2012.

Initially, the load management technology could only be utilized within a network that carried the Verizon Wireless signal. The new gateway meters (Rev. B model) are capable of working with other providers. The KPCO service territory is primarily within the Appalachian Wireless cellular network, with the Verizon network covering five counties in the southern region and the Ashland District in the north (see Table 6). Consert received detailed coverage data from Verizon Wireless. The Appalachian Wireless network carries the Verizon Wireless signal and reported that the system was 95 percent reliable, but did not provide detailed coverage data. In February 2012, Consert made the decision to begin installations within the Appalachian Wireless network.

Table 6 Cellular Provider Customer Counts within Kentucky Power Service Territory⁷

Cellular Provider	Residential Customers		Commercial Customers	
	Count	Percentage	Count	Percentage
Verizon Wireless	6,273	34%	114	36%
Appalachian Wireless	12,052	66%	203	64%
Total	18,325	100%	317	100%

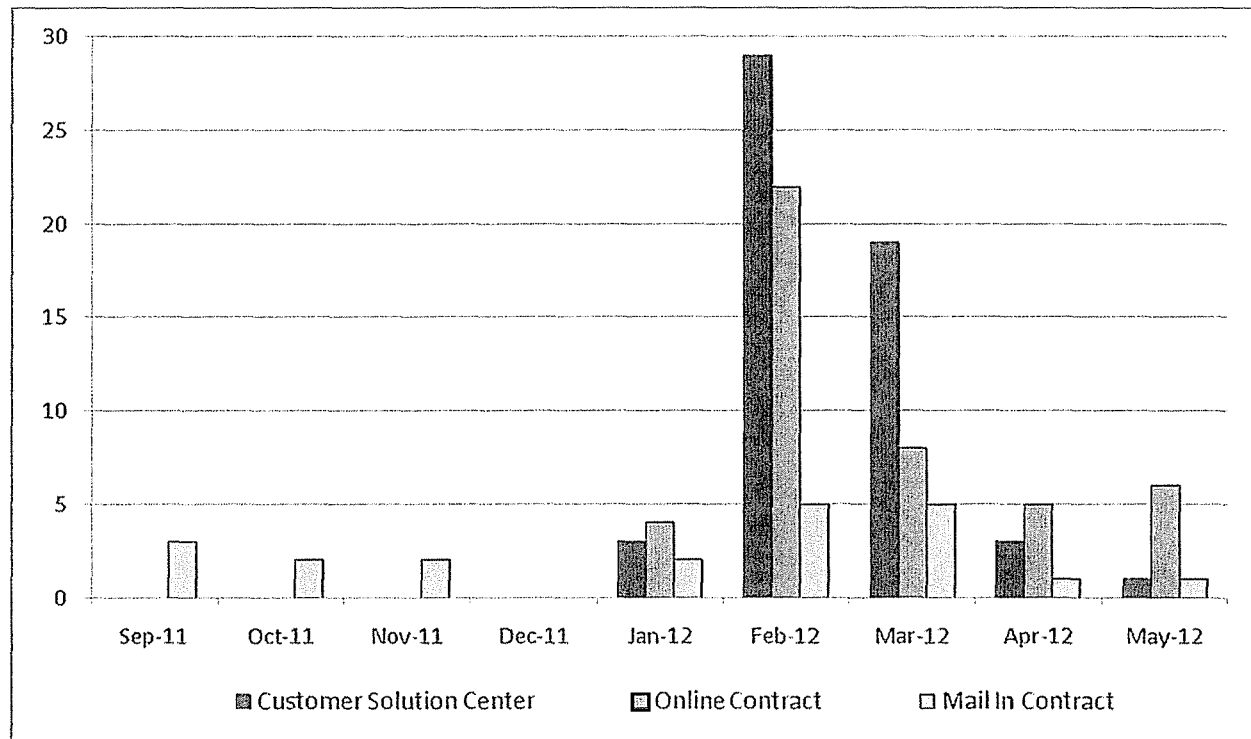
The program was offered to KPCO employees beginning September 2011 and to KPCO customers in the Ashland District beginning January 2012. The first employee installation occurred in September 2011 utilizing Consort certified technicians and the first customer installation occurred in February 2012 utilizing the installation contractor. The first load event occurred on February 29, 2012.

As of May 31, 2012, 35 residential customers had 73 device controllers fully installed, 39 central air conditioner/heat pump devices and 34 electric water heater devices. Five (5) customers had 10 devices installed in 2011, achieving 1.1 percent of the annual installation goal. Thirty (30) residential customers had 63 devices installed through May 2012, achieving 12.6 percent of the annual installation goal.

Table 7 Residential Participation and Device Installation

	2011			2012 (Jan to May)		
	Actual	Goal	% of Goal	Actual	Goal	% of Goal
Load Management Devices	10	950	1.1%	63	1,000	6.3%
AC/HP	6	475	1.3%	33	500	6.6%
Water Heater	4	475	0.8%	30	500	6.0%
Participants	5			30		

⁷ Customer counts include tariff codes 22 and 17.

Figure 2 Residential Customer Solution Center Calls and Contract Submittals

Sixty-one (61) residential customers signed the agreement to participate in the program, 66 percent submitted the online form, 23 percent mailed/faxed the Customer Agreement and 11 percent were Kentucky Power employees.

Fifty-five (55) customers contacted Kentucky Power customer solution center, 12 customers mailed/faxed the Customer Agreement and 6 completed the online form. Eighteen (18) customers signed the agreement to participate in the program, 11 had a smart meter installed and 10 had HAN equipment installed.

- 2 participants withdrew from the program, 1 had a smart meter and HAN equipment installed.
- 2 customers are scheduled for installation.
- 67% of customers did not sign the agreement to participate and did not receive follow-up.

Forty (40) customers submitted the online form, 26 had a smart meter installed and 21 had HAN equipment installed. Three (3) customers are scheduled for installation and the status of 3 customers is unclear based on the UCMS database.

- 9 customers were disqualified; four had a smart meter installed.
- 4 participants withdrew from the program, 1 had a smart meter installed.

Seven (7) employees enrolled in the Load Management Program, one of whom was disqualified after the smart meter and HAN equipment were installed. Two (2) customers mailed/faxed the Customer Agreement but had not contacted the KPCO customer solution center, one of whom was disqualified after the smart meter was installed.

Eleven (11) participants were disqualified due to inadequate cellular coverage (27%), low credit rating with Kentucky Power (18%), issues with HVAC equipment or electric wiring (36%), not being able to access the customer's electric meter (9%) or not having a KPCO electric service at least 12 months (9%). Six (6) customers withdrew from the program, 4 prior to having the smart meter installed. Six (6) participants had the gateway meter installed prior to disqualification/withdrawal from the program, requiring follow-up and replacement with standard KPCO meters. Of the 6 participants,

- 3 participants had inadequate cellular coverage. In May 2012, Consort modified the smart meter installation procedure such that the installer would remove any smart meters with inadequate cellular coverage (i.e. not communicating with Consort's system) during the initial installation appointment.
- 1 participant did not meet National Electrical Code electric wiring standards for homes.
- 2 participants were elderly with health issues and chose not to participate after fully understanding the program, 1 of whom did not have internet access.

Table 8 Residential Participation as of May 31, 2012

	KPCO Employee	Online Form	Mailed Customer Agreement	Total
Enrolled via Customer Solution Center	0	6	12	18
Signed Participation Contract	7	40	14	61
Smart Meter Installation	7	26	11	44
HAN Installation	7	21	10	38
Installation Scheduled	0	3	2	5
Unknown	0	3	0	3

The majority of the 2011 expenditures were administrative costs (91 percent). In 2011, residential expenditures accounted for 19 percent of the budget and the small commercial expenditures accounted for 24 percent of the budget. The 2012 expenditures through May 31st accounted for 14 percent of the annual residential budget and 17 percent of the small commercial budget. The 2012 cost per device controller (through May) decreased significantly from the 2011 cost per device controller (\$1,353 versus \$10,350).

Table 9 2011 Cost per Participant, Budgeted and Actual

	Residential		Small Commercial	
	Budgeted	Actual	Budgeted	Actual
Incentives	\$14,000	\$0	\$1,540	\$0
Promotion	\$35,000	\$0	\$3,000	\$0
Equipment	\$176,700	\$205	\$21,105	\$0
Equipment Installation	\$62,225	\$0	\$5,940	\$0
Switch Maintenance	\$4,780	\$0	\$540	\$0
Administrative	\$230,610	\$94,500	\$25,625	\$10,500
Evaluation	\$29,460	\$8,793	\$2,890	\$3,815
Total Cost (\$)	\$552,775	\$103,498	\$60,640	\$14,315
Load Management Devices	950	10	90	0
Cost (\$) per Device	\$582	\$10,350	\$674	-

Table 10 2012 Cost per Participant, Budgeted and Actual

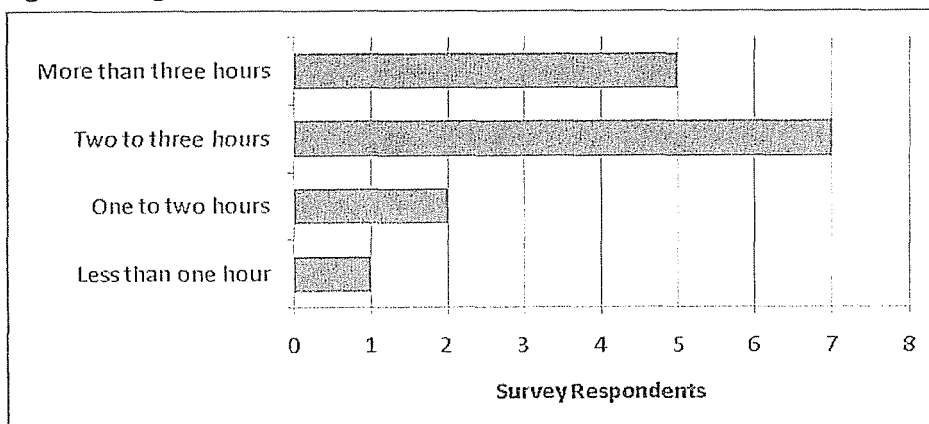
	Residential		Small Commercial	
	Budgeted	Actual (Jan to May)	Budgeted	Actual (Jan to May)
Incentives	\$28,000	\$18	\$2,800	\$0
Promotion	\$35,000	\$12,141	\$3,000	\$229
Equipment	\$186,000	\$4,710	\$21,105	\$0
Equipment Installation	\$65,500	\$1,725	\$5,940	\$0
Switch Maintenance	\$5,030	\$259	\$540	\$0
Administrative	\$230,610	\$54,000	\$25,625	\$6,000
Evaluation	\$29,750	\$11,697	\$2,950	\$5,398
Other	\$0	\$669	\$0	\$0
Total Cost (\$)	\$579,890	\$85,219	\$61,960	\$11,626
Load Management Devices	1,000	63	90	0
Cost (\$) per Device	\$580	\$1,353	\$688	-

Consert and the installation contractor conducted quality assurance/quality control checks in April 2011. Seventeen (17) of the 18 homes with complete installations were visited. Proper installation was confirmed at all locations.

Ninety-four (94) customers either contacted the Kentucky Power customer solution center and/or submitted the online form. These customers were asked a few basic questions, including whether they rent/own, the type of cooling system, and whether they have an electric water heater. Based on the customer responses,

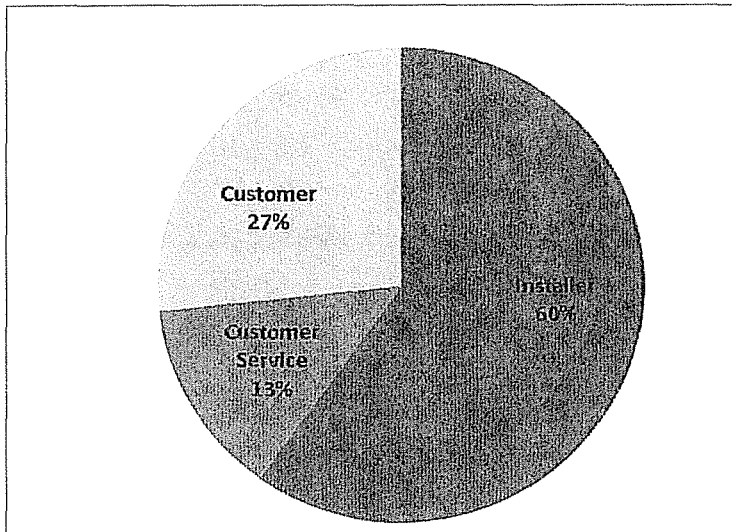
- 85 percent are homeowners and 15 percent are renters.
- 87 percent have central heating and cooling systems, 12 percent have only central cooling systems and 1 percent did not have either.
- 98 percent have electric water heaters.

Programmable thermostat and device controller installation generally took between two and three hours. However, nearly a third of survey respondents reported that the process took more than three hours and one in five reported that the installation took two hours or less.

Figure 3 Length of Time for Thermostat and Device Controller Installation (n=15)

The installer initially programmed 60 percent of the programmable thermostats, based on the participant survey. Customer's programmed 27 percent themselves and 13 percent contacted customer service for assistance with the initial programming.

Figure 4 Initial Thermostat Programming (n=15)



Kentucky Power offers multiple bill payment methods to electric customers. As a measure of internet usage for everyday activities, the participant survey asked the how customers paid their electric bills. Fifty-three (53) percent of customers pay their bill online and 20 percent have automatic withdrawal.

4.3 Program Marketing

The Residential and Small Commercial Load Management Program is marketed under Kentucky Power's GRIDSMART® Programs. Kentucky Power utilizes targeted marketing to customers that are likely to have electric cooling and water heating, service for at least 12 months, low credit risk level, sufficient cellular service and non-demand meters.

In 2011 and 2012, marketing activities included:

- **Direct Mail.** Direct mailers, including letters, postcards, bill inserts and self mailers, were distributed to targeted residential and small commercial customers in the Ashland District in January, February, March and May of 2012.
- **KPCO Employee Communications.** Posters and email blasts were utilized to help KPCO employees become more familiar with the DSM Programs. KPCO employees were encouraged to enroll in the pilot program and to promote programs in the local community.
- **Phone Blast.** In February 2012, Kentucky Power utilized phone blasts to follow-up direct mail distributed in January and February 2012.
- **Internet.** Kentucky Power marketed the program online through the KPCO SMART Programs website at kentuckypower.com/save
- **Customer Service.** The KPCO Customer Services Group provides program information to eligible customers.

Based on customer information from KPCO and cellular service coverage from Consert, 18,325 residential and 317 small commercial customers have been identified. The customers and Kentucky Power employees classified as 'good coverage' are within Ashland District and 'Unknown' are within the Appalachian Wireless network. Kentucky Power focused on 'good coverage' customers and employees initially. Marketing activities planned for 'moderate coverage' and 'unknown coverage' customers in Pike, Perry and Letcher counties in April and May were cancelled due to the lack of an installation contractor in the southern territory.

Table 11 Residential and Small Commercial Targeted Marketing

Cellular Coverage	Residential Customers	Commercial Customers
KPCO Employee		
Good Coverage	96	
Moderate Coverage	17	
Poor Coverage	9	
No Coverage	7	
Unknown	100	
Customers		
Good Coverage	3,476	90
Moderate Coverage	971	12
Poor Coverage	1,084	
No Coverage	613	12
Unknown	11,952	203
Total	18,325	317

Table 12 Marketing Activities To-Date

Date	Activity	Audience	Quantity
9/9/11	Email	KPCO Employees	340
10/6/11	Email	KPCO Employees	340
1/17/12	Self Mailer	Residential	501
1/31/12	Self Mailer	Residential	502
2/7/12	Self Mailer	Residential	3455
2/24/12	Phone blast	Residential	3351
3/9/12	Self Mailer	Small Commercial	77
3/16/12	Letter	Residential	3,455
5/30/12	Self Mailer	Residential	1065
5/30/12	Self Mailer	Small Commercial	228

Figure 5 Phone Blast Text

Hello. This is a message from Kentucky Power. Again, this message is from Kentucky Power.

Kentucky Power is offering a pilot program for customers who have central electric cooling systems and electric water heaters. It's called SMART Energy Management, and it can help lower your electricity bills. When you sign up, you'll receive a free, programmable, communicating thermostat professionally installed at no charge. Plus you can receive up to a total of \$28 in credits on your electricity bills each year.

There's more. With SMART Energy Management, you can view your daily electricity use online... and, if you have a smart phone, you can remotely adjust your thermostat settings when you are on the go.

So sign up today. To learn more, visit kentuckypower.com/go/smartenergy or call 1-855-368-8259. Again, that's kentuckypower.com/go/smartenergy or call 1-855-368-8259.

Thank you.

Figure 6 Direct Mail

Lower your electricity bills year-round.

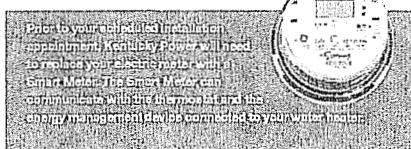
As part of our gridSMARTSM initiative, Kentucky Power is offering SMART Energy ManagementSM - a new air conditioning (A/C) and electric water heater energy management program. This program is offered to customers who have central electric cooling systems or electric heat pumps as well as electric water heaters. It is designed to help lower your electricity bill, conserve electricity and cut energy consumption and emissions.

Sign up for SMART Energy ManagementSM and you'll receive:

- A free programmable communicating thermostat installed by a licensed contractor
- Energy management devices for your electric water heater and cooling system, installed free-of-charge
- Up to \$28 in bill credits by allowing your programmable thermostat to be automatically adjusted and your electric water heater to be turned off during periods of high electricity demand*
- Access to our web-based energy management software so you can conveniently change or program your thermostat's temperature settings and view your daily energy use. Mobile user? You can monitor and remotely adjust the thermostat settings and operation of your water heater when you are on the go.

Enroll online today!

kentuckypower.com/go/smartenergy
Or call toll free 1-855-KENTUCKY (1-855-368-8259)
Customer Code SEM10



How SMART Energy ManagementSM works



1. The call for electricity is high and there is a need to reduce demand on the power grid.
 2. The temperature setting on your thermostat is adjusted and your water heater is turned off.
 3. The event ends.
- Once the event ends, your thermostat returns to its digital programmed temperature setting and your water heater is returned to normal status.
- Key facts about service at your location:
- As a participant in the program, you will receive a call from a Kentucky Power representative to request the information required to enroll in SMART Energy Management.
 - Up to 10 SMART Energy Management events can be scheduled during peak periods and will occur weekly, Thursday, 11 a.m. to 10 p.m. Eastern Standard Time. The events require Kentucky Power to automatically adjust your thermostat from 68°F to 72°F and your water heater to be turned off for no more than six hours during the months of June through September between the hours of noon and 8 p.m. It may also be turned off no more than four hours during the months of November through February between the hours of 7 a.m. - 11 a.m. and 6 p.m. - 10 p.m.

Receive credits on your monthly electric bills

Receive \$20 in bill credits during the summer months by allowing your thermostat to be automatically adjusted (\$5 per month from June through September).

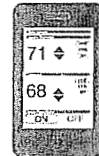
You can also receive \$8 in bill credits by allowing your water heater to be turned off (\$1 monthly bill credit during the months of June through September and November through February).

Program your thermostat online.

As a participant of SMART Energy Management, you can go online to program and adjust the temperature settings on your thermostat - from anywhere, at any time. You'll also learn how much electricity you use hour-by-hour and day-by-day so you can see how your energy-efficient actions save money and energy.

Have a smart phone?

Our online tool recognizes mobile users, and other mobile devices, so you can remotely adjust the temperature settings on your thermostat when you are on the go.

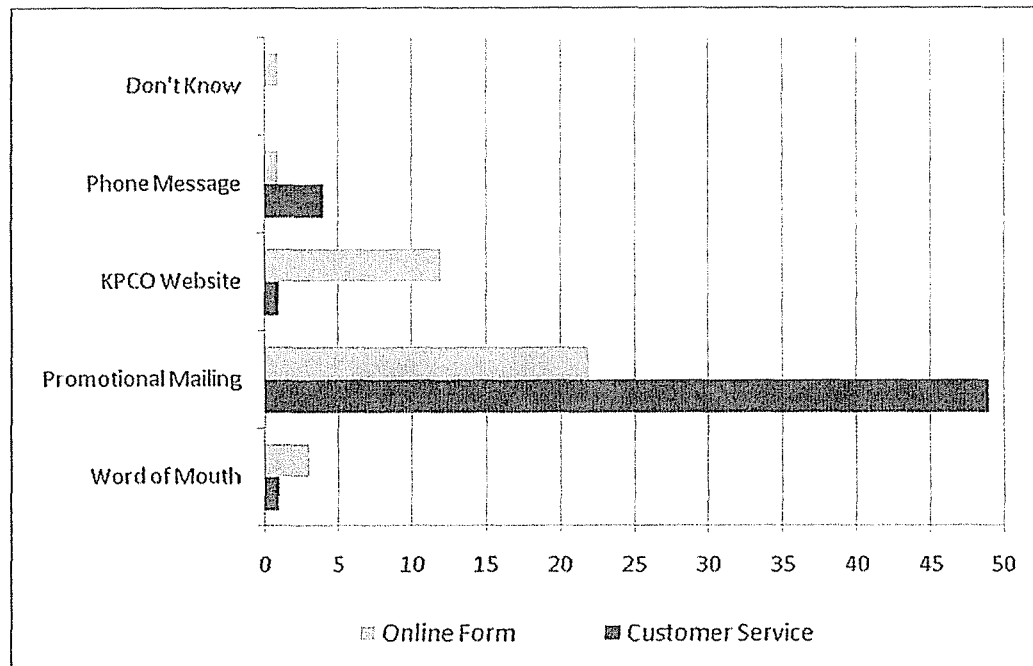


Why SMART Energy ManagementSM?

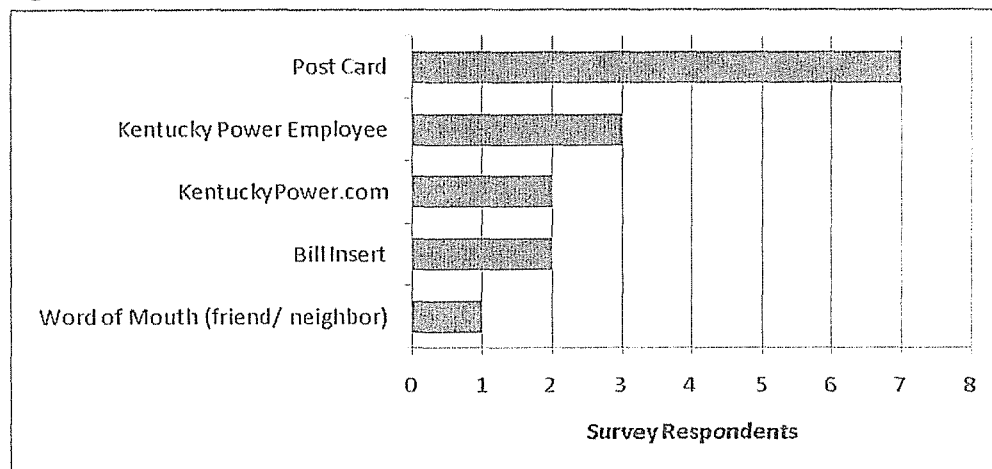
When the call for electricity is high, there is a need to reduce demand on the power grid. SMART Energy Management can help conserve electricity during high demand periods throughout the year, while also reducing emissions.

4.3.1 Program Awareness

Of the customers that contacted the Kentucky Power customer solution center and/or submitted the online form, the majority had heard of the program from a promotional mailing, followed by the KPCO website (Figure 7).

Figure 7 How Customers Heard of the Program, Enrollment Form

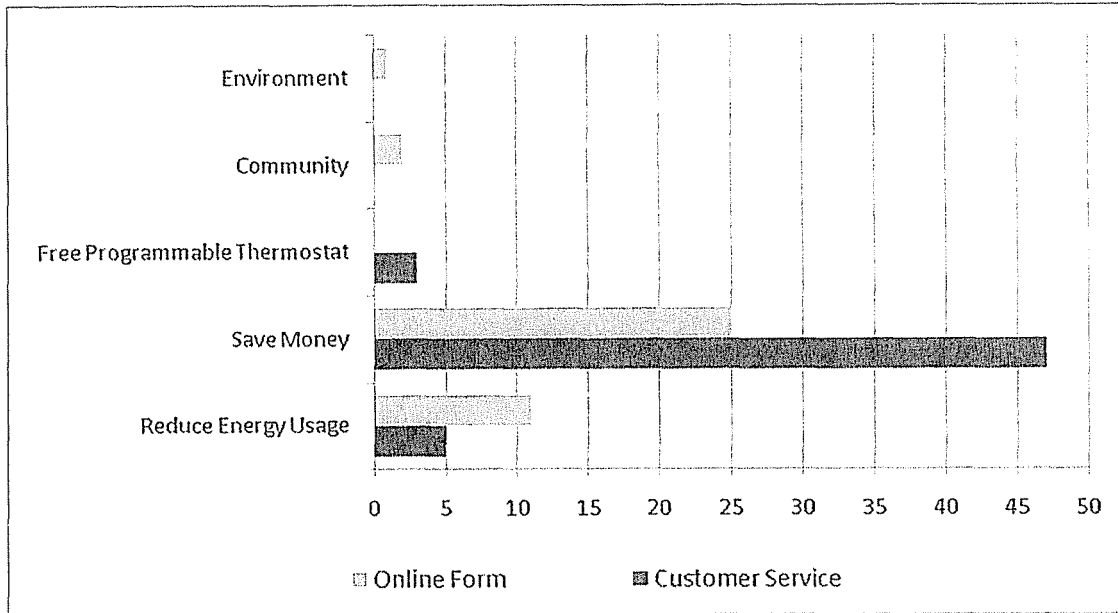
According to survey respondents, customers most often learned of the program from KPCO direct mail. Forty-seven (47) percent of customers learned of the program from a post card and 13 percent from a bill insert. KPCO employees and customer referral also raised awareness about the program.

Figure 8 How Customers First Learned of the Program, Survey Response (n=15)

4.3.2 Motivation for Participation

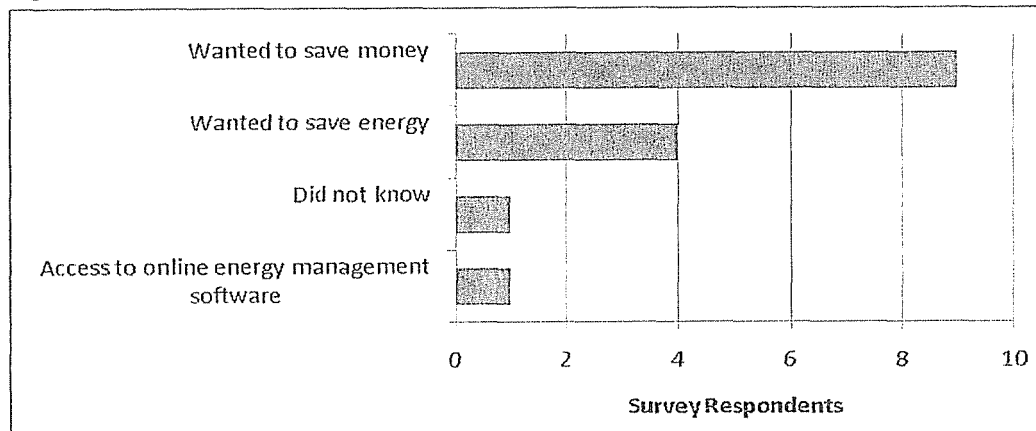
Of the customers that contacted the Kentucky Power customer solution center and/or submitted the online form, the majority noted that the main reason for enrolling in the program was to save money, followed by reducing energy usage (Figure 9). Consert would like to modify the marketing to stress the ability for the customer to control their energy use from the internet rather than the potential bill savings, as they believe that it would attract a different type of customer to the program.

Figure 9 Customer Motivation, Enrollment Form



Participating customers surveyed cited that the primary reason for participating in the Load Management Pilot Program was saving money (60 percent) and energy (27 percent).

Figure 10 Customer Motivation (n=15)



4.4 Program Tracking

Kentucky Power submits bi-annual reports to the Kentucky PSC with program progress to-date, including participation, estimated energy and demand savings, and budget. The utility reviews actual, projected and summary program data with the DSM Collaborative on a quarterly basis. Consort manages and tracks all customer information and load event data as well as customer usage data for the HVAC equipment, water heater, programmable thermostat settings and room temperature. An online management system, the Utility Campaign Management System ("UCMS"), is utilized to track customer information and status within the program. An online portal, the Utility Portal, is utilized to manage the load management data, including monitoring energy consumption, starting and stopping load control events and managing customer energy management accounts.

Consert provides weekly status reports summarizing the contracts received, installations scheduled, meter installs, complete installs, disqualified customers and the number of accounts in the scheduling queue. The data is manually pulled from UCMS and some inputs are estimated based on recent installation activities. Therefore, discrepancies occasionally appear in the reports. Consert anticipates automating the UCMS reports utilized to provide the weekly and monthly status reports to KPCO within the next 3 to 6 months.

Within three business days of an event, Consert provides load control event data including:

- Start and end date and time of event.
- Available load when event began.
- Energy and demand shed during event (individual and total).
- Number of customers that opted-out of the event and the time of opt-out.
- Number of HVAC units and water heaters (individual and total).
- Energy usage per device on 15-minute intervals (individual and total).

Consert will not initiate more than 15 scheduled load events, up to 150 hours, during a season. Consert anticipates incorporating load event data into the weekly status reports within the next 3 to 6 months, including the number of participants per event, number of load events, number of load event hours and the demand reduced during the event.

Consert databases and system snapshots are backed-up on a nightly basis and the system would be restored within 12 hours of any technical issue. The smart meters contain 3-days of energy usage data and customer programmable thermostat settings. However, Consert does not have the ability to restore/recreate customer programmable thermostat settings if an account is reset or cancelled. Consert plans to develop this capability by Spring 2013.

Customer enrollment and agreement information is entered into UCMS.

- The online enrollment form is entered directly into UCMS.
- KPCO customer solution center enters the customer information directly into UCMS utilizing a KPCO web-interface.
- Kentucky Power manually indicates on the customer record in UCMS the date the contract was received and may attach a copy of the signed agreement.

UCMS automatically screens the online form and KPCO customer solution center enrollments for eligibility utilizing a database created by Consert. Kentucky Power provided a database of customers with eligible credit rating, length of service and type of service (i.e. customer rate class). Consert added cellular service availability to the KPCO database. The KPCO eligibility of mailed/faxed Customer Agreements is verified when Kentucky Power staff updates the customer records in UCMS (as the database contains only KPCO eligible customers). Consert manually screens these participants for cellular service availability.

The customer is determined to be eligible or pending action. Consert reviews pending records to verify that the customer is eligible or ineligible. Eligible records are listed in outbound scheduling and Consert schedules installation appointments. The UCMS system contains a number of reports and a database of potentially eligible KPCO customers, searchable by customer name or address. The UCMS reports contain varying levels of information; a few only contain customer counts with no identifiable customer information (i.e. customer name or account number). The reports include:

- Completed online forms and Customer Agreements by enrollment date.
- Customers that need to be scheduled for installation.
- Scheduled installation appointments.
- Work orders for gateway meter and HAN equipment installations.
- Customers that are in the queue and need to receive a meter.
- Completed installations.
- Disqualified customers.
- Customers that withdrew from the program.
- Trouble tickets, detailing the customer issue and ticket issue and close dates.
- KPCO customer solution center customer records.

Consert anticipates automating these reports within the next 3 to 6 months. The UCMS system also contains a database of potentially eligible KPCO customers, searchable by customer name or address. The database may contain multiple entries for the same customer. The customer records in the searchable database track:

- Name, address, contact information and account number
- Status of contract
- Record of program history, including the date the contract was received, the date the customer was screened by UCMS, the date(s) and time(s) the customer was called or emailed to schedule the installation, the installation date (whether the installation was completed, cancelled, withdrawn, etc), the reason for disqualification, the Consert/KPCO contact.
- A copy of the customer agreement.
- Equipment information, including existing and new meter serial number, manufacturer meter reading, meter seal number and pictures of existing and new meter as well as the device controller serial numbers and locations in the home.

During the customer enrollment process, the following information is collected:

- Customer name, address, KPCO electric account number, telephone number, email address
- Residence information:
 - Rent or own residence
 - Type of cooling system installed
 - Is there an electric water heater
- Awareness:
 - How did they hear of the program

- Type of mailing received
- Main reason the customer is signing up for the program

The KPCO Meter Revenue Operation Group tracks the meters removed and replaced from customer homes/businesses using a two-step process. When both steps are completed by the installation contractor, the customer is considered a program participant and can receive bill credits.

1. KPCO receives the change meter order for the gateway meter.
2. The installation contractor installs the HAN device controller equipment.

AEP Customer Support notifies Consort via email and by the Customer Communication System when to schedule a load event. The Utility Portal is utilized to monitor energy consumption, schedule and monitor load events as well as manage customer energy management accounts. Utility Portal data includes, but is not limited to:

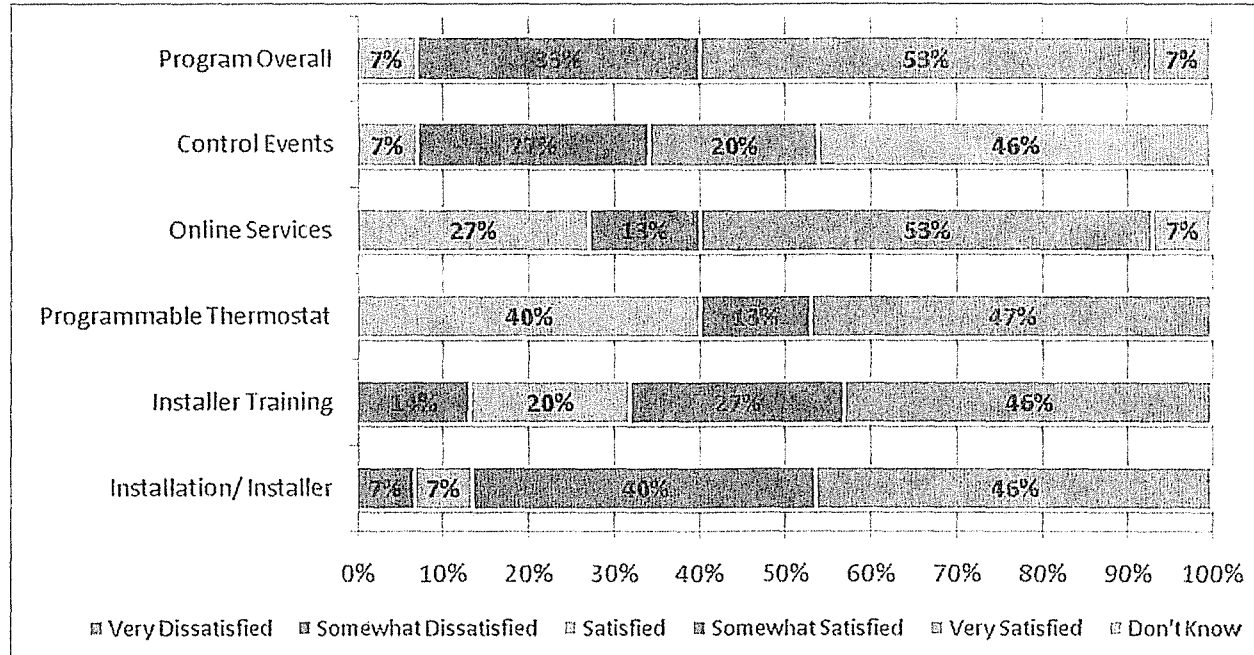
- Energy Consumption: Real-time participant usage and available load by program and device controller.
- Manage Customer Energy Management Accounts: Participant information such as account number, contact information, equipment information, meter reading and status of the meter. Consort customer service representatives can assist customers with their energy management account and reset customer passwords.
- Schedule Load Events: Load events can be established up to two weeks in advance.
- Monitor Load Events: Information available for events in-progress, upcoming and past. Summary statistics and account-specific statistics are provided for in-progress and past events. A graphic presents total participant consumption for 4-hours prior the event and real-time (updates every 5 minutes throughout the event). A summary graphic and detailed log of accounts presents participant status during the event, from in-progress to opted-out.

Kentucky Power had difficulty viewing the graphics available through the Utility Portal because the Consort portal is supported on the most up-to date Internet Explorer and Adobe Flash systems. Consort addresses compatibility issues as new version are rolled-out every six months. The Kentucky Power viewing issues were resolved.

4.5 Customer Satisfaction

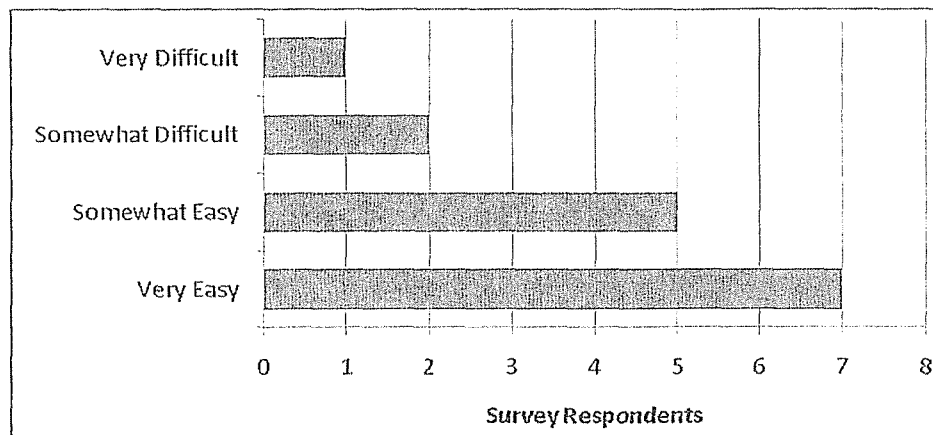
Overall, participants were satisfied with the Load Management Pilot Program, particularly the online services. Ninety-three (93) percent of customers surveyed would recommend the program. Based on the participant survey, the areas that could use the most improvement include the programmable thermostat and the installer training.

Figure 11 Customer Satisfaction (n=15)

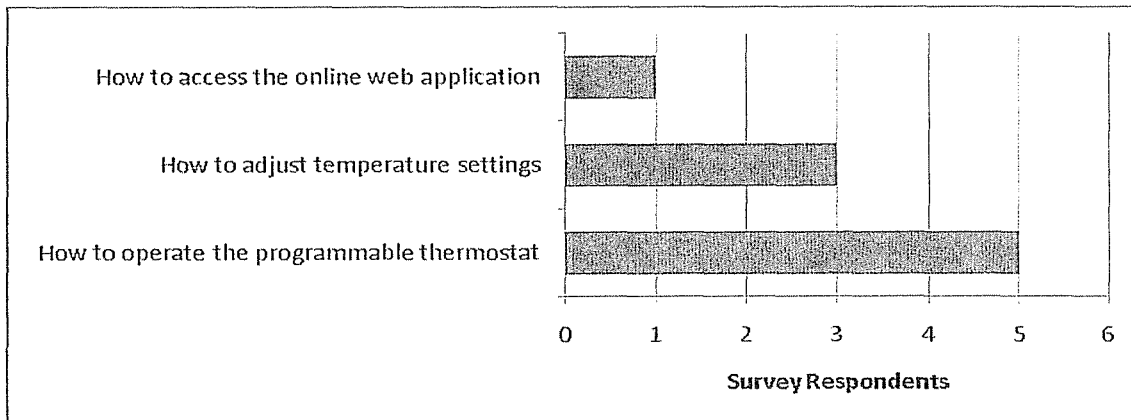


Nearly half (47 percent) of survey respondents noted that the process of having the programmable thermostat and device controller installed was very easy. One customer noted that the installer did not show up for several appointments.

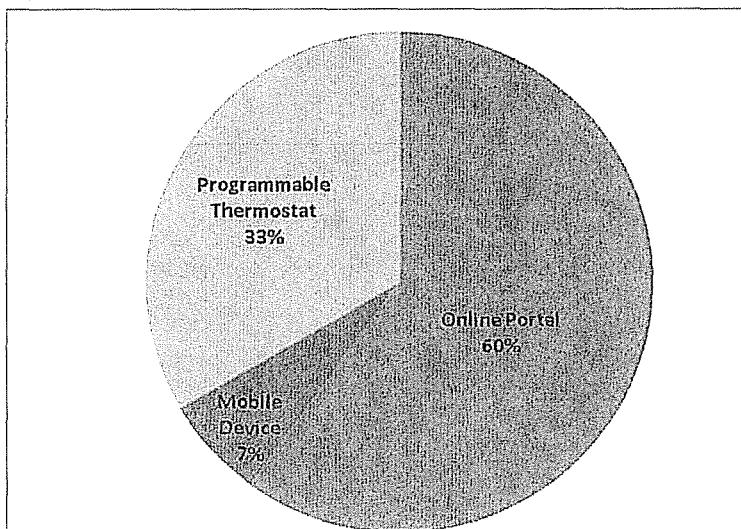
Figure 12 Ease of Programmable Thermostat and Device Controller Installation (n=15)



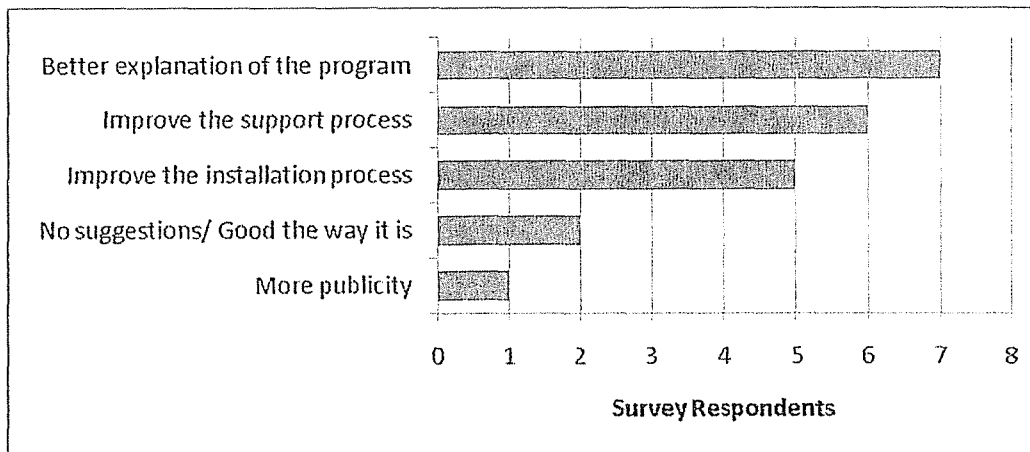
According to survey results, program participants were generally quite satisfied with the installer. In general, the installer was neat and courteous (93 percent), flexible about scheduling the installation appointment (86 percent) and on-time for the appointment (80 percent). Fifty-three (53) percent of survey respondents felt the installer provided adequate training on how to operate the programmable thermostat. Participants recommended additional training on how to operate the programmable thermostat, especially how to adjust the temperature and access the online web application.

Figure 13 Participant Suggested Additional Training (n=15)

Eighty (80) percent of survey respondents found the thermostat easy to use and 87 percent had experience adjusting the temperature settings. Participants most often adjust the thermostat settings utilizing the online customer portal (60%), followed by the programmable thermostat itself (33%). One participant reported using a mobile device to make adjustments.

Figure 14 How Participants Adjust Temperature Settings (n=15)

Suggested program improvements were primarily, better explanation of program (33%), improvement of the support process (29%) and improvement of the installation process (24%). Participants surveyed noted that the installer needs better training and that the online applications could be improved.

Figure 15 Program Improvements (n=15)

Many respondents (60 percent) contacted customer service and/or the installation contractor, primarily to receive a better understanding of the thermostat temperature settings and how to adjust the settings. Two customer service issues that arose in recent weeks are summarized below. The first concerns an elderly customer without internet access that had load management equipment installed.

A neighbor was helping the customer, who was elderly and did not have a computer or internet access, manage the system. Two days after the installation was completed, Consert customer service received a call from the customer's neighbor. Consert assisted the neighbor in setting the thermostat for the home. However, three days later the neighbor contacted customer service requesting that the customer be removed from the program as they were having difficulty operating the thermostat. Consert removed the customer from the program and removed the load management equipment the following day.

A second customer service issue concerned the deletion of a customer program account due a Consert system error.

The customer had to notify Consert that the account had been deleted. The customer had difficulty finding the customer service contact information as it was not available unless the customer was logged into the online portal. The customer service representative reset the account, but the customer's program settings were not saved and the customer had to reprogram the thermostat settings. The customer displayed concern that Consert did not notify them of the account issue and that there was not a back-up of the thermostat settings or energy usage history.

5. Key Findings and Recommendations

The objective of the Residential and Small Commercial Load Management Pilot Program is to determine whether peak demand can be effectively reduced through the installation of device controllers on residential and small commercial central air conditioners, heat pumps and/or electric water heaters.

5.1 Key Program Findings

The objective of the Residential and Small Commercial Load Management Pilot Program is to determine whether peak demand can be effectively reduced through the installation of device controllers on residential and small commercial central air conditioners, heat pumps and/or electric water heaters.

5.1.1 Program Performance Indicators

As of May 31, 2012, 35 residential customers had 73 device controllers fully installed, 39 central air conditioner/heat pump devices and 34 electric water heater devices. Sixty-one (61) residential customers signed the agreement to participate in the program, 66 percent submitted the online form, 23 percent mailed/faxed the Customer Agreement and 11 percent were Kentucky Power employees. The majority (91 percent) of the 2011 expenditures were administrative costs. The cost per device controller is decreasing, from \$10,350 in 2011 to \$1,353 through May 2012.

Table 13 Residential Participation and Device Installation

	2011			2012 (Jan to May)		
	Actual	Goal	% of Goal	Actual	Goal	% of Goal
Load Management Devices	10	950	1.1%	63	1,000	6.3%
AC/HP	6	475	1.3%	33	500	6.6%
Water Heater	4	475	0.8%	30	500	6.0%
Participants	5			30		

Fifty-five (55) customers contacted Kentucky Power customer solution center, 12 customers mailed/faxed the Customer Agreement and 6 completed the online form. Eighteen (18) customers signed the agreement to participate in the program, 11 had a smart meter installed and 10 had HAN equipment installed. Sixty-seven (67) percent of customers did not complete the agreement to participate and did not receive follow-up.

Forty (40) customers submitted the online form, 26 had a smart meter installed and 21 had HAN equipment installed. Three (3) customers are scheduled for installation and the status of 3 customers is unclear based on the UCMS database. Seven (7) employees enrolled in the Load Management Program and 2 customers mailed/faxed the Customer Agreement but had not contacted the KPCO customer solution center.

Eleven (11) participants were disqualified and 6 withdrew from the program. Six (6) participants had the gateway meter installed prior to disqualification, requiring follow-up and replacement with standard KPCO meters. Of the 6 participants, one did not meet the National Electrical Code electric wiring standards for homes, two were elderly with health issues (one of whom did not have internet access), and three had inadequate cellular coverage.

In May 2012, Consort modified the smart meter installation procedure. Going forward, the installer would remove any smart meters with inadequate cellular coverage (i.e. not communicating with Consort's system) during the initial installation appointment.

Table 14 Residential Participation as of May 31, 2012

	KPCO Employee	Online Form	Mailed Customer Agreement	Total
Enrolled via Customer Solution Center	0	6	12	18
Signed Participation Contract	7	40	14	61
Smart Meter Installation	7	26	11	44
HAN Installation	7	21	10	38
Installation Scheduled	0	3	2	5
Unknown	0	3	0	3

The Load Management Pilot Program was approved in October 2010 and the tariff in December 2010. Kentucky Power solicited an implementation contractor and awarded the contract to Consort in December 2010. Consort began working with KPCO staff in January 2011 to establish the program infrastructure while the contract terms were negotiated and equipment testing was being conducted. A contract was signed in July 2011. AEP conducted rigorous testing of the device controller, gateway meter and Consort technology security. AEP Dolan Laboratory approved the HAN (energy management) equipment in April 2011 and AEP Canton Meter Laboratory approved the gateway meter, Rev. A model 200 ampere rating, in July 2011. The AEP Canton Meter Laboratory tested a new gateway meter, Rev. B model, and approved usage for the 320 ampere and 200 ampere rated meter in January 2012. Automated billing for program participants was completed in February 2012.

In November 2011, Consort issued an RFP to solicit licensed electricians to perform the equipment installations. Two installation contractors were selected, one in the northern region and one in the southern region of the KPCO service territory. The installation contractor in the southern territory elected to back out of the program in April 2012.

The load management technology can only be utilized within a network that carries the Verizon Wireless signal. The new gateway meters (Rev. B model) are capable of working with other providers and Consort's future plans include working with other providers. Approximately 65 percent of the KPCO service territory is within the Appalachian Wireless network, with the Verizon network primarily covering five counties in the southern region and the Ashland District in the north. Consort received detailed coverage data from Verizon Wireless. The Appalachian Wireless network carries the Verizon Wireless signal and reported that the system was 95 percent reliable, but did not provide detailed coverage data. In February 2012, Consort made the decision to begin installations within the Appalachian Wireless network.

The program was initially offered to KPCO employees beginning September 2011 and later to KPCO customers in the Ashland District beginning January 2012. The first employee installation occurred in September 2011 utilizing Consort certified technicians and the first external customer installation occurred in February 2012 utilizing the Consort installation contractor. The first load event occurred on February 29, 2012.

Participants have multiple avenues for program assistance, including Kentucky Power customer solution center, the installer and Consort. The KPCO program website provides Kentucky Power customer

solution center contact information while the program paperwork, including the Welcome Packet and the online portal, provide Consert customer service contact information.

5.1.2 Program Awareness and Marketing Strategies

Kentucky Power utilizes targeted marketing to customers likely to be eligible for the program. Marketing activities included phone blasts, emails, direct mail, program brochures and the KPCO website. According to participating customers surveyed, customers most often learned of the program from KPCO direct mail. The primary reason for participating was saving money and energy.

Targeted marketing to customers within the Ashland District began in January 2012. Targeted marketing to customers in Pike, Perry and Letcher counties was anticipated to begin in April 2012 but was cancelled due to issues with Consert installation contractors.

5.1.3 Program Tracking

Consert manages and tracks all customer information and load event data as well as customer usage data for the HVAC equipment, water heater, programmable thermostat settings and room temperature. An online management system, the Utility Campaign Management System ("UCMS"), is utilized to track customer information and status within the program. An online portal, the Utility Portal, is utilized to manage the load management data, including monitoring energy consumption, starting and stopping load control events and managing customer energy management accounts.

Consert provides weekly status reports summarizing the contracts received, installations scheduled, meter installs, complete installs, disqualified customers and the number of accounts in the scheduling queue. The data is manually pulled from UCMS and some inputs are estimated based on recent installation activities. Therefore, discrepancies occasionally appear in the reports. Consert anticipates automating the UCMS reports utilized to provide the weekly and monthly status reports to KPCO within the next 3 to 6 months.

Within three business days of an event, Consert provides load control event data including, but not limited to, energy and demand shed during the event, number of HVAC units and water heaters, and number of customers that opted-out. Consert will not initiate more than 15 scheduled load events, up to 150 hours, during a season. Consert anticipates incorporating load event data into the weekly status reports within the next 3 to 6 months, including the number of participants per event, number of load events, number of load event hours and the demand reduced during the event.

Consert databases and system snapshots are backed-up on a nightly basis and the system would be restored within 12 hours of any technical issue. The smart meters contain 3-days of energy usage data and customer programmable thermostat settings. However, Consert does not have the ability to restore/recreate customer programmable thermostat settings if an account is reset or cancelled. Consert plans to develop this capability by Spring 2013.

The UCMS system contains a number of reports and a database of potentially eligible KPCO customers, searchable by customer name or address. However, the UCMS reports contain varying levels of information; a few only contain customer counts with no identifiable customer information (i.e.

customer name or account number). Additionally, the database may contain multiple entries for the same customer.

5.1.4 Customer Satisfaction

Participants are generally satisfied with the pilot program, particularly the online energy management services. However, there may be a lack of understanding on how to program the thermostat. According to the participant survey,

- 60% of program participants contacted customer service to get a better understanding of how to set/adjust the thermostat settings.
- Participants recommended the program provide additional training on how to operate the programmable thermostat, especially how to set/adjust the temperature and access the online web application.
- 87% had adjusted the temperature settings, primarily using the online portal (60%) followed by the programmable thermostat itself (33%).

5.2 Recommendations

AEG has several recommendations on how to improve the program. These include:

AEG recommends an impact evaluation commence after a full summer and winter season of load data is available to determine energy and demand savings. Data from a full year of control events must be collected before a meaningful impact evaluation can be conducted. An evaluation of the load impacts and program cost-effectiveness could be conducted in Fall 2013.

5.2.1 Encourage Online Enrollment

AEG recommends that KPCO modify customer enrollment options to encourage online enrollment. Participants must have internet access and be an experienced internet user to properly program the thermostat and make modifications to the thermostat settings. KPCO should limit mailed/faxed Customer Agreement applications to renters. The Customer Agreement application should be removed from the program website. Customers can be provided the KPCO customer solution center contact if there are enrollment issues or they need to be mailed/faxed a Customer Agreement.

AEG recommends that the Customer Agreements are submitted directly to Consert rather than to Kentucky Power staff. Currently, KPCO receives the applications submitted via mail or fax, and can upload the file to the UCMS customer record indicating the date the contract was received. Additionally, the Customer Agreements should consistently be uploaded to the UCMS customer record.

5.2.2 Consider Program Modifications

AEG recommends that Kentucky Power work with Consert to engage an installation contractor for the southern territory. The installation contractor in the southern territory elected to back out of the program in April 2012 and Consert has been unable to find another contractor located within that territory. Preferably, an installation contractor within the southern territory would conduct the installations and provide response to service calls. However, if this is not possible, the installation

contractor in the northern territory is willing to conduct the installations. Consert needs to ensure that the travel will not negatively impact the program or the services provided by the installation contractor and that the contractor can provide adequate response to customer service and/or equipment maintenance calls.

AEG recommends that the Consert representative review the program with the customer when scheduling the installation appointment. In an effort to minimize disqualifications and withdrawals after the gateway meter has been installed, the representative should remind the customer that the load management equipment adjusts household temperature and the thermostat is operated via the internet.

AEG recommends that the personal energy management account log-in webpage provide Consert's customer service contact information.

AEG recommends that the installation contractor provide a basic overview of the programmable thermostat online capabilities at the time of the installation. Approximately 60 percent of survey respondents contacted customer service, primarily to receive a better understanding of the thermostat temperature settings and how to adjust the settings. Additionally, survey respondents recommended additional training on how to operate the programmable thermostat, especially how to adjust the temperature and access the online web application.

AEG recommends that Consert improve the reporting process and automate some reporting functions, as anticipated. Manually counting the number of entries in UCMS can lead to discrepancies and it is necessary for Kentucky Power to have accurate program data. The UCMS system contains a number of reports and a database of potentially eligible KPCO customers. However, the UCMS reports contain varying levels of information; a few only contain customer counts with no identifiable customer information (i.e. customer name or account number). Additionally, the database may contain multiple entries for the same customer. The UCMS system should contain a downloadable report of all participating customers, including customer contact information (name, address and account number) as well as their status in the program. The UCMS systems should also contain a database of customers enrolled in the program, separate from the database of eligible customers. The database should list all enrolled customers and provide a link to the customer record as well as have a search function by customer name, address or account number.

5.2.3 Modify Marketing

AEG recommends that Kentucky Power work with Consert to modify marketing materials and activities.

4. Materials should emphasize online enrollment. For example, materials should direct customers to the Load Management Program website rather than provide the KPCO customer solution center telephone number.
5. Materials should highlight the ability for the customer to control their energy use from the internet. According to Consert, emphasizing online capabilities may attract a different type of customer to the program. For example, an experienced internet-user interested in the convenience of online temperature management.

6. Redefine marketing responsibilities. Of the 55 customers that contacted Kentucky Power customer solution center, 67 percent did not sign the agreement to participate in the program. There was no follow-up to determine why these customers did not sign the agreement.

Appendix A. Customer Survey

Good morning/afternoon/evening, I'm _____ with Applied Energy Group. We have been retained by Kentucky Power to conduct a survey of their SMART Energy Management Pilot Program. I'd like to talk with you about your impression of the program and get some feedback. This is NOT a sales effort, but for research purposes only. The survey should only take 5 to 10 minutes. All comments will remain confidential.

According to our records, you are participating in the SMART Energy Management Load Management Pilot Program. If the customer does not recall the program: "The pilot program provides free programmable thermostats and an energy management device to adjust your central electric cooling system and/or electric water heater during periods of high electricity demand."

Program Participation

1. Did you have a energy management device installed on your:
 - a) Central Air Conditioner (7)
 - b) Heat Pump (11)
 - c) Electric Water Heater (12)
2. Do you pay your Kentucky Power bill online?
 - a) Yes (11)
 - b) No (5)
3. How did you first become aware of the SMART Energy Management Pilot Program? (Indicate first mention)
 - a) Kentucky Power employee (3)
 - b) KentuckyPower.com (2)
 - c) Email
 - d) Bill Insert (2)
 - e) Postcard (7)
 - f) Telephone Call
 - g) Word of Mouth (Friend / Neighbor) (1)
 - h) Community event/meeting/presentation
 - i) Other (verbatim)
4. Why did you decide to participate in this program? (Mark all that apply – DO NOT READ)
 - a) Wanted to save energy (4)
 - b) The free programmable thermostat
 - c) Access to online energy management software (1)
 - d) Bill credits offered by Kentucky Power
 - e) Other (verbatim)
 - Save money (9)
 - Don't Know (1)

Program Installation

5. Was the process of having the programmable thermostat and energy management device installed (READ ANSWERS)
 - a) Very easy (7)
 - b) Somewhat easy (5)
 - c) Somewhat difficult (2)

d) Very difficult (If very difficult, ask why) (1)

Was given several appointments to which no one showed up before meeting success

6. Was the installer:

	Yes	Somewhat	No	Comments
a) Flexible about scheduling the installation appointment	13	1	1	
b) On time for the appointment	12	1	2	
c) Neat/courteous	14	1	0	

7. About how long did it take to install the programmable thermostat and energy management device?
(READ ANSWERS)

- a) Less than one hour (1)
- b) 1 to 2 hours (2)
- c) 2 to 3 hours (7)
- d) More than 3 hours (5)

8. Who initially programmed the thermostat?

- a) Installer (9)
- b) Customer Service (2)
- c) Other (verbatim)
Customer (4)

9. Did the installer provide adequate training on how to operate the programmable thermostat?

- a) Yes (skip to question 11) (8)
- b) No (continue to next question) (7)

Only knew default settings

10. What additional training should be provided? (READ ANSWERS)

- a) How to operate the programmable thermostat (5)
- b) How to opt-out of a load management event
- c) How to adjust temperature settings (3)
- d) How to access the online web application (1)

11. Have you had any reason to contact the installer or Kentucky Power?

- a) Yes (If yes, ask the reason why) (9)
- b) No (6)

Needed better explanation of temperature settings for the thermostat (1)

When a new heat pump was needed, KPCO disconnected the pilot system and it shocked the installer (1)

Programmable thermostat needed readjustment (5)

Setting up online account (1)

Lost accessibility(1)

12. Have you contacted customer service for any reason?

- a) Yes (continue to next question) (9)
- b) No (skip to question 14) (6)

There was no access to the web-application from an i-pad

Programming issues with the online web application

Log-in issues at the beginning of the program

13. How would you rate your experience with customer service? (READ ANSWERS)

- a) Inadequate (1)
- b) Slightly adequate (2)
- c) Somewhat adequate (4)

- d) Excellent (3)
14. Do you find the programmable thermostat is easy to use/understand?
- a) Yes (12)
- b) No (If no, ask why?) (3)
*It's a gradual learning process, too much to pick up at the outset.
 getting temp info from inputs
 moderately, some trouble*
15. Outside of a control event, have you adjusted the temperature settings on your programmable thermostat?
- a) Yes (continue to next question) (13)
- b) No (skip to question 17) (2)
16. How do you adjust the temperature settings?
- a) On-line customer web application (9)
- b) Phone support
- c) Mobile device (1)
- Thermostat (5)

Customer Satisfaction

17. Please rate your satisfaction with the following on a five-point scale, where "5" means "Very Satisfied" and "1" means "Very Dissatisfied." How satisfied are you with the:

	Very Dissatisfied	2	3	4	Very Satisfied	Don't Know
a) Installation/Installer	1	0	1	6	7	
b) Installer training	0	2	3	3	7	
c) Programmable thermostat	0	0	6	2	7	
d) Online services	0	0	4	2	8	1
e) Control events	0	0	1	4	3	7
f) Program overall	0	0	1	5	8	1

Comments (verbatim)

18. Would you recommend the program to someone else?
- a) Yes (14)
- b) No (1)
Yes, but would need to talk to them about the pros/cons first.
19. How could the Kentucky Power program be improved?
- a) More publicity/advertise it (1)
- b) Improve the installation process (2)
- c) Improve the support process (5)
- d) Better explanation of the program (6)
- e) Easier to reach people at Kentucky Power
- f) No suggestions/good the way it is (2)
- g) Other (verbatim)
*Installer needs better training (1)
 Inform customers the installation is a long process, not a simple walk-in (1)
 Improve online application and support (2)*

Thank you for taking the time to answer my questions!



Kentucky Power Company
Residential Efficient
Products Program

Process, Market and Impact Evaluation • July 2012

Submitted by

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Abstract

Kentucky Power Company retained Applied Energy Group to conduct a process, market and impact evaluation of its Residential Efficient Products Program. ENERGY STAR® qualified lighting uses up to 75 percent less energy and lasts up to 10 times longer than standard incandescent bulbs. Replacing existing incandescent light bulbs with ENERGY STAR® qualified lighting, such as compact fluorescent lighting (CFLs), is one of the simplest and most effective ways to reduce electric bills. The Residential Efficient Products Program utilizes upstream markdown incentives and in-store coupons to reduce the retail price of eligible products at participating retail stores as well as at the Kentucky Power online store. Kentucky Power provides incentives to participating retailers for actual products sold, verified with supporting sales documentation.

To arrive at the final recommendations of the process, market and impact evaluation, AEG reviewed program materials, assessed Kentucky Power's program tracking and conducted interviews with Kentucky Power program staff, the third-party program implementation contractor and participating retailers. The results of the analysis, along with key findings and recommendations for program improvements, are included in this report.

Table of Contents

Abstract	ii
Abbreviations	i
Definitions	ii
Executive Summary	v
1. Introduction.....	1
2. Energy Independence and Security Act (EISA)	1
3. Program Description	2
4. Evaluation Methodology	4
5. Process and Market Evaluation Findings.....	7
5.1 Program Logic Model	7
5.1.1 Activities and Outputs	10
5.1.2 Outcomes	11
5.1.3 External Factors	12
5.1.4 Best Practices	12
5.2 Program Performance	12
5.3 Program Marketing	15
5.4 Program Tracking & Invoice Processing	18
5.5 Retailer Interviews	20
5.6 Opportunities for Improvement.....	22
6. Impact Evaluation Findings	23
6.1 Gross Energy and Demand Savings	23
6.2 Net Energy and Demand Savings	24
6.2.1 Free Ridership.....	24
6.2.2 Spillover.....	25
6.3 Program Cost-Effectiveness	26
7. Key Findings and Recommendations	28
7.1 Key Program Findings.....	28
7.1.1 Program Performance Indicators.....	28
7.1.2 Program Tracking	29
7.1.3 Program Awareness and Marketing Strategies.....	29
7.1.4 Best Practices	29
7.1.5 Verification and Documentation of Program Impacts	29
7.2 Recommendations	30
7.2.1 Engage Independent Retailers and Reduce Barriers to Entry	30
7.2.2 Review Product Offerings.....	30
7.2.3 Increase Marketing and Promotional Activities	31
Appendix A. Walmart/Lowe's Retailer Survey	32
Appendix B. Independent Retailer Survey	35
Appendix C. Cost-Effectiveness Analysis Inputs.....	37

List of Tables

Table ES1 2011 CFL Bulb Sales by Manufacturer/Retailer	vi
Table ES2 Participation Goal versus Sales, 2011	vi
Table ES3 2011 CFL Bulb Savings by Type	vii
Table 1 EISA Phase 1 Standard	2
Table 2 Eligible Products and Rebates	3
Table 3 Program Budget, 2010-2012	4
Table 4 Program Participation Goals, 2010-2012	4
Table 5 Expected Energy Savings per Participant	4
Table 6 Overview of IPMVP Options	6
Table 7 Manufacturer/Retailer MOU Allocation, 2011	13
Table 8 CFL Bulb Sales by Manufacturer/Retailer, 2011	13
Table 9 Total Bulbs and Incentives by Retail Location, 2011	13
Table 10 2011 Cost per Bulb, Budgeted and Actual	15
Table 11 2011 Promotional Events	17
Table 12 Gross Savings per Unit, 2011	23
Table 13 Total Gross Demand and Energy Savings, 2011	24
Table 14 Net Demand and Energy Savings, 2011	24
Table 15 Free Ridership Probability Scores, Questions 1 and 2	25
Table 16 Free Ridership Weighted Probability	25
Table 17 Spillover Probability Scores, Questions 1 and 2	26
Table 18 Spillover Weighted Probability	26
Table 19 Cost-Effectiveness Results	27
Table 20 Kentucky Power Portfolio Cost-Effectiveness Results, 2011	28
Table 21 Participation Goal versus Sales, 2011	28
Table 22 2011 CFL Bulb Savings by Type	30

List of Figures

Figure 1 Program Logic Model	9
Figure 2 Number of Bulbs Rebated by Manufacturer by Month Sold, 2011	14
Figure 3 Expenditures and Number of Bulbs Reported by Month, 2011	15
Figure 4 APT Field Representative Site Visits by Month, 2011	17
Figure 5 APT Field Representative Training by Month, 2011	18
Figure 6 APT Field Representative Training by Retailer, 2011	18
Figure 7 Eligible Lighting Stock at Retailer Stores	20
Figure 8 Highest Selling Lighting Products	21
Figure 9 Non-Standard CFLs Sales Compared to Standard CFLs, Walmart/Lowe's Retailers	21
Figure 10 Kentucky Power Influence in Moving CFL Stock in 2011, Walmart/Lowe's Retailers	21
Figure 11 Adequacy of Kentucky Power Promotional and Education Efforts	22

Abbreviations

AEG	Applied Energy Group, Inc.
AEP	American Electric Power
APT	Applied Proactive Technologies
CFL	Compact Fluorescent Lighting
EFI	Energy Federation Incorporated
EM&V	Evaluation Measurement and Verification
DSM	Demand Side Management
IPMVP	International Performance Measurement and Verification Protocols
KPCO	Kentucky Power Company
LED	Light Emitting Diode
MOU	Memorandum of Understanding
NTG	Net-To-Gross Ratio
PSC	Public Service Commission
QA/QC	Quality Assurance/Quality Control

Definitions

Benefit-Cost Ratio: The ratio of total benefits of a program to the total costs discounted over some specified time period. The benefit-cost ratio gives a rough measure of the participant rate of return and provides an indicator of program risk. A ratio above one indicates a beneficial program.

Participant Cost Test: Measures the quantifiable benefits and costs to the customer due to participation in a program.

Program Administrator Cost Test: Measures the net costs of a demand-side management program as a resource option based on the costs incurred by the program administrator (including incentive costs), excluding any net costs incurred by the participant. The benefits are similar to the Total Resource Cost benefits, but costs are more narrowly defined.

Ratepayer Impact Measure (RIM) Cost Test: Measures what happens to customer bills or rates due to changes in utility revenues and operating costs caused by the program. Rates will go down if the change in revenues from the program is greater than the change in utility costs. Conversely, rates or bills will go up if revenues collected are less than the total costs incurred by the utility. The RIM test indicates the direction and magnitude of the expected change in customer bills or rate levels.

Total Resource Cost (TRC) Test: Measures the net costs of a demand side management program as a resource option based on the total costs of the program, including both the participant and utility costs.

Coincidence Factor: The ratio, expressed as a numerical value or as a percentage, of the simultaneous maximum demand of a group of electrical appliances or consumers within a specified period to the sum of their individual maximum demands within the same period.

Compact Fluorescent Light Bulb: An efficient electric light source that uses about 75 percent less energy than incandescent bulbs. In a CFL, an electric current is driven through a tube containing argon and a small amount of mercury vapor. This generates invisible ultraviolet light that excites a fluorescent coating (called phosphor) on the inside of the tube, which then emits visible light.

Standard CFL: The most common form of basic CFL that can be identified by its characteristic spiral tube.

Non-Standard CFL: A variety of CFL that come in different shapes and may have additional features such as dimming.

Cost-effectiveness: A criterion that specifies that a technology or measure delivers a good or service at equal or lower cost than current practice, or the lowest cost alternative for the achievement of a given target.

Demand Side Management (DSM): Programs designed to provide incentives to end-use customers or curtailment service providers to enhance the ability and opportunity for reduction of load during peak hours.

Evaluation Measurement and Verification: A set of analyses used to assess energy efficiency programs in terms of energy and demand savings and cost-effectiveness. There are several approaches to EM&V, some of which have been codified as best practices (see IPMVP). Most energy efficiency programs are subject to some type of EM&V.

GRIDSMA[®]RT Programs: An AEP energy efficiency initiative that includes over 100 energy efficiency programs across the AEP service territory. The programs feature smart grid technologies such as smart meters, voltage optimization equipment and smart appliances that can reduce energy use.

Gross Energy Savings: Energy and demand savings seen by the participant at the meter. These are the appropriate program impacts to calculate bill reductions for the Participant Test.

Impact Evaluation: A method of evaluation that assesses any changes, intended or unintended that are directly attributable to an energy efficiency program.

Independent Retailer: A retail business that is owned and operated by the same person outside of a larger company chain.

International Performance Measurement and Verification Protocols (IPMVP): Provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. It may also be used by facility operators to assess and improve facility performance. Energy conservation measures covered in the protocols include fuel saving measures, water efficiency measures, load shifting and energy reductions through installation or retrofit of equipment, and/or modification of operating procedures.

Kilowatt (kW): A unit of power that describes the rate at which energy is generated or used. It quantifies the electric power required by an appliance or device such as a light bulb.

Kilowatt Hour (kWh): A unit of energy that describes how much electricity is consumed over a period of time. For example, if you turn on a 100 watt light bulb all day for 24 hours the light bulb consumed 2.4 kWh of electricity.

Light Emitting Diode (LED) Bulb: Small light sources that become illuminated by the movement of electrons through a semiconductor material. LEDs emit light in a specific direction, whereas an incandescent or fluorescent bulb emits light — and heat — in all directions. For direct lighting applications LED lighting uses both light and energy more efficiently. LED lighting, when designed well, can be more efficient, durable, versatile and longer lasting than incandescent and fluorescents lighting.

Memorandum of Understanding (MOU): A document that details the criteria that retailers and manufacturers must meet to participate in the program. Walmart and Lowe's entered into an MOU for the Residential Efficient Products Program.

Net Energy Savings: The energy and demand savings attributable to the program, adjusted for free riders and spillover.

Net-to-Gross (NTG) Ratio: The ratio of net energy savings to gross energy savings indicates the overall effectiveness of an energy efficiency program. As the NTG ratio approaches one, the magnitude of the program impact increases.

Free Riders: Customers who participate in energy efficiency programs who would have engaged in the efficient behavior in the absence of the program. As a result, the presence of free riders tends to overestimate the energy savings of the program.

Spillover: Customers who engage in energy efficient behavior, but do not participate in the program, due to some influence of the program.

Process Evaluation: A method of evaluation that uses empirical data to assess the delivery of energy efficiency programs, verify goals and determine whether the program is implemented as designed.

Program Logic Model: Graphic representations of an energy efficiency program and its processes. Logic models shows the causal relationships or linkages among the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders critical to a program's performance.

Standard Incandescent Light Bulb: A common light bulb that produces light by heating a filament wire to a high temperature until it glows. With up to 90 percent of its energy emitted as heat, it is among the least efficient sources of electric light.

Upstream Markdown Incentive: A method of promoting energy efficiency by reducing manufacturer, distributor and retailer costs prior to the point of sale to the consumer at the retail level.

Executive Summary

Applied Energy Group, Inc ("AEG") was retained by Kentucky Power Company ("KPCO" or "Kentucky Power") to conduct a process, market and impact evaluation of its Residential Efficient Products Program. ENERGY STAR® qualified lighting uses up to 75 percent less energy and lasts up to 10 times longer than standard incandescent bulbs. Replacing existing incandescent light bulbs with ENERGY STAR® qualified lighting, such as compact fluorescent lighting ("CFLs"), is one of the simplest and most effective ways to reduce electric bills. The Residential Efficient Products Program utilizes upstream markdown incentives and in-store coupons to reduce the retail price of eligible products at participating retail stores as well as at the Kentucky Power online store. Kentucky Power provides incentives to participating retailers for actual products sold, verified with supporting sales documentation.

AEG designed the process and market evaluation to examine program processes and retailer responses to the program. The evaluation identifies methods for gathering data and measuring program results, and makes recommendations for program improvements. To arrive at the final recommendations, AEG performed the following tasks:

- Reviewed program materials and data.
- Reviewed program tracking methods.
- Updated program logic model and assessed program flow.
- Conducted interviews with KPCO staff, the program implementer and participating retailers.

AEG designed the impact evaluation to assess the gross and net demand savings, gross and net energy savings, and the cost-effectiveness of installed measures. The evaluation verifies gross and net savings and measure installation. To verify program impacts AEG performed the following tasks:

- Calculated the gross energy (kWh) and peak (kW) impacts by lighting type using engineering calculations.
- Performed cost-effectiveness analysis using a benefit-cost analysis model.

Summary of Key Findings

The goal of the Residential Efficient Products Program is to produce long-term energy savings in the residential sector by increasing the market share (sales) of ENERGY STAR® CFLs and other ENERGY STAR® lighting products sold through retail sales channels.

Program Performance Indicators

In 2011, 13 participating retailers sold 133,692 CFLs, exceeding the overall program goal of 125,800 bulbs. Ninety-three (93) percent of sales were standard CFLs and the remaining 7 percent were non-standard CFLs. Walmart accounted for 89 percent of all sales and Lowe's accounted for 11 percent of all sales. According to APT, independent retailers did not submit any coupons for reimbursement. Incentives accounted for 43 percent of total actual expenditures, at an average cost of \$1.01 per bulb.

The total actual cost of \$2.35 per bulb was slightly less than the budgeted cost of \$2.92 per bulb (as revised in August 2011).

Table ES1 2011 CFL Bulb Sales by Manufacturer/Retailer

Manufacturer/Retailer	Standard CFL	Non-Standard CFL	Total CFL
Feit/Lowe's	-	3,258	3,258
Sylvania/Lowe's	12,081	46	12,127
General Electric/Walmart	111,867	6,440	118,307
Total	123,948	9,744	133,692

Table ES2 Participation Goal versus Sales, 2011

	Goal	Sales
CFLs	125,000	133,692
ENERGY STAR Ceiling Fans	200	-
LED Products	600	-
Total	125,800	133,692

Although the program was successful in promoting CFL sales, there were no sales of ENERGY STAR® ceiling fans and LED products. APT noted that the residential market for LED holiday lights and LED night lights has already transformed and does not require incentives. Additionally, customer purchases of ceiling fans and fixtures are based primarily on aesthetic preferences.

Walmart/Lowe's retailers noted that CFLs are the best selling lighting product while independent retailers noted that incandescent bulbs are still the best selling product. According to APT, the independent retailers comprise less than 8 percent of the lighting market and have difficulty competitively pricing CFLs compared to large stores such as Walmart or Lowe's.

Program Tracking

Program data is managed and tracked by EFI and APT. The program tracking and monitoring systems accurately track program data and process invoices. On average, the invoicing process took 4 to 6 weeks from the time the manufacturer submitted the sales data to when they received reimbursement from EFI.

Program Awareness and Marketing Strategies

APT and Kentucky Power marketed the program to residential customers as well as lighting manufacturers and retailers within the KPCO service territory. In 2011, the APT Field Representative participated in 25 promotional events, including in-store promotions and KPCO community events, conducted 384 site visits and trained 3,537 individuals at participating stores. Seventy-one (71) percent of APT Field Representative training took place at Walmart stores, compared to 27 percent at Lowe's stores and 2.3 percent at the independent retailers.

Best Practices

Kentucky Power's program design and processes are largely consistent with best practices for similar energy efficiency programs. Eighty-five (85) percent of energy efficiency programs targeted at

residential customers provide incentives for compact fluorescent lighting.¹ Incentives for residential lighting typically range between \$0.50 and \$3.50 for CFLs, \$10 and \$30 for LED Bulbs, and \$15 and \$25 for ceiling fans. Depending on the design of the program, these incentives are typically point-of-sale discounts, mail-in rebates or instant rebates.²

Challenges posed by lack of information are ubiquitous in energy efficiency programs. Investment in education and outreach boosts awareness of the potential benefits of energy efficiency. Successful marketing strategies can increase program participation, increase energy savings and enable the delivery of more sophisticated energy efficient programs. Achieving maximum benefits from energy efficiency programs requires establishing clearly defined goals that are linked to overall program objectives as well as modifying the program over time.³

Verification of Program Impacts

Based on the participating retailer survey results, free ridership is estimated at 22 percent and spillover at 17 percent. Therefore, the net-to gross ratio for the Residential Efficiency Products Program is 95%.

Table ES3 2011 CFL Bulb Savings by Type

Measure	Gross Peak Savings (kW)	Gross Energy Savings (kWh)	NTG Ratio	Net Peak Savings (kW)	Net Energy Savings (kWh)	TRC
Standard CFL	607	5,989,416	95%	576	5,689,945	2.37
Non-Standard CFL	62	610,361	95%	59	579,843	2.55
Program Total	668	6,599,777		635	6,269,788	2.39

Recommendations

AEG has several recommendations on how to improve the program. These include:

Engage Independent Retailers and Reduce Barriers to Entry

AEG recommends that Kentucky Power work with APT to engage independent retailers and reduce barriers to entry. Independent retailers comprise less than 8 percent of the lighting market and cannot competitively price CFLs compared to large stores such as Walmart or Lowe's. Nevertheless, it is important to keep independent retailers in the program as it allows customers greater access to the program and efficient lighting products.

Two barriers to entry for independent retailers include:

- Lack of in-store promotions and staff training. The APT Field Representative did not actively engage independent retailers, with 1 in-store promotion and 2.3 percent of training, despite APT's attempts to recruit additional independent retailers. The Field Representative should conduct more frequent in-store promotions for these retailers.

¹ Consortium for Energy Efficiency (2012). State of the Efficiency Program Industry: Budgets, Expenditures and Impacts 2011.

² ICF International. ENERGY STAR Summary of Lighting Programs, October 2011 Update.

³ National Action Plan for Energy Efficiency (2010). *Customer Incentives for Energy Efficiency Through Program Offerings*. Prepared by William Prindle, ICF International, Inc. <www.epa.gov/eeactionplan>

- Participant data requirements. Current in-store instant coupons require independent retailers to collect customer name, address and telephone, while Walmart and Lowe's stores collect only product information. Collection of customer data is a barrier to participation for independent retailers that Walmart and Lowe's stores are not subject to. As with the Walmart and Lowe's stores, the independent retailers are located within KPCO territory. Therefore, AEG recommends that the in-store instant coupons be modified to collect only the product information that Walmart/Lowe's stores collect.

Addressing these barriers to entry is necessary to increase participation among independent retailers. Any decision to increase engagement with independent retailers could affect the program's cost-effectiveness. If the program goal is to reduce overall energy consumption at the lowest cost, then the program should encourage large scale retailer participation. Engaging independent retailers at multiple locations would broaden the geographic reach of the program, which corresponds to the current program goal.

Review Product Offerings

AEG recommends that Kentucky Power review the current program offerings and examine the cost-effectiveness of incentivizing additional lighting measures.

- Remove incentives for LED holiday lights, LED nightlights and ENERGY STAR ceiling fans. Kentucky Power did not achieve any sales of LED nightlights, LED holiday lights and ENERGY STAR ceiling fans. Additionally, APT noted that the market for LED holiday lights and LED night lights has already transformed and purchases of ceiling fans are based on aesthetic preferences.
- Establish separate goals for standard and non-standard CFLs. Establishing goals will allow Kentucky Power to determine the progress of the program in terms of achieving participation goals and remaining within the budget. Program progress will influence future program design (e.g. 2011 program participation goals were exceeded, therefore Kentucky Power could increase 2012/2013 participation goals).
- Examine the cost-effectiveness of incentivizing LED bulbs, the next step in efficient lighting. The LED bulb market is maturing and costs are decreasing. AEG recommends that KPCO work with APT to determine which LED bulbs should be evaluated, the incentive levels and the participation goals.

AEG recommends that the incentive levels for the standard and non-standard CFLs remain the same through 2012, at which point the program should be reexamined. Incentives may be decreased slightly depending upon achievement of participation goals and other product offerings. Potential participation goals for consideration include 150,000 standard CFLs and 25,000 non-standard CFLs, to be adjusted based upon APT input, program performance and other product offerings.

AEG recommends that KPCO consider examining the cost-effectiveness of incentivizing other residential products. KPCO should work with APT to determine which products, such as smart strips or ENERGY STAR® refrigerators, should be evaluated, the incentive levels and the participation goals. Any decision to incorporate additional products into the program portfolio could affect the program's cost-

effectiveness. In addition to cost-effectiveness, KPCO should consider the customer benefit of incorporating the additional products and the potential energy savings.

Increase Marketing and Promotional Activities

AEG recommends that Kentucky Power continue current marketing and promotional activities, particularly the APT Field Representative in-store promotions and staff training. Marketing materials, such as program fact sheets or handouts, should include education information to reduce customer concerns regarding the health and environmental impacts of CFL mercury content.

AEG recommends an increase in marketing and promotional activities for independent retailers, including APT Field Representative in-store promotions, in-store signage and potentially short-term cooperative marketing.

1. Introduction

Applied Energy Group, Inc. ("AEG") was retained by Kentucky Power Company ("Kentucky Power" or "KPCO") to conduct a comprehensive evaluation of its 2010-2012 Demand Side Management ("DSM") Program Portfolio.⁴ The 2010-2012 DSM Program Portfolio includes the Residential Efficient Products Program, Residential and Small Commercial HVAC Diagnostic and Tune-up Program, Commercial Incentive Program, Small Commercial High Efficiency Heat Pump and Air Conditioner Program, and the Residential and Small Commercial Load Management Pilot Program. The DSM programs will be evaluated concurrently and individual program Evaluation, Measurement and Verification ("EM&V") reports will be filed with the Kentucky Public Service Commission ("PSC") by the August 15, 2012 regulatory filing deadline.

Kentucky Power is an electric utility that serves approximately 175,000 customers in all or part of 20 eastern Kentucky counties.⁵ The utility is part of the American Electric Power ("AEP") system, which is one of the largest electric utilities in the United States.⁶ The 2010-2012 DSM Program Portfolio was implemented to help Kentucky Power and AEP reduce electricity use and peak demand, help customers lower their electricity bills, and encourage long-term change in the market through the adoption of energy efficiency technologies and services.

ENERGY STAR® qualified lighting uses up to 75 percent less energy and lasts up to 10 times longer than standard incandescent lighting. Replacing existing incandescent light bulbs with ENERGY STAR® qualified lighting, such as compact fluorescent lighting ("CFLs"), is one of the simplest and most effective ways to reduce electric bills. The Residential Efficient Products Program utilizes upstream markdown incentives and in-store coupons to reduce the retail price of eligible products at participating retail stores as well as at the Kentucky Power online store. Kentucky Power provides incentives to participating retailers for actual products sold, verified with supporting sales documentation.

This report describes the key findings from the process, market and impact evaluation and provides recommendations for improving program performance and operations. Section 2 provides an overview of the Energy Independence and Security Act of 2007. Section 3 provides a program description and Section 4 provides the process, market and impact evaluation methodology. Sections 5 and 6 present the process, market and impact evaluation findings. Key findings and recommendations are described in Section 7.

2. Energy Independence and Security Act (EISA)

The United States Congress passed the Energy Independence and Security Act ("EISA") of 2007 to promote energy efficiency through performance standards for electronic appliances and lighting. In particular, the legislation set efficiency standards for 'general service' light bulbs.

⁴ Kentucky Power's 2010-2012 DSM programs were approved in Case No. 2010-00095 and Case No. 2010-00198.

⁵ Kentucky Power. Facts, Figures & Bios. Accessed at www.kentuckypower.com/info/facts/

⁶ American Electric Power delivers electricity to more than 5 million customers in 11 states and ranks among the nation's largest generators of electricity, with almost 38,000 megawatts of generating capacity in the U.S.

The efficiency standards will be implemented in two phases, with higher efficiency requirements in each phase. From 2012 to 2014, standard light bulbs manufactured will be required to use approximately 20 to 30 percent less energy than current incandescent light bulbs. Phase 2 calls for a 60 percent reduction in light bulb energy use by 2020, or 45 lumens per watt.⁷

Table 1 outlines the first phase and the maximum rate wattage required to attain EISA phase one standards. For example, transitioning from the common incandescent light bulb to the more efficient CFL bulb can result in up to 78 percent energy savings. The table shows that the 100, 75, 60 and 40 Watt traditional incandescent bulbs will be not meet the efficiency standards as they take effect from 2012 to 2014.

Table 1 EISA Phase 1 Standard

Rated Lumen Ranges	Maximum Rate Wattage	Minimum Rate Lifetime	Effective Date	Efficacy Ranges (lumens per watt)
1490-2600 (~90W – 150W)	72	1000 hrs	1/1/2012	21 – 36
1050-1489 (~75W – 90W)	53	1000 hrs	1/1/2013	20 – 28
750-1049 (~60W – 75W)	43	1000 hrs	1/1/2014	17 – 24
310-749 (~30W – 60W)	29	1000 hrs	1/1/2014	11 – 26

The EISA legislation is not expected to have an impact on Kentucky Power's Residential Efficient Products Program at this time for the following reasons:

- Twenty-two bulb types are exempted from the EISA standard, such as 3-way bulbs, shatter resistant bulbs and high lumen bulbs.
- The effective dates of the EISA legislation pertain to newly manufactured bulbs, not existing stock. For example, while the first phase of the EISA legislation went into effect on January 1, 2012, customers will be able to purchase non-EISA mandated bulbs until stock runs out. A typical CFL bulb has an average life of 7 to 9 years.⁸ AEG utilized an average bulb life of 5 years for the cost-effectiveness analysis to account for the increasing lighting efficiency requirement in future years. The 5 year lifetime infers that the baseline wattage will be equivalent to standard CFLs in future years.
- Energy Star CFLs are still more efficient than the new incandescent bulbs that are compliant with EISA standards.

3. Program Description

ENERGY STAR® qualified lighting uses up to 75 percent less energy and lasts up to 10 times longer than standard incandescent lighting. Replacing existing incandescent light bulbs with ENERGY STAR® qualified lighting, such as CFLs, is one of the simplest and most effective ways to reduce electric bills.

⁷ See Database of State Incentives for Renewables & Efficiency (DSIRE). *Federal Appliance Standards*. Available at: www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US04R&re=1&ee=1

⁸ See Energy Star. Available at: www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=LB

The Residential Efficient Products Program utilizes upstream markdown incentives to reduce the retail price of eligible products at participating retail stores as well as at the Kentucky Power online store. Kentucky Power provides incentives to participating retailers for actual products sold, verified with supporting sales documentation. Table 2 illustrates the various efficient product rebates offered by participating retailers through the program and the customer purchase limit for claiming rebates. Rebates are available for Single-Pack and Multi-Pack CFLs, Non-Standard CFLs, LED Holiday Lights, LED Nightlights and ENERGY STAR® Ceiling Fans. Product selection and rebate amounts may vary by store.

Table 2 Eligible Products and Rebates

	Incentive	Annual Purchase Limit per Customer
Standard CFLs	\$1.00	12
Non-Standard CFLs	\$1.50	12
LED Holiday Lights	\$2.00	10
LED Night Lights	\$2.00	2
Energy Star Ceiling Fans	\$10.00	5

Kentucky Power entered into a Memorandum of Understanding (“MOU”) with manufacturers and retailers to offer upstream market incentives. The MOU details the criteria retailers and manufacturers must meet to participate in the program. Independent retailers that could not meet the MOU criteria were given the opportunity to participate in the customer coupon program.

The overall goal of the Residential Efficient Products Program is to produce long-term energy savings in the residential sector by increasing the market share (sales) of ENERGY STAR® CFLs and other ENERGY STAR® lighting products sold through retail sales channels. Program objectives include:

- Increase participant satisfaction
- Engage retailers within KPCO service territory, initially targeting retailers with large lighting sales.
- Cost-effectively increase the sales and availability of efficient lighting.

The Kentucky Public Service Commission (“PSC”) approved a three-year budget and participation goals for the Residential Efficient Products Program. Tables 3 and 4 present the program budgets and participation goals for 2010 through 2012. The 2011 program budget was revised from the original filing to \$367,876. The 2012 program budget and participation goals were revised from the original filing to \$355,205 and 133,143, respectively. Table 5 shows the anticipated energy and demand savings per participant by product per the original filing.⁹

⁹ See Case No. 2010-00095, Case No. 2011-00300 and Case No. 2012-00051.

Table 3 Program Budget, 2010-2012

	2010	2011	2012
CFL Incentive/Markdown	\$31,250	\$125,000	\$125,000
Other Lighting Incentives	\$1,100	\$4,400	\$4,400
Admin./Promotion	\$17,000	\$55,000	\$55,000
Evaluation	\$1,000	\$1,000	\$15,000
Total Budget	\$50,350	\$185,400	\$199,400

Table 4 Program Participation Goals, 2010-2012

	2010	2011	2012
CFLs	31,250	125,000	125,000
Other Lighting Products	200	800	800
Total	31,450	125,800	125,800

Table 5 Expected Energy Savings per Participant

	Summer kW	Winter kW	Energy kWh
Indoor CFL	0.001	0.010	50
ENERGY STAR Ceiling Fans	0.003	0.026	180
LED Holiday Lights	-	-	4
LED Night Light	-	0.001	22

4. Evaluation Methodology

AEG designed the process, market and impact evaluation to determine the efficacy of program procedures and systems, evaluate the achievement of program objectives, provide insight into and recommendations for program improvement and verify the direct impacts of program activities.

The process and market evaluation identifies whether key elements, such as incentive levels, program delivery, program tracking mechanisms and quality assurance/quality control ("QA/QC") procedures are performing as designed and identifies issues or opportunities to improve these key elements. The goals of the process and market evaluation are to:

- Examine key performance indicators to identify participation or program issues;
- Conduct a comprehensive review of program tracking systems;
- Determine awareness levels as a way to refine marketing strategies and reduce barriers to program participation;
- Assist program implementers and managers to structure programs and achieve cost-effective savings while maintaining high levels of satisfaction;
- Provide recommendations for changing the program's structure, management, administration, design, delivery, operations or goals; and
- Determine if specific best practices should be incorporated.

Impact evaluations verify the energy and demand savings directly associated with a program and assess the cost-effectiveness of the DSM program. The goals of the impact evaluation are to:

- Verify the annual energy and coincident peak capacity savings and total resource benefit claims made by Kentucky Power; and
- Provide verification and documentation of DSM program impacts.

To arrive at the final recommendations, AEG carried out the following activities:

Review Program Materials

AEG reviewed current program materials, documents and processes, including the rebate applications and marketing and promotional materials. The review served as the basis for understanding whether the program has been implemented as planned and is on track to meet participation goals. The review was particularly important for preparing the interview guides and survey instruments for other process evaluation tasks.

Program Logic Model

AEG developed a program logic model based on the review of program materials and discussions with KPCO program staff. The model shows the linkages among the program's activities, outputs, key program stakeholders and outcomes and highlights potential external influences and program inputs.

Kentucky Power Staff Interview

AEG conducted a comprehensive group interview with Kentucky Power program staff in November 2011. The purpose of the interview was to get staff impressions of program implementation activities, program performance, marketing and customer awareness of the program, program data and tracking mechanisms, and opportunities for program improvements. Individual interviews with program staff, as well as informal discussions around program performance, were conducted between December 2011 and March 2012. Individual interviews focused on program design and delivery issues, program performance, potential areas of improvements, and overall program effectiveness.

Third-Party Implementer Interview

The Residential Efficient Products Program is implemented by the APT Team, comprised of Applied Proactive Technologies, Inc ("APT") and Energy Federation Incorporated ("EFI"). As program implementer, the APT Team worked with KPCO to develop the program goals and budget, product selection and incentives, program eligibility, and data collection, tracking and reporting. The respective roles of the APT team members are as follows:

- EFI receives, tracks and reports sales data, processes payments and manages the online store.
- APT fosters retailer relationships and manages the day-to-day program processes. An APT Field Representative conducts weekly visits with MOU retailers to check product stock, displays and product labels and to ensure retail pricing markdowns are current. The representative provides sales staff training and conducts in-store promotions.

AEG interviewed APT in November 2011 and January 2012. The interview provided information on program implementation activities, program data and tracking methods, and barriers to increased participation. AEG also obtained detailed information on program performance.

Retailer Interviews

AEG administered a 10 to 12 minute telephone survey to a sample of participating stores to assess product availability and sales, customer satisfaction, potential areas for improvement, marketing and coordination efforts, educational efforts, attitudes regarding energy efficiency and conservation, and program tracking as well as ascertain participant free ridership and spillover. The participating store survey guides can be found in Appendices A and B. Currently, 13 Walmart and Lowe's stores and 9 Independent Retailer stores are participating in the Residential Efficient Products Program. AEG conducted 11 surveys of participating stores.

Review Engineering or Deemed Savings Assumptions

AEG reviewed the engineering and/or deemed savings assumptions utilized by APT to calculate program energy and demand impacts. Kentucky Power's initial program filing deemed savings assumptions were reviewed to ensure consistence with the impact evaluation results.

Gross Energy and Demand Impacts

AEG determined the gross energy and demand savings of a representative sample based on Option A of the International Performance Measurement and Verification Protocols ("IPMVP")¹⁰ outlined in Table 6.

Table 6 Overview of IPMVP Options

IPMVP M&V Option	Measure Performance Characteristics	Data Requirements
Option A: Engineering calculations using spot or short-term measurements, and/or historical data	Constant performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • Spot measurements • Run-time hour measurements
Option B: Engineering calculations using metered data.	Constant or variable performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • End-use metered data
Option C: Analysis of utility meter (or sub-meter) data using techniques from simple comparison to multivariate regression analysis.	Variable performance	<ul style="list-style-type: none"> • Verified installation • Utility metered or end-use metered data • Engineering estimate of savings input to SAE model
Option D: Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering	Variable performance	<ul style="list-style-type: none"> • Verified installation • Spot measurements, run-time hour monitoring, and/or end-use metering to prepare inputs to models • Utility billing records, end-use metering, or other indices to calibrate models

Engineering calculations referenced from the *New York Standard Approach for Estimating Energy savings from Energy Efficiency Programs*, using Kentucky Power specific inputs, were utilized to calculate gross energy and demand impacts for standard and non-standard CFL bulbs.

¹⁰ IPMVP provides best practice techniques for verifying results of energy efficiency projects, i.e. verifying savings attributed to energy efficiency projects.

Net Energy and Demand Impacts

AEG adjusted the gross energy and demand savings to reflect estimates of free ridership and spillover. Free ridership and spillover were determined from the retailer interviews; see Section 6 for a detailed explanation.

Cost-Effectiveness Analysis

AEG analyzed the cost-effectiveness of the Residential Efficient Products Program utilizing Bencost, an updated version of a public domain model that AEG customized for Kentucky Power. Bencost is an input-output model that calculates four standard California cost-effectiveness tests, the Total Resource Cost, Participant Test, Utility Test and Rate Impact Measure Test. The analysis was conducted using Kentucky Power specific inputs, including avoided costs, discount rates, participation and incentives. Cost-effectiveness inputs and outputs are detailed in Appendix C.

5. Process and Market Evaluation Findings

The process and market evaluation identifies whether key elements, such as incentive levels, program delivery, program tracking mechanisms and quality assurance/quality control ("QA/QC") procedures are performing as designed. When potential deficiencies in these areas arise, the evaluation identifies opportunities for improving these key elements.

5.1 Program Logic Model

Program logic models are graphic representations of an energy efficiency program and its processes. Logic models show the causal relationships or linkages between the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders that are critical to a program's performance.¹¹

Key elements of a program logic model include:

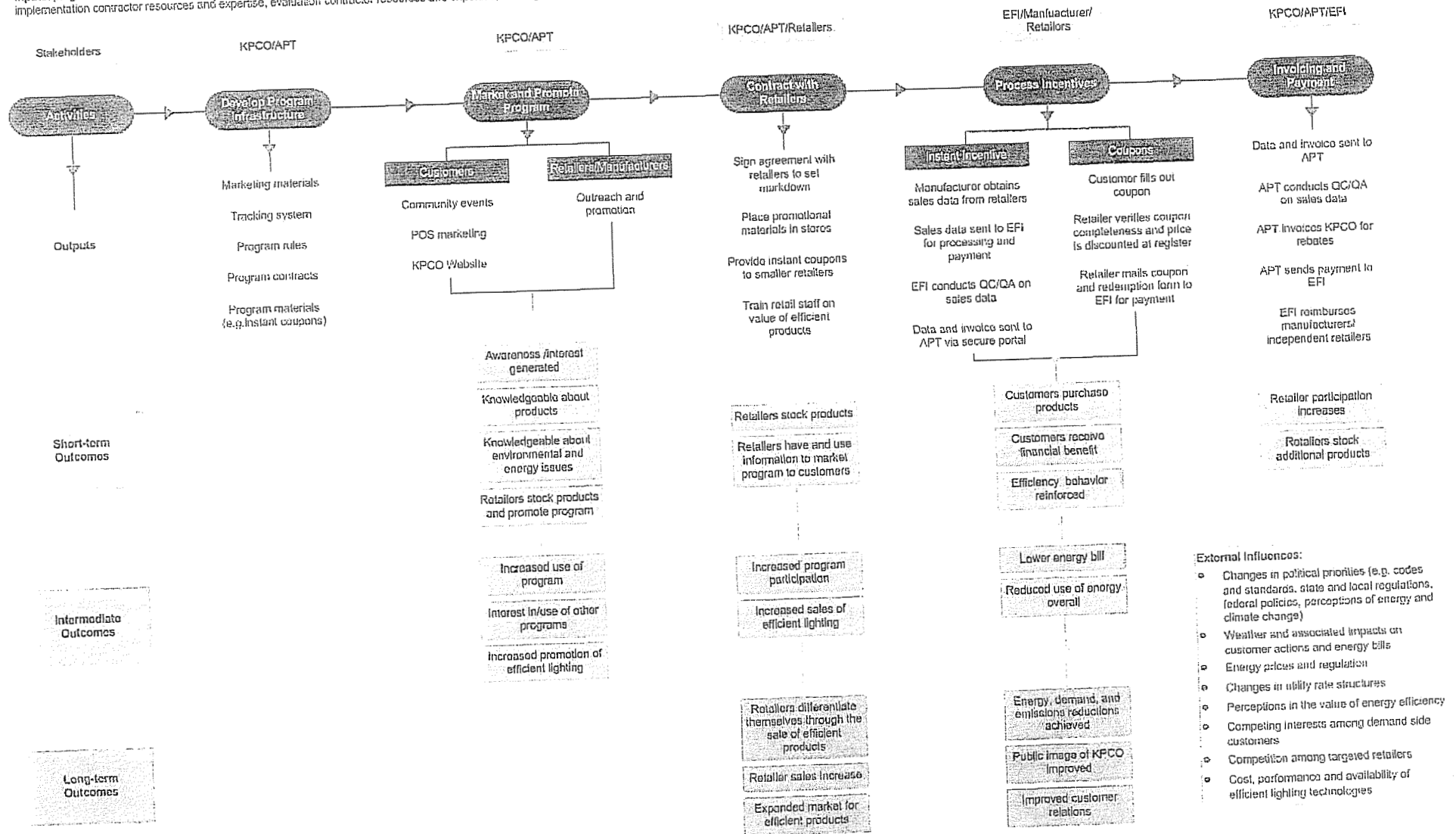
- **Inputs.** Resources that program stakeholders contribute to a program, such as knowledge, skills, expertise, finances or equipment.
- **Outputs.** Program activities and number of people reached, based on program goals.
- **Outcomes.** Short-term, intermediate or long-term results of the program outputs. Assists evaluators and program administrators in establishing program results.
- **External Influences.** Factors outside the utility's control that may influence the program outcomes. They help to identify important program partnerships as well as the issue(s) the program can realistically influence. The factors help determine which evaluation measures will accurately reflect project outcomes or any other goals that must be met to address the problem or situation.

¹¹ McCawley, P. (2001). *The Logic Model for Program Planning and Evaluation*. Moscow: University of Idaho Extension.

In the logic model presented in Figure 1, program activities are oriented sequentially across the top of the page from the left to the right. The sequence of program activities is important. For example, the program's infrastructure, including its advertising materials, tracking systems, program rules, and contracts must be developed before the program can be marketed and customers recruited. The performance outputs and outcomes are oriented vertically from top to bottom. The box on the bottom right contains the external factors outside the utility's control that may affect program performance.

Figure 1 Program Logic Model

Inputs: program funding, PSC goals and reporting requirements, AEP human resources and integrated resource goals, Kentucky Power program staff, implementation contractor resources and expertise, evaluation contractor resources and expertise, existing awareness of Kentucky Power



5.1.1 Activities and Outputs

There are five main activities in the Residential Efficient Products Program. The program activities and their corresponding outputs establish linkages between the situation the program is designed to address and the program's intended outcomes. Therefore, activities and outputs are discussed together.

Develop Program Infrastructure

Activities include gathering market knowledge, setting program goals, designing the program, establishing program rules, developing marketing approaches and content, and establishing institutional and operating structures. The APT Team designed the program with the assistance of Kentucky Power staff. Together they developed the program design, including product offerings, retailer relationships, data tracking system and marketing materials.

Market and Promote Program

The marketing strategy for the program included a combination of point-of-sale marketing, retailer outreach and promotion, and community events. Marketing activities included in-store shelf tags and beam stands, educational sheets, retailer training, and program fact sheets. The program was also marketed online through the KPCO website. Section 5.3 provides further analysis of the program marketing activities.

Contract with Retailers/Manufacturers

The Residential Efficient Products Program utilizes upstream markdown incentives to reduce the retail price of eligible products at participating retail stores as well as the Kentucky Power online store. Kentucky Power provides incentives to participating retailers for actual products sold, verified with supporting sales documentation.

APT, in collaboration with Kentucky Power program staff, identified potential manufacturers and retail stores to participate in the program and facilitated MOU negotiations between the parties. The MOU details the criteria retailers and manufacturers must meet to participate in the program. As part of the MOU, the manufacturers provided the up-front capital to the retailers. Current MOU agreements expire in June 2012.

The Memorandum of Understanding agreements with retailers and manufacturers were in place in March and April 2011.

Independent retailers that could not meet the MOU criteria were given the opportunity to participate in the customer coupon program. Under the customer coupon program, participating retailers agree to reduce the retail price of eligible products, provide documentation of eligible product sales, receive in-store materials such as shelf tags and beam stands as well as allow an APT Field Representative to train employees on the value of efficient products.

Process Customer Rebate

Processing customer rebates differs between MOU and customer coupon program participants. Customers that purchased a qualifying lighting product at a participating MOU retailer received a reduced retail price. The discounted price was only available for branded and non-branded products

made by manufacturers that entered into an MOU with Kentucky Power. The manufacturer received sales data from participating retailers and reviewed for completeness and accuracy. The manufacturer submitted the sales data to EFI for processing and payment. EFI staff reviewed the sales data for anomalies.

Customers that purchased a qualifying lighting product at an independent retailer filled out a coupon, which included product information as well as customer name, address and telephone number, and presented it to the cashier. The cashier checked the coupon for completeness and sold the product to the customer at the discounted price. After the sale, the independent retailer filled out a coupon redemption form that included a summary of the coupons by value, the address where the check was to be mailed and the total amount of expected redemption. The retailer then submitted both the coupons and the completed coupon redemption form to EFI. EFI staff reviewed the documentation for completeness and eligibility.

Customers also had a third option of purchasing a lighting product through the Kentucky Power online store. A discount was applied to participants that had a KPCO account number and address within the Kentucky Power service territory. The online store was managed by EFI, therefore purchase data was sent directly to EFI staff for review. Section 5.4 provides more in-depth analysis of customer rebate processing.

Invoicing and Payment

EFI generally submitted unaudited and audited sales data and coupon redemption data to APT on a bi-weekly basis, but frequency varied depending on volume. APT reviewed the audited sales data and ensured the data matches the manufacturer invoice. An audited invoice, with sales data, was submitted to Kentucky Power on a monthly basis, often within one or two days of receiving the audited sales data from EFI. Kentucky Power approved the invoice and submitted payment to APT within 10 days of receiving the invoice. APT submitted payment to EFI and EFI submitted payment to the manufacturer/retailer.

5.1.2 Outcomes

Outcomes are distinct from program outputs. Program partners (retailers) and target audiences (customers) respond to the program outputs resulting in program outcomes. The outcomes are divided into short-term, intermediate, and long-term outcomes.

Short-term Outcomes

When the program is marketed and promoted, awareness and interest in efficient lighting may increase among customers, manufacturers and retailers. Retailers may stock efficient lighting products and promote the program. Customers will receive a financial benefit from installing efficient lighting and participating in the KPCO program. The program may lead to an increased commitment to energy efficiency.

Intermediate Outcomes

Intermediate outcomes may include increased use of the program, interest in and use of other KPCO efficiency programs, increased promotion and sales of efficient lighting products, and lower energy bills.

Long-term Outcomes

The long-term outcomes may include an expanded market for energy efficient products. Retailers may strive to differentiate themselves from other retailers by increasing sales of efficient products. Additional outcomes include energy and demand savings, reduced utility emissions, fewer greenhouse gases emitted. Kentucky Power may enhance its public image as a utility that responds to customer needs without sacrificing consideration of environmental issues.

5.1.3 External Factors

Documenting external factors outside the control of Kentucky Power and its stakeholders improves program planning and evaluation by identifying important program partners, the activities the program can realistically influence, which evaluation measures will accurately reflect project outcomes, and other needs that must be met. External factors include:

- Changes in political priorities (e.g. codes and standards, state and local regulations, federal policies, perceptions of energy and climate change);
- Weather and associated impacts on customer actions and energy bills;
- Energy prices and regulation;
- Changes in utility rate structures;
- Perceptions in the value of energy efficiency;
- Competing interests among demand side customers; and
- Cost, performance and availability of efficient lighting technologies.

5.1.4 Best Practices

Program administrators encounter common challenges that hinder energy efficiency programs from achieving maximum benefits, including, but not limited to:

- Lack of information and awareness of energy efficiency benefits.
- Limited resources / High initial costs energy efficient technologies.
- Competing priorities among customers and program administrators.
- Lack of clear, well-communicated program goals that correspond to overall organizational goals.

Best practices can provide ideas and/or tools to overcome these and other program barriers. Some key best practices include, but are not limited to, the following:

- Coordinate with other energy efficiency program administrators to overcome market barriers.
- Increase awareness by investing in education, outreach and marketing activities.
- Solicit stakeholder input and feedback to optimize program design and delivery.
- Develop reliable program tracking systems to support evaluation and implementation.

5.2 Program Performance

Table 7 outlines the budget and bulb allocation information for the 3 MOU agreements that were executed in March and April 2011. Nine (9) Walmart stores partnered with General Electric and 4 Lowe's

stores partnered with Feit and Sylvania. Nine (9) stores participated as independent retailers, including 5 Do It Best, 1 ACE Hardware and 3 True Value Hardware stores.

Table 7 Manufacturer/Retailer MOU Allocation, 2011

Manufacturer/Retailer	MOU	Budget Allocation		Total Bulb Allocation	
		Initial	Final	Initial	Final
[REDACTED]					
Total					

In 2011, 13 participating stores sold 133,692 CFLs through the Residential Efficient Products Program. Ninety-three (93) percent of sales were standard CFLs and the remaining 7 percent were non-standard CFLs. Walmart accounted for 89 percent of all bulbs sold and incentives distributed while Lowe's accounted for 11 percent of all sales. Independent retailer customer coupons were made available in April 2011. According to APT, independent retailers did not submit any customer coupons for reimbursement in 2011. Program participation was concentrated in the top five (5) Walmart stores accounting for nearly two-thirds of the bulbs and incentives.

Table 8 CFL Bulb Sales by Manufacturer/Retailer, 2011

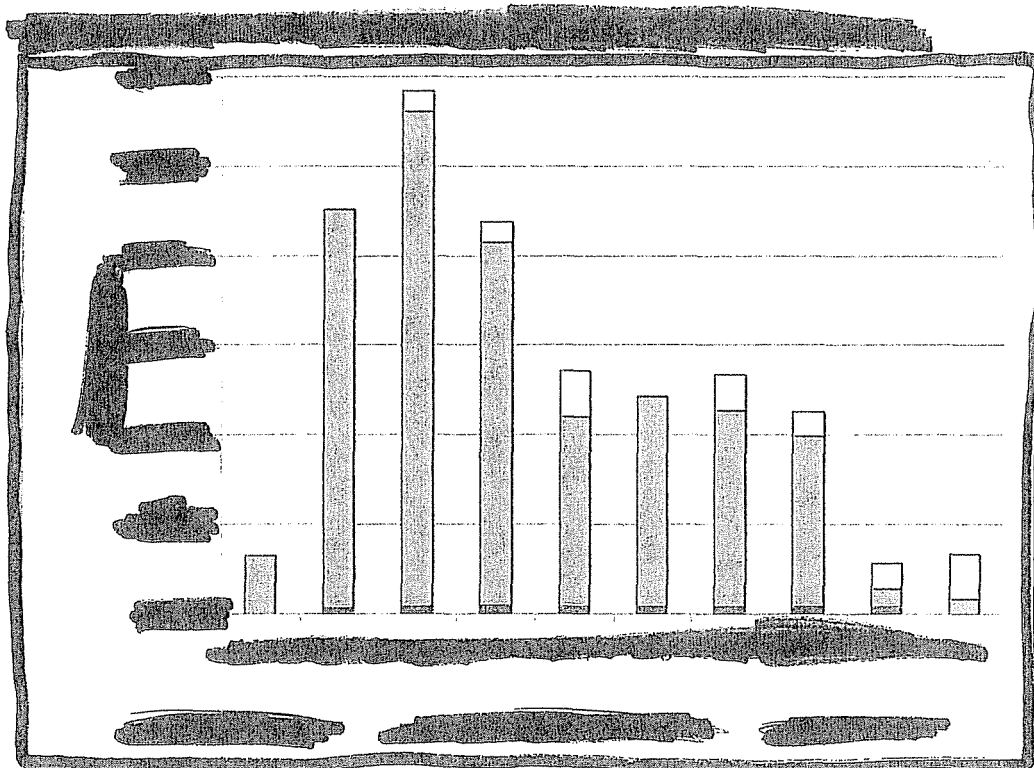
Manufacturer/Retailer	Standard CFL	Non-Standard CFL	Total CFL
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total	[REDACTED]	[REDACTED]	[REDACTED]

Table 9 Total Bulbs and Incentives by Retail Location, 2011

[illegible]

Figure 2 presents the number of bulbs rebated by manufacturer by month sold and Figure 3 presents expenditures and number of bulbs reported by month. CFL sales peaked in May 2011 and declined through the end of 2011 as budgets were quickly depleted and sales goals were obtained. In particular,

participating Walmart stores exceeded expectations. MOU allocations were modified multiple times in an effort to continue program operations in Walmart stores.¹² Despite the MOU modifications, Walmart eliminated all non-branded CFL packages from the promotion in October and had to suspend all promotions from November 7th to 28th to ensure the program did not exceed the approved budget. The budget was reviewed and the suspension lifted later in November. Despite the time lag associated with re-instating a program around Thanksgiving Day, December CFL sales experienced a slight increase.



¹² Walmart exceeded their initial MOU allocated budget and sales goal. MOU allocations were modified: Lowe's allocation was adjusted in September 2011 and Walmart's allocation was modified in August, September, November and December 2011.

Figure 3 Expenditures and Number of Bulbs Reported by Month, 2011

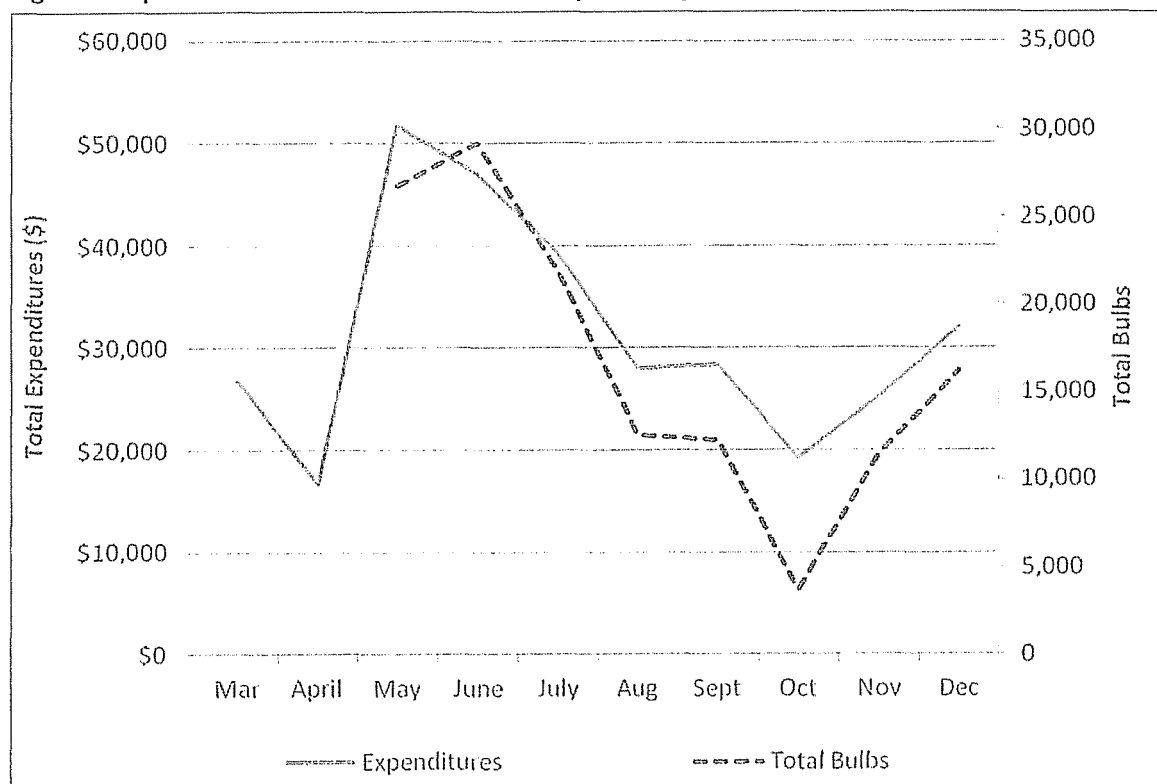


Table 10 presents the original and revised budget and budgeted cost per bulb sold as compared to actual expenditures and actual cost per bulb. Incentives accounted for 43 percent of total actual expenditures, at an average cost of \$1.01 per bulb. The total actual cost of \$2.35 per bulb was slightly less than the budgeted cost of \$2.92 per bulb (as revised in August 2011).

Table 10 2011 Cost per Bulb, Budgeted and Actual

	Original Budget	Revised Budget	Actual
CFL Incentive/Markdown	\$125,000	\$123,735	\$134,375
Other Lighting Incentives	\$4,400	\$20,814	\$0
Admin./Promotion	\$55,000	\$221,327	\$173,712
Evaluation	\$1,000	\$2,000	\$6,068
Total Cost (\$)	\$185,400	\$367,876	\$314,155
Participation	125,800	125,800	133,692
Cost (\$) per Bulb	\$1.47	\$2.92	\$2.35

5.3 Program Marketing

The Residential Efficient Products Program is marketed under Kentucky Power's GRIDSMA[®] Programs. APT and Kentucky Power market the program to residential customers as well as lighting manufacturers and retailers within the KPCO service territory. According to KPCO program staff and APT,

It is very important that customers know Kentucky Power is offering the lighting incentives.

In 2011, marketing activities included:

- **In-Store Materials.** In-store displays include shelf tags and horizontal and vertical beam stands. Customer coupons are prominently displayed at independent retailers.
- **Retailer Site-Visits.** An APT Field Representative within Kentucky Power's service territory conducts weekly visits with MOU retailers to check product stock, displays and product labels and to ensure retail pricing markdowns are current. The representative reviews program details with sales staff and potential program participants.
- **In-Store Activities.** The APT Field Representative periodically promoted the program at the retail stores. The representative set up a table with educational lighting information, a light meter and Kentucky Power DSM Program fact sheets. The representative discussed the program with shoppers, answering questions and demonstrating energy savings.
- **Community Events.** KPCO organized community events in multiple counties, promoting the DSM Programs and distributing program fact sheets. The APT Field Representative supported company sponsored community events by displaying education materials, demonstrating energy savings on a light meter and answering customer questions. The events were advertised in local newspapers and phone promotion to area residents.
- **Internet.** Kentucky Power marketed the program through kentuckypower.com/save. Customers could search an online database for participating retailers and access the KPCO/EFI online store. Kentucky Power offers additional resources on CFL handling and disposal.
- **Retailer Employee Training.** The APT Field Representative provided training to retailer employees on efficient lighting products. Retailers had the option of 17 different training modules.

APT Field Representatives spent one week at APT offices to receive training and educational resources. The representatives were tested prior to performing site visits in order to ensure they demonstrated competency. APT periodically provides training and educational sessions for staff. In 2011, the APT Field Representative participated in 25 promotional events, including in-store promotions and KPCO community events (see Table 11). The representative conducted 384 site visits and trained 3,537 individuals at participating stores, as seen in Figures 4 and 5. Overall, 71 percent of APT Field Representative training took place at Walmart stores, 27 percent at Lowe's stores and 2.3 at the independent retailers.

Participating retailers also promoted the Residential Efficient Products Program. According to the survey results, the Walmart/Lowe's retailers primarily advertised and promoted the program to customers via flyers. Independent retailers made customers aware of the program and displayed coupons both in the lighting aisle and at the register.

Table 11 2011 Promotional Events

[illegible]

Figure 4 APT Field Representative Site Visits by Month, 2011

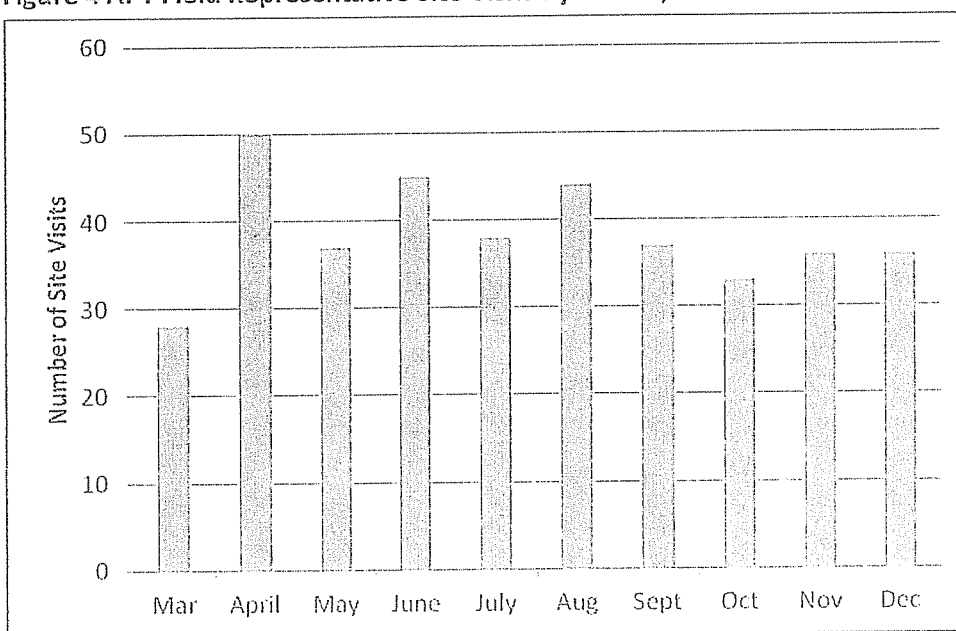


Figure 5 APT Field Representative Training by Month, 2011

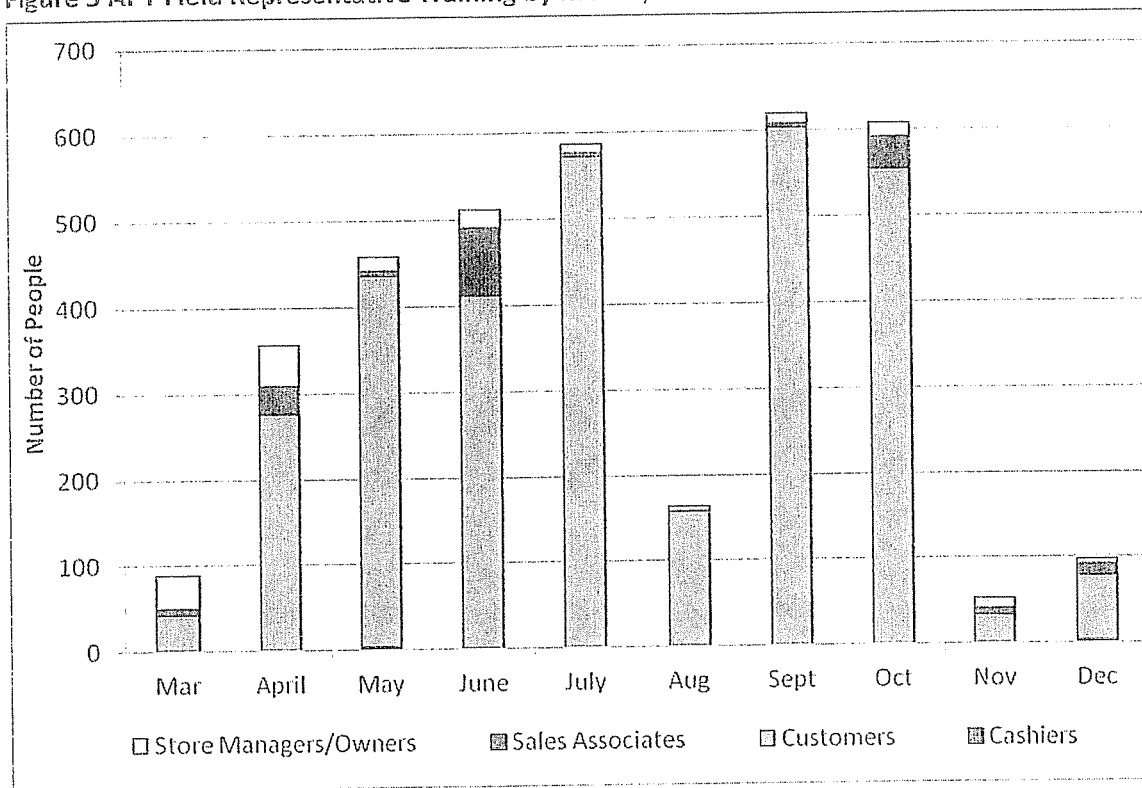
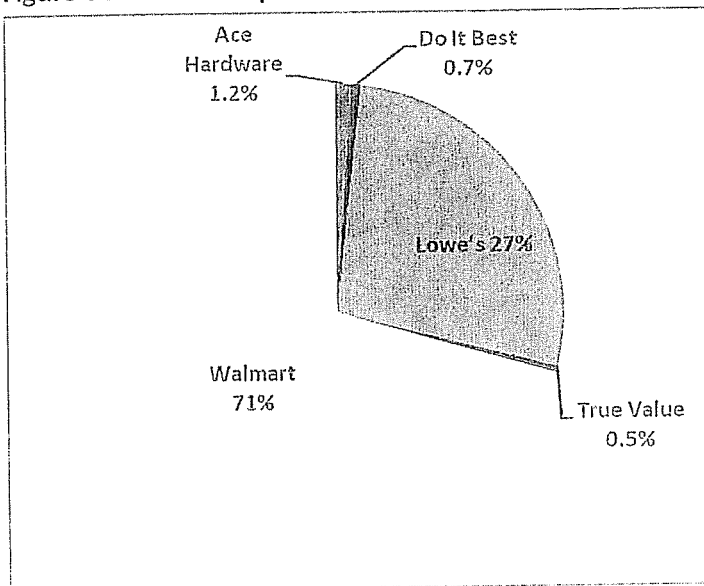


Figure 6 APT Field Representative Training by Retailer, 2011



5.4 Program Tracking & Invoice Processing

Kentucky Power submitted bi-annual reports to the Kentucky PSC with program progress to-date, including participation, estimated energy and demand savings, and budget. The utility reviewed actual, projected and summary program data with the DSM Collaborative on a quarterly basis.

EFI managed and tracked all data and processed manufacturer invoices and customer coupons. Sensitive data could be accessed only by approved EFI staff; APT and Kentucky Power could access non-sensitive data via EFI's web-based portal. APT ensured that retailer sales systems were operated correctly and analyzed sales trends.

Independent retailers submitted the coupons and completed coupon redemption form to EFI. The coupon redemption form included a summary of the coupons by value, the address where the check is to be mailed and the total amount of expected redemption. EFI staff reviewed the redemption form and coupons for completeness and eligibility. Upon approval, an incentive check was mailed to the retailer, reimbursing the retailer for the value of the coupons. The customer coupon included the following information:

- Customer name, address, phone number and email address.
- Model number.
- Manufacturer.
- Number of bulbs in package.
- Wattage.
- Date of purchase.

Manufacturers received KPCO program-related sales data from participating retailers. The manufacturer reviewed the data for completeness and accuracy prior to submitting the data to EFI for processing and payment. The manufacturer often provided the data in a Microsoft Excel format, which was compatible with EFI's tracking system. EFI staff reviewed the sales data for anomalies. EFI submitted unaudited and audited sales data to APT on a bi-weekly basis, frequency varied depending on volume.

APT submitted the unaudited sales data to KPCO as they received them from EFI. APT reviewed the audited sales data and ensured the data matched the manufacturer invoice. An audited invoice, with sales data, and progress report was submitted to Kentucky Power on a monthly basis, often within one or two days of receiving the audited sales data from EFI. The progress report contained APT Field Representative site visit notes, training activities and total sales and incentives by store. Kentucky Power approved the invoice and submitted payment to APT within 10 days of receiving the invoice. APT submitted payment to EFI and EFI submitted payment to the manufacturer/retailer.

The invoicing process took 4 to 6 weeks from the time the manufacturer submitted the sales data to when they received reimbursement from EFI.

The retailer/manufacturer tracked the following data:

- Measure description and model
- Manufacturer
- Wattage
- Quantity: number of bulbs in a pack, number of packs/bulbs, total number of bulbs
- Life of bulbs

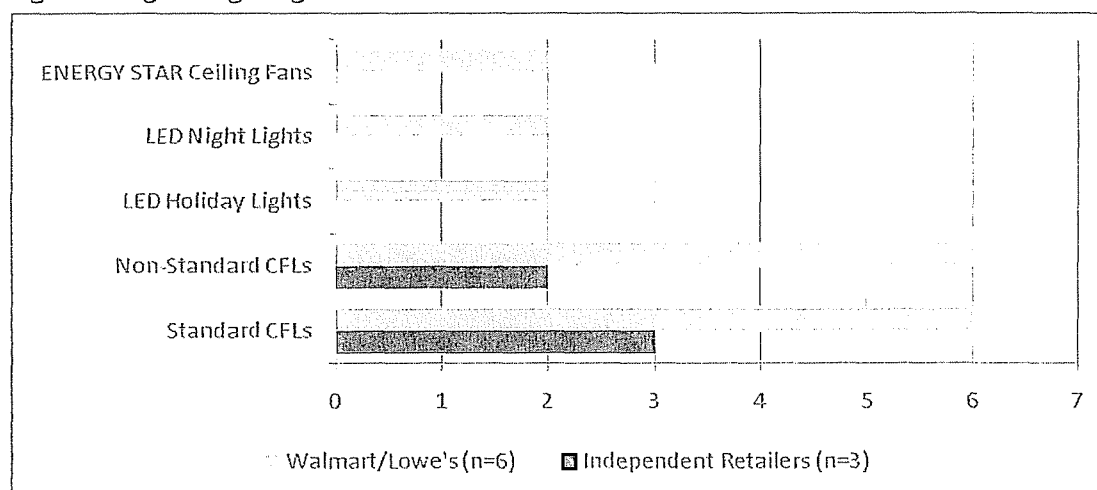
- Retailer name and address
- Total incentive
- Date of sale, invoice submittal and payment
- Retailer/Manufacturer invoice number

5.5 Retailer Interviews

Retailer surveys helped to assess key aspects of the program, including product availability and sales, customer satisfaction and attitudes regarding energy efficiency and conservation, marketing and coordination efforts, educational outreach, program tracking, as well as other support materials provided by KPCO. The retailer surveys also helped identify potential areas for improvement in these areas.

All retailers surveyed stocked qualifying standard CFLs, 66 percent of independent retailers stocked qualifying non-standard CFLs and 33 percent of Walmart/Lowe's retailers surveyed stocked other qualifying lighting products.

Figure 7 Eligible Lighting Stock at Retailer Stores



Approximately half of Walmart/Lowe's retailers and all independent retailers surveyed stocked CFLs prior to participating in the KPCO program. The program influenced the types of CFLs stocked at 66 percent of Walmart/Lowe's and 33 percent of independent retailers surveyed. Walmart/Lowe's retailers noted that CFLs are the best selling lighting product while independent retailers noted that incandescent bulbs are still the best selling product (see Figure 8). One (1) independent retailer stated that while incandescent bulb sales were high, CFLs sales were increasing.

Figure 8 Highest Selling Lighting Products

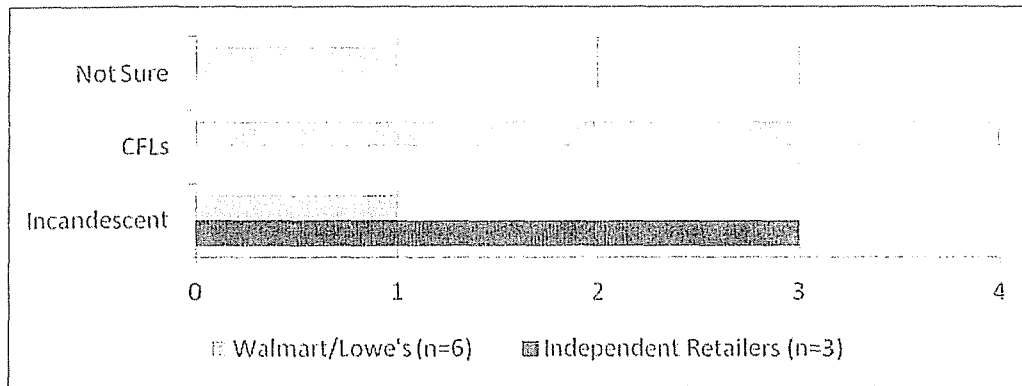
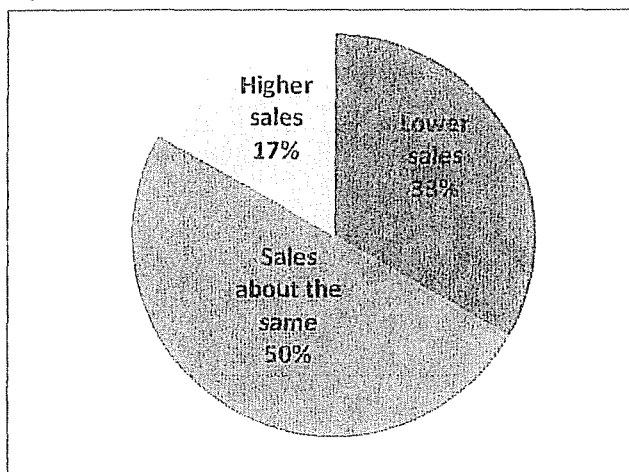


Figure 9 Non-Standard CFLs Sales Compared to Standard CFLs, Walmart/Lowe's Retailers

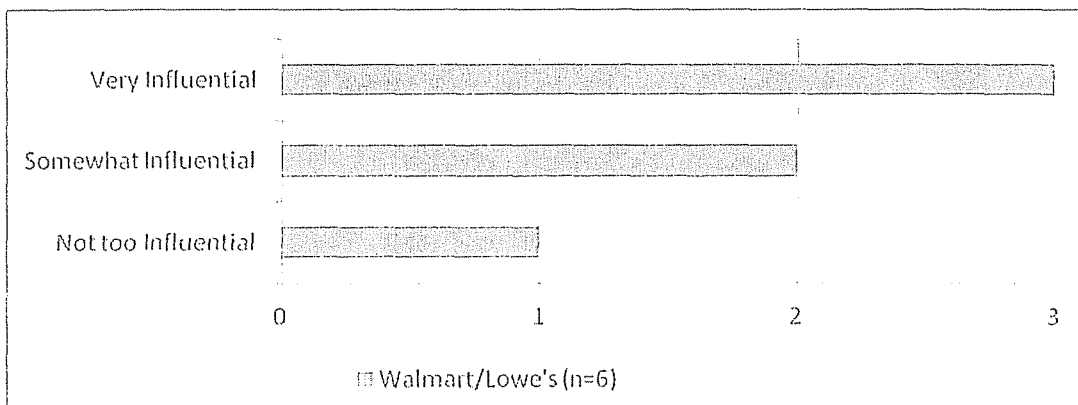


According to Walmart/Lowe's retailers, in the absence of the Kentucky Power incentive:

- The store would have sold as many CFLs (33%).
- The store would have sold the same types of CFLs (66%).

Additionally, 66 percent of Walmart/Lowe's retailers believe that the KPCO program is having an effect on consumer expectations regarding CFL prices.

Figure 10 Kentucky Power Influence in Moving CFL Stock in 2011, Walmart/Lowe's Retailers



Of the 5 independent retailers surveyed, 2 are no longer participating in the Kentucky Power program due to a lack of efficient lighting sales and customer interest in CFLs. According to these 2 retailers,

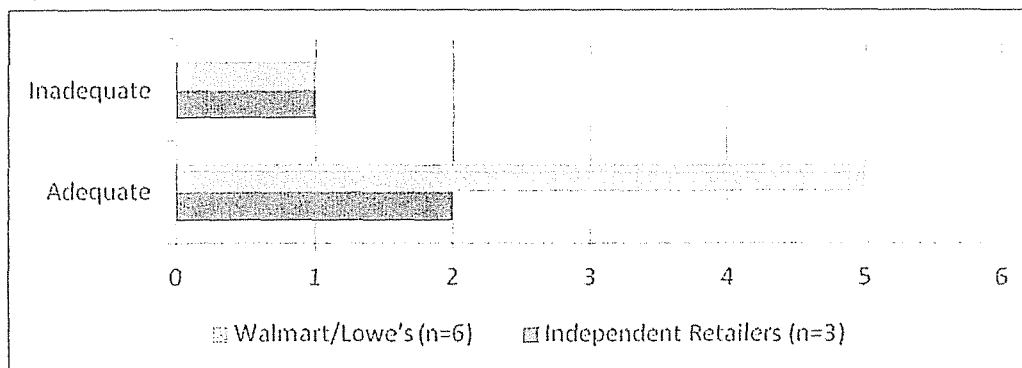
Customers are more interested in purchasing incandescent bulbs than CFLs.

The participating independent retailers surveyed sold efficient lighting products through the Kentucky Power program.

5.6 Opportunities for Improvement

Overall, retailers are very satisfied with the Residential Efficient Products Program. Both Walmart/Lowe's and independent retailers mentioned customer awareness and education as one area that needs improvement. Retailers noted that the APT Field Representative helped to sell CFLs. However, retailer comments called for better education efforts for senior citizens and reducing customer concerns regarding the health and environmental impacts of CFL mercury content. Retailers noted that additional APT Field Representative in-store promotions and Kentucky Power advertising could improve the program.

Figure 11 Adequacy of Kentucky Power Promotional and Education Efforts



Independent retailers did not actively participate in the program in 2011. APT noted that independent retailer participation is consistent with other utility programs. However, APT is working to recruit more small hardware stores and to increase the variety of lighting products available at these stores.

According to APT, hardware stores make up less than 8 percent of lighting market share – the stores cannot competitively price CFLs compared to large stores such as Walmart or Lowe's.

The program has adequate coverage across KPCO service territory. However, APT noted that it is important to keep locally owned retailers in the program as it allowed customers greater access to the program and efficient lighting products.

Currently, APT has no plans to modify the types of lighting products eligible for incentives and has not recommended any program changes. Other products did not perform well in 2011. According to APT:

- LED Holiday Lights and LED Night Lights. The market is already transformed and customers are already purchasing this product.
- ENERGY STAR® Ceiling Fans. Incentives are available only through the KPCO online store. Customer purchases of ceiling fans and fixtures based primarily on aesthetic preferences.

6. Impact Evaluation Findings

Impact evaluations verify the energy and demand savings directly associated with a program and assess the cost-effectiveness of the DSM program.

6.1 Gross Energy and Demand Savings

AEG determined the gross energy and demand savings of a representative sample based on the International Performance Measurement and Verification Protocols (IPMVP) Option A. Option A involves engineering calculations of gross savings using historical data. Engineering calculations referenced from the *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs*, using Kentucky Power specific inputs, were utilized to calculate gross energy and demand impacts. The equation used to determine gross energy impacts is:

$$\text{Gross Energy Impacts} = \text{units} \times \text{leakage} \times \Delta \text{Watts} \times \text{Yearly Operating Hours}$$

$$\text{Gross Demand Impacts} = \text{units} \times \text{leakage} \times \Delta \text{Watts} \times \text{Coincidence Factor}$$

Where:

Units = quantity of bulbs

Leakage = bulbs purchased by non-Kentucky Power customers and bulbs purchased but placed into storage

Δ Watts = wattage difference between efficient bulb installed and standard bulb

Operating Hours = number of hours bulb used per day¹³

Coincidence Factor

Gross impacts were calculated for both standard and non-standard CFL bulbs. The weighted average wattage of a standard CFL bulb purchased through the KPCO program was 18 Watts and a non-standard CFL bulb was 30 Watts. Tables 12 and 13 present the gross savings per bulb and the total energy and demand savings in 2011, respectively.

Table 12 Gross Savings per Unit, 2011

Measure	Summer Peak Savings per Unit (kW)	Winter Peak Savings per Unit (kW)	Energy Savings per Unit (kWh)
Standard CFL (18W)	0.005	0.005	48
Non-Standard CFL (30W)	0.006	0.006	63

¹³ Hourly usage consistent with ENERGY STAR calculator

www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=LB

Table 13 Total Gross Demand and Energy Savings, 2011

Measure	Gross Capacity Savings (kW)	Gross Energy Savings (kWh)
Standard CFL	607	5,989,416
Non-Standard CFL	62	610,361
Program Total	668	6,599,777

6.2 Net Energy and Demand Savings

Net energy and demand savings are the gross savings attributable to the Residential Efficient Products Program, not accounting for impacts resulting from other influences such as free ridership or spillover. Net impacts were calculated by applying a net-to-gross ("NTG") factor to gross impacts.

$$NTG \text{ Ratio} = 1 - \text{Free Ridership} + \text{Spillover}$$

Free ridership and spillover calculations are described in the following subsections. Based on the process evaluation survey results, AEG has determined the net-to-gross ratio for the Residential Efficiency Products Program to be 95 percent. Table 14 presents the 2011 net demand and energy savings achieved.

Table 14 Net Demand and Energy Savings, 2011

Measure	NTG Ratio	Net Capacity Savings (kW)	Net Energy Savings (kWh)
Standard CFL	95%	576	5,689,945
Non-Standard CFL	95%	59	579,843
Program Total		635	6,269,788

6.2.1 Free Ridership

Free ridership estimates the sales of efficient lighting that would have occurred without the Kentucky Power incentive. Three participating retailer questions were designed to determine the portion of a customer's savings that should be attributed to free ridership.

Question 1. How influential have the Kentucky Power incentives been in moving CFL stock in 2011?

The less influential the Kentucky Power incentives were in moving CFL stock, the higher the probability that the customer was a free rider. For example, if a retailer responded 'Not Too Influential,' free ridership probability ranged from 50 to 90 percent.

Question 2. In the absence of the Kentucky Power incentive, do you believe the store would have sold as many CFLs in 2011?

If the store would have sold as many CFLs without the Kentucky Power incentive, there was a high probability that the customer was a free rider. Therefore, if a retailer responded 'Yes,' the probability that the customer was a free rider was higher than if the retailer responded 'No.'

Question 3. Prior to participating in the Kentucky Power program, did your store stock CFLs?

The final question indicated whether the store stocked CFLs prior to participating in the Residential Efficient Products Program. Retailers that stocked CFLs would have a better understanding of the impact of Kentucky Power incentives on CFL sales than retailers that did not stock CFLs.

Each retailer was assigned a value based on the probability that there was free ridership. Table 15 presents the free ridership probability scoring mechanism for Questions 1 and 2.

Table 15 Free Ridership Probability Scores, Questions 1 and 2

Q1 Response	Q2 Response	Min	Max	Estimate
Very influential	No	0%	20%	10%
Very influential	Yes	0%	40%	20%
Somewhat influential	No	30%	50%	40%
Somewhat influential	Yes	40%	60%	50%
Not too influential	No	50%	90%	70%
Not too influential	Yes	70%	90%	80%

The retailer probability from Questions 1 and 2 was adjusted to account for whether CFLs were stocked prior to program participation (Question 3).

- If the retailer stocked CFLs prior to participating, the probability was not altered (0%).
- If the retailer did not stock CFLs prior to participating, the probability was adjusted downward by 25 percent (-25%).

The free ridership probability was bound by 0 percent and 100 percent.

$$\text{Free Ridership} = \text{Question 1\&2} + \text{Question 3}$$

The weighted mean of the retailer probabilities resulted in a free ridership estimate of 22 percent (see Table 16). Therefore, 22 percent of individuals that purchased a CFL through the Residential Efficient Products Program would have purchased the CFL without the KPCO incentive.

Table 16 Free Ridership Weighted Probability

Free Rider Probability	Observations	Weight	Weighted Value
0%	1	0.17	0%
10%	1	0.17	2%
15%	1	0.17	3%
20%	1	0.17	3%
40%	1	0.17	7%
45%	1	0.17	8%
Free Ridership Estimate			22%

6.2.2 Spillover

Spillover estimates the additional sales of efficient lighting that were due to the influence of the Residential Efficient Products Program. Two participating retailer questions were designed to determine the portion of a customer's savings that should be attributed to spillover.

Question 1. Have sales of other non-discounted efficient lighting products increased?

If non-discounted efficient lighting product sales increased, there was participant spillover. Therefore, if a retailer responded 'No,' the probability that there was spillover was 0 percent. If a retailer responded 'Yes,' the probability that there was spillover ranged from 0 to 70 percent.

Question 2. What influence do you think the Kentucky Power program had on these sales?

The greater the influence that the Kentucky Power program had on non-discounted lighting product sales, the higher the participant spillover. For example, if a retailer responded that the KPCO program 'Had a Large Influence,' then spillover probability ranged from 50 to 70 percent.

Each retailer was assigned a value based on the probability that there was spillover. Table 17 presents the spillover probability scoring mechanism.

Table 17 Spillover Probability Scores, Questions 1 and 2

Q1 Response	Q2 Response	Min	Max	Estimate
No		0%	0%	0%
Yes	Had no influence	0%	20%	10%
Yes	Had some influence	20%	40%	30%
Yes	Had a large influence	50%	70%	60%

The weighted mean of retailer probabilities resulted in a spillover estimate of 17 percent. Therefore, 17 percent of individuals that participated in the Residential Efficient Products Program purchased additional efficient lighting due to the influence of the KPCO program.

Table 18 Spillover Weighted Probability

Spillover Probability	Observations	Weight	Weighted Value
0%	3	0.50	0%
10%	1	0.17	2%
30%	1	0.17	5%
60%	1	0.17	10%
Spillover Estimate			17%

6.3 Program Cost-Effectiveness

Cost-effectiveness analysis compares the costs and benefits of efficient equipment with those of baseline (non-efficient) equipment. Cost-effectiveness analysis indicates whether the efficient technology(s) improve a customer's financial position, decrease overall energy costs to ratepayers, or raise society's well-being. A program is considered cost-effective if the benefit-cost ratio is greater than one (1.0).

AEG analyzed the cost-effectiveness of the Residential Efficient Products Program utilizing four standard cost-effectiveness tests taken from the California Standard Practices Manual.¹⁴ Each test analyzes cost-effectiveness from a different perspective and answering a separate question:

- Participant Cost Test: Compares customer costs and benefits of installing the measure. Will the participant benefit over the life of the measure?
- Program Administrator Cost Test (Utility Cost Test): Comparison of program administrator costs to supply-side resource benefits. Will utility costs to save energy be less than utility costs to deliver the same amount of energy?
- Ratepayer Impact Measure: Measures the impact of the DSM program on utility rates if rates were to be adjusted to account for the program. Comparison of utility program costs and bill reductions associated with energy savings to supply-side resource benefits. Will customer rates increase?
- Total Resource Cost Test: Comparison of program administrator and customer costs to utility resource savings. Will the total costs of energy in the utility service territory decrease?

Results from the impact evaluation, utilizing IPMVP best practices, are utilized in the four cost-effectiveness tests taken from the California Standard Practices Manual.

A typical CFL bulb has an average life of 7 to 9 years.¹⁵ However, national lighting efficiency standards are being increased according to the Energy Independence and Security Act of 2007. AEG utilized an average bulb life of 5 years for the cost-effectiveness analysis to account for the increasing lighting efficiency requirement in future years. The 5 year lifetime infers that the baseline wattage will be equivalent to standard CFLs in future years.

Kentucky Power specific inputs, including avoided costs, discounts rates, participation and incentives, were used to conduct the cost-effectiveness analysis. Bencost, an updated version of a public domain model that AEG customized for Kentucky Power, was utilized to perform the cost-effectiveness modeling (see Appendix C). Bencost is an input-output model that calculates all four cost-effectiveness tests. All program costs and benefits are discounted to present-day dollar values in order to accurately compare future benefits with current costs.

Table 19 Cost-Effectiveness Results

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Ratepayer Impact Measure Test	0.45	\$2,977,088	\$1,341,838	-\$1,635,251
Utility Cost Test	4.22	\$318,344	\$1,341,838	\$1,023,494
Participant Cost Test	6.02	\$382,523	\$2,301,064	\$1,918,542
Total Resource Cost Test	2.39	\$562,303	\$1,341,838	\$779,535

¹⁴ The California Standard Practices Manual details cost-effectiveness guidelines and procedures for standardized cost-effectiveness evaluations.

¹⁵ See www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=LB

The Residential Efficient Products Program is the main driver for the cost-effectiveness of the entire Kentucky Power portfolio being cost-effective in 2011. Table 20 provides the cost-effectiveness for the 2010-2012 Demand Side Management Program Portfolio being evaluated by AEG.¹⁶

Table 20 Kentucky Power Portfolio Cost-Effectiveness Results, 2011

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	2.13	\$720,104	\$1,533,730	\$813,626
Ratepayer Impact Measure Test	0.44	\$3,507,956	\$1,533,730	-\$1,974,227
Participant Test	5.13	\$486,703	\$2,499,101	\$2,012,397
Total Resource Cost Test	1.57	\$975,217	\$1,533,730	\$558,512

7. Key Findings and Recommendations

7.1 Key Program Findings

The goal of the Residential Efficient Products Program is to produce long-term energy savings in the residential sector by increasing the market share (sales) of ENERGY STAR® CFLs and other ENERGY STAR® lighting products sold through retail sales channels.

7.1.1 Program Performance Indicators

In 2011, 13 participating retailers sold 133,692 CFLs, exceeding the overall program goal of 125,800 bulbs. Ninety-three (93) percent of sales were standard CFLs and the remaining 7 percent were non-standard CFLs. Walmart accounted for 89 percent of all sales and Lowe's accounted for 11 percent of all sales. According to APT, independent retailers did not submit any coupons for reimbursement. Incentives accounted for 43 percent of total actual expenditures, at an average cost of \$1.01 per bulb. The total actual cost of \$2.35 per bulb was slightly less than the budgeted cost of \$2.92 per bulb (as revised in August 2011).

Table 21 Participation Goal versus Sales, 2011

	Goal	Sales
CFLs	125,000	133,692
ENERGY STAR Ceiling Fans	200	-
LED Products	600	-
Total	125,800	133,692

Although the program was successful in promoting CFL sales, there were no sales of ENERGY STAR® ceiling fans and LED products. APT noted that the residential market for LED holiday lights and LED night lights has already transformed and does not require incentives. Additionally, customer purchases of ceiling fans and fixtures are based primarily on aesthetic preferences.

¹⁶ The 2010-2012 DSM Program Portfolio includes the Small Commercial Heat Pump/Air Conditioner Program, Residential Efficient Products Program, Commercial Incentive Program, and Residential and Small Commercial HVAC Diagnostic and Tune-Up Program.

Walmart/Lowe's retailers noted that CFLs are the best selling lighting product while independent retailers noted that incandescent bulbs are still the best selling product. According to APT, the independent retailers comprise less than 8 percent of the lighting market and have difficulty competitively pricing CFLs compared to large stores such as Walmart or Lowe's.

7.1.2 Program Tracking

Program data is managed and tracked by EFI and APT. The program tracking and monitoring systems accurately track program data and process invoices. On average, the invoicing process took 4 to 6 weeks from the time the manufacturer submitted the sales data to when they received reimbursement from EFI.

7.1.3 Program Awareness and Marketing Strategies

APT and Kentucky Power marketed the program to residential customers as well as lighting manufacturers and retailers within the KPCO service territory. In 2011, the APT Field Representative participated in 25 promotional events, including in-store promotions and KPCO community events, conducted 384 site visits and trained 3,537 individuals at participating stores. Seventy-one (71) percent of APT Field Representative training took place at Walmart stores, compared to 27 percent at Lowe's stores and 2.3 percent at the independent retailers.

7.1.4 Best Practices

Kentucky Power's program design and processes are largely consistent with best practices for similar energy efficiency programs. Eighty-five (85) percent of energy efficiency programs targeted at residential customers provide incentives for compact fluorescent lighting.¹⁷ Incentives for residential lighting typically range between \$0.50 and \$3.50 for CFLs, \$10 and \$30 for LED Bulbs, and \$15 and \$25 for ceiling fans. Depending on the design of the program, these incentives are typically point-of-sale discounts, mail-in rebates or instant rebates.¹⁸

Challenges posed by lack of information are ubiquitous in energy efficiency programs. Investment in education and outreach boosts awareness of the potential benefits of energy efficiency. Successful marketing strategies can increase program participation, increase energy savings and enable the delivery of more sophisticated energy efficient programs. Achieving maximum benefits from energy efficiency programs requires establishing clearly defined goals that are linked to overall program objectives as well as modifying the program over time.¹⁹

7.1.5 Verification and Documentation of Program Impacts

Based on the participating retailer survey results, free ridership is estimated at 22 percent and spillover at 17 percent. Therefore, the net-to gross ratio for the Residential Efficiency Products Program is 95%.

¹⁷ Consortium for Energy Efficiency (2012). State of the Efficiency Program Industry: Budgets, Expenditures and Impacts 2011.

¹⁸ ICF International. ENERGY STAR Summary of Lighting Programs, October 2011 Update.

¹⁹ National Action Plan for Energy Efficiency (2010). *Customer Incentives for Energy Efficiency Through Program Offerings*. Prepared by William Prindle, ICF International, Inc. <www.epa.gov/eeactionplan>

Table 22 2011 CFL Bulb Savings by Type

Measure	Gross Peak Savings (kW)	Gross Energy Savings (kWh)	NTG Ratio	Net Peak Savings (kW)	Net Energy Savings (kWh)	TRG
Standard CFL	607	5,989,416	95%	576	5,689,945	2.37
Non-Standard CFL	62	610,361	95%	59	579,843	2.55
Program Total	668	6,599,777		635	6,269,788	2.39

7.2 Recommendations

AEG has several recommendations on how to improve the program. These include:

7.2.1 Engage Independent Retailers and Reduce Barriers to Entry

AEG recommends that Kentucky Power work with APT to engage independent retailers and reduce barriers to entry. Independent retailers comprise less than 8 percent of the lighting market and cannot competitively price CFLs compared to large stores such as Walmart or Lowe's. Nevertheless, it is important to keep independent retailers in the program as it allows customers greater access to the program and efficient lighting products.

Two barriers to entry for independent retailers include:

- Lack of in-store promotions and staff training. The APT Field Representative did not actively engage independent retailers, with 1 in-store promotion and 2.3 percent of training, despite APT's attempts to recruit additional independent retailers. The Field Representative should conduct more frequent in-store promotions for these retailers.
- Participant data requirements. Current in-store instant coupons require independent retailers to collect customer name, address and telephone, while Walmart and Lowe's stores collect only product information. Collection of customer data is a barrier to participation for independent retailers that Walmart and Lowe's stores are not subject to. As with the Walmart and Lowe's stores, the independent retailers are located within KPCO territory. Therefore, AEG recommends that the in-store instant coupons be modified to collect only the product information that Walmart/Lowe's stores collect.

Addressing these barriers to entry is necessary to increase participation among independent retailers. Any decision to increase engagement with independent retailers could affect the program's cost-effectiveness. If the program goal is to reduce overall energy consumption at the lowest cost, then the program should encourage large scale retailer participation. Engaging independent retailers at multiple locations would broaden the geographic reach of the program, which corresponds to the current program goal.

7.2.2 Review Product Offerings

AEG recommends that Kentucky Power review the current program offerings and examine the cost-effectiveness of incentivizing additional lighting measures.

- Remove incentives for LED holiday lights, LED nightlights and ENERGY STAR ceiling fans. Kentucky Power did not achieve any sales of LED nightlights, LED holiday lights and ENERGY

- STAR ceiling fans. Additionally, APT noted that the market for LED holiday lights and LED night lights has already transformed and purchases of ceiling fans are based on aesthetic preferences.
- Establish separate goals for standard and non-standard CFLs. Establishing goals will allow Kentucky Power to determine the progress of the program in terms of achieving participation goals and remaining within the budget. Program progress will influence future program design (e.g. 2011 program participation goals were exceeded, therefore Kentucky Power could increase 2012/2013 participation goals).
 - Examine the cost-effectiveness of incentivizing LED bulbs, the next step in efficient lighting. The LED bulb market is maturing and costs are decreasing. AEG recommends that KPCO work with APT to determine which LED bulbs should be evaluated, the incentive levels and the participation goals.

AEG recommends that the incentive levels for the standard and non-standard CFLs remain the same through 2012, at which point the program should be reexamined. Incentives may be decreased slightly depending upon achievement of participation goals and other product offerings. Potential participation goals for consideration include 150,000 standard CFLs and 25,000 non-standard CFLs, to be adjusted based upon APT input, program performance and other product offerings.

AEG recommends that KPCO consider examining the cost-effectiveness of incentivizing other residential products. KPCO should work with APT to determine which products, such as smart strips or ENERGY STAR® refrigerators, should be evaluated, the incentive levels and the participation goals. Any decision to incorporate additional products into the program portfolio could affect the program's cost-effectiveness. In addition to cost-effectiveness, KPCO should consider the customer benefit of incorporating the additional products and the potential energy savings.

7.2.3 Increase Marketing and Promotional Activities

AEG recommends that Kentucky Power continue current marketing and promotional activities, particularly the APT Field Representative in-store promotions and staff training. Marketing materials, such as program fact sheets or handouts, should include education information to reduce customer concerns regarding the health and environmental impacts of CFL mercury content.

AEG recommends an increase in marketing and promotional activities for independent retailers, including APT Field Representative in-store promotions, in-store signage and potentially short-term cooperative marketing.

Appendix A. Walmart/Lowe's Retailer Survey

Hello, may I speak with _____.

If they are unavailable, "Is a manager in the lighting department available?"

If no one is available, ask to have someone call you back (732-447-1367) during the hours you are working that day.

Hello, I'm _____. Kentucky Power is conducting an evaluation of its Residential Efficient Products Program. Your store has participated in the program over the last year by stocking and selling CFL's and I'd like to ask you a few questions about how things are going.

This is NOT a sales call, but for research purposes only. The survey should take about 10 minutes, and all comments will remain confidential.

Product Mix /Free-Ridership

1. What lighting products sold at your store are eligible for a Kentucky Power incentive? (DO NOT READ)
 - a) Standard CFLs (6)
 - b) Non-Standard CFLs (6)
 - c) LED Holiday lights (2)
 - d) LED night lights (2)
 - e) ENERGY STAR ceiling fans (2)
2. Prior to participating in the Kentucky Power program, did your store stock CFLs?
 - a) Yes (3)
 - b) No (3)
3. Did the Kentucky Power program have an influence on the types of CFLs stocked?
 - a) Yes (4)
 - b) No (2)
4. In general, what types of lighting products sell best in your store?
 - a) Incandescent (1)
 - b) CFLs (4)
 - c) Not Sure (1)
5. How well are CFLs selling compared to incandescent bulbs?
 - a) Sales are lower
 - b) Sales are about the same
 - c) Sales are higher (6)
6. Does your store stock both standard (bare spiral) and non-standard CFLs?
 - a) Yes (continue) (6)
 - b) No (go to Q8)
7. How well are non-standard CFLs selling compared to standard CFLs?
 - a) Sales are lower (2)
 - b) Sales are about the same (3)
 - c) Sales are higher (1)
8. How influential have the Kentucky Power incentives been in moving CFL stock in 2011?
 - a) Very Influential (1)
 - b) Somewhat Influential (2)

- c) Not Too Influential **(3)**
- d) Not At All Influential
- e) Don't Know (DO NOT READ)
- f) Other (please specify)

9. In the absence of the Kentucky Power incentive, do you believe the store would have sold as many CFLs in 2011?
- a) Yes **(4)**
 - b) No **(2)**
10. In the absence of the Kentucky Power incentive, do you believe the store would have sold the SAME TYPES of CFLs in 2011?
- a) Yes **(N/A)**
 - b) No **(N/A)**

Spillover

11. Have sales of other non-discounted efficient lighting products increased?
- a) Yes **(3)**
 - b) No **(3)**
12. What influence do you think the Kentucky Power program had on these sales?
- a) Had no influence **(2)**
 - b) Had some influence **(2)**
 - c) Had a large influence **(2)**
13. Do you think the Kentucky Power program is having an effect on consumer expectations regarding CFL prices?
- a) Yes **(4)**
 - b) No **(2)**
 - c) Other

Marketing and Education

14. Do you think the Kentucky Power promotional and education efforts are adequate?
- a. Yes (skip to Q16) **(5)**
 - b. No (continue) **(1)**
15. What would you change?
- Education could be better*
- There was nothing I would change. The representative really helped sell the bulb.*
16. Did your store advertise or promote the Kentucky Power program (i.e. print ads, signage)?
- a) Yes (continue) **(6)**
 - b) No (skip to Q18)
17. What type of advertising/promotion?
- Flyers, index cards, sticky things that are on shelves, AEP guy set up a booth one time to spread awareness.*
- Flyers/Signs*
- More demos*
18. Would you recommend any changes to improve consumer education about CFLs?
- a) Yes **(3)**
 - b) No **(1)**

c) N/A (2)

"I think there needs to be more info put out there, I'm not sure on how you would do that but, the community around his has a lot of older people so you have to explain it slowly."

"That they can throw them away because there is not as much mercury in them as compared to a regular light bulb."

"More demos"

Sales Data

19. What type of sales information do you provide to Kentucky Power?

Usually the representative will come around with his own information and I will give him the sales sheet as well.

The forms from the sales.

Don't know. Corporate takes care of that.

Cost Savings/ Usage Savings

Not sure.

Not sure - the representative that comes in would know better.

20. How often do you provide the data? (N/A)

Every once in a while, sometimes he talks to others so I don't always see him.

The manger could tell you better but I believe every few weeks.

"As often as we can"

The representative comes in once a week. I assume he provides the data he collects.

21. Is there anything that might improve the data collection process?

No (4)

Thank you for taking the time to answer my questions.

Appendix B. Independent Retailer Survey

Hello, may I speak with _____.

If they are unavailable, "Is a manager or sales associate available?"

If no one is available, ask to have someone call you back (732-447-1367) during the hours you are working that day.

Hello, I'm _____. Kentucky Power is conducting an evaluation of its Residential Efficient Products Program. Your store has participated in the program over the last year by stocking and selling CFL's and I'd like to ask you a few questions about how things are going.

This is NOT a sales call, but for research purposes only. The survey should take about 10 minutes, and all comments will remain confidential.

Product Mix

1. What lighting products sold at your store are eligible for a Kentucky Power incentive? (DO NOT READ)
 - a) Standard CFLs **(3)**
 - b) Non-Standard CFLs **(2)**
 - c) LED Holiday lights **(0)**
 - d) LED night lights **(0)**
 - e) ENERGY STAR ceiling fans **(0)**
2. Prior to participating in the Kentucky Power program, did your store stock CFLs?
 - a) Yes **(3)**
 - b) No **(0)**
3. Did the Kentucky Power program have an influence on the types of CFLs stocked?
 - a) Yes **(1)**
 - b) No **(2)**
4. In general, what types of lighting products sell best in your store?
 - a) Incandescent **(3)**
 - b) CFLs **(0)**
 - c) Not Sure **(0)**
5. How well are CFLs selling compared to incandescent bulbs?
 - a) Sales are lower **(3)**
 - b) Sales are about the same **(0)**
 - c) Sales are higher **(0)**
6. Does your store stock both standard (bare spiral) and non-standard CFLs?
 - a) Yes **(3)**
 - b) No **(0)**
7. Have you sold any efficient lighting products through the Kentucky Power program?
 - a) Yes **(3)**
 - b) No **(0)**
8. Have you submitted any coupons for reimbursement?
 - a) Yes (continue) **(2)**
 - b) No (skip to Q10) **(1)**

9. How long did it take to be reimbursed, from the time you submitted the paperwork until you received the incentive? CONTINUE TO QUESTION 11

- a) Less than 2 weeks (1)
- b) 2 to 4 weeks
- c) 4 to 8 weeks
- d) Greater than 8 weeks
- e) Don't Know (DO NOT READ) (1)
- f) Other

10. Why have you not submitted the coupons for reimbursement?

Let the customer, submit the coupons.

No longer participating in the program, wasn't worth it. Had put up all of the signs and promoted the program, but customers were more interested in purchasing incandescent bulbs. Very few CFLs sold. Bill inserts may help participation.

11. Do you expect to submit any coupons in 2012?

Yes, if more people start buying the CFL's, most people just stock up on the incandescents.

Program Participation

12. Where are the Kentucky Power coupons located in your store?

- a) Lighting Aisle (2)
- b) Register (2)
- c) Other

13. Do you make customers aware of the Kentucky Power coupon incentive?

- a) Yes (3)
- b) No

14. Do you verify that the customer is a Kentucky Power electric customer?

- a) Yes (continue)
- b) No (skip to Q14) (3)

15. How could the program be improved?

Its work well for me so far, no suggestions.

More advertising.

Marketing and Education

16. Do you think the Kentucky Power promotional and education efforts are adequate?

- a. Yes (skip to Q18) (2)
- b. No (continue) (1)

17. What would you change?

More awareness of the program.

18. Did your store advertise or promote the Kentucky Power program (i.e. print ads, signage)?

- a) Yes (continue)
- b) No (skip to Q19) (3)

19. What type of advertising/promotion?

Word of mouth from customers.

20. Would you recommend any changes to improve consumer education about CFLs?

No (3)

Thank you for taking the time to answer my questions.

Appendix C. Cost-Effectiveness Analysis Inputs

Table C1: General Bencost Model KPCO Rate Inputs

BENEFIT COST TEST FOR CONSERVATION PROGRAMS -- Cost-Effectiveness Analysis				
Company:		Kentucky Power Company		
General Inputs				
Input Data			Source	
Electric Retail Rate (\$/kWh) =		\$0.08599	Residential	Kentucky Power Cost & Rate
		\$0.07402	Commercial	Kentucky Power Cost & Rate
		\$0.08001	All Classes	
Variable O&M (\$/kWh) =		\$0.00000		
	Escalation Rate =		3.00%	
Environmental Damage Factor ■		\$0.0097		
	Escalation Rate =		3.00%	
Participant Discount Rate =		15.00%		KPCO Data Request from AEP Load Research
Utility Discount Rate =		7.47%		KPCO Data Request from AEP Load Research
Social Discount Rate =		7.47%		KPCO Data Request from AEP Load Research
General Input Data Year =		2011		
Project Analysis Year 1 =		2011		
Residential and Small Commercial Energy Losses		8.7%		KPCO email dated 4/20/12 from Alan Graves
Residential and Small Commercial Peak Losses		10.7%		KPCO email dated 4/20/12 from Alan Graves

Table C2: Bencost Model Commodity Cost Inputs²⁰

Year	Avoided Energy Commodity Cost (\$/kWh)	Avoided Capacity Cost (\$/kW-year)	Avoided Electric Retail Rate (\$/kWh)
2011	\$0.0395	\$40.15	\$0.080
2012	\$0.0403	\$6.01	\$0.080
2013	\$0.0399	\$10.12	\$0.082
2014	\$0.0432	\$45.99	\$0.084
2015	\$0.0447	\$124.83	\$0.086
2016	\$0.0510	\$124.83	\$0.088
2017	\$0.0520	\$69.30	\$0.090
2018	\$0.0528	\$80.15	\$0.092
2019	\$0.0540	\$89.71	\$0.094
2020	\$0.0547	\$97.91	\$0.096
2021	\$0.0561	\$104.70	\$0.098
2022	\$0.0658	\$110.03	\$0.100
2023	\$0.0670	\$113.83	\$0.103
2024	\$0.0691	\$116.04	\$0.105
2025	\$0.0707	\$118.13	\$0.108
2026	\$0.0716	\$120.25	\$0.110
2027	\$0.0731	\$122.42	\$0.113
2028	\$0.0746	\$124.62	\$0.115
2029	\$0.0761	\$126.86	\$0.118
2030	\$0.0779	\$129.15	\$0.120
2031	\$0.0788	\$130.70	\$0.123
2032	\$0.0788	\$132.26	\$0.126
2033	\$0.0788	\$133.85	\$0.129
2034	\$0.0788	\$135.46	\$0.132
2035	\$0.0788	\$137.08	\$0.135

²⁰ Avoided cost inputs provided by Kentucky Power (AEP) Load Forecasting Group through a data request.

TABLE C3: BENECOST MODEL INPUTS

General Inputs	Specific Project Inputs
Retail Rate (\$/kWh)	Utility Project Costs (\$)
Non-Electric Fuel Retail Rate (\$/Fuel Unit)	Administrative Costs (\$)
Commodity Cost (\$/kWh)	Incentive Costs (\$)
Demand Cost (\$/kW/Yr)	Total Utility Project Costs (\$)
Peak Reduction Factor (%)	Direct Participant Project Costs (\$/Participant)
Variable O&M (\$/kWh)	Participant Non-Energy Costs (Annual \$/Part)
Non-Electric Fuel Cost (\$/Fuel Unit)	Participant Non-Energy Savings (Annual \$/Part)
Non-Electric Fuel Loss Factor	Project Life (Years)
Electric Environmental Damage Factor (\$/kWh)	Avg. kWh/Participant Saved
Participant Discount Rate (%)	Avg. Non-Electric Fuel Units/Part. Saved
Utility Discount Rate (%)	Avg. Additional Non-Electric Fuel Units/Part. Saved
Societal Discount Rate (%)	Number of Participants
General Input Data Year	Total Annual kWh Saved
Project Analysis Year	Incentive/Participant
Growth and Escalation Factors (%)	

TABLE C4: BENECOST MODEL OUTPUTS

General Outputs	Benefit-Cost Test Outputs (Per Test)
Coincident Utility Peak Demand Reduction	Net Present Value of Benefits - Costs
Annual Utility Energy Reduction	Benefit-Cost Ratio
Total Utility Demand Reduction	Total Benefits
Total Utility Energy Reduction	Total Costs
Levelized Costs per kWh	
Levelized Costs per kW	
Annual Participant Savings	
Simple Payback	



Kentucky Power Company
Small Commercial Heat
Pump/Air Conditioner
Incentive Program
Process, Market and Impact Evaluation • July 2012

Submitted by

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Abstract

Kentucky Power Company retained Applied Energy Group to conduct a process, market and impact evaluation of its Small Commercial Heat Pump/ Air Conditioner Incentive Program. The program offers small commercial (less than 100 kW) financial incentives for upgrading to a new qualifying central air conditioner or heat pump system, up to a 5 ton unit.

To arrive at the final recommendations of the evaluation, AEG reviewed program materials, assessed Kentucky Power's program tracking and conducted interviews with Kentucky Power program staff, participating customers and participating HVAC dealers. The results of the analysis, along with key findings and recommendations for program improvements, are included in this report.

Table of Contents

Abbreviations	i
Definitions	ii
Executive Summary	iv
1. Introduction.....	1
2. Program Description	1
3. Evaluation Methodology	3
4. Process and Market Evaluation Findings.....	6
4.1 Program Logic Model	6
4.1.1 Activities and Outputs	8
4.1.2 Outcomes	9
4.1.3 External Factors.....	10
4.1.4 Best Practices	10
4.2 Program Performance	10
4.3 Program Marketing	14
4.3.1 Program Awareness	15
4.3.2 Motivation for Participation.....	16
4.4 Program Tracking & Incentive Processing.....	17
4.5 Program Satisfaction	18
4.5.1 Participating Customer Satisfaction	18
4.5.2 Participating Dealer Satisfaction	20
5. Impact Evaluation Findings	22
5.1 Gross Energy and Demand Savings	22
5.2 Net Energy and Demand Savings	24
5.3 Program Site Inspections and Installation Verification	24
5.4 Program Cost-Effectiveness	25
6. Key Findings and Recommendations	27
6.1 Summary of Key Findings	27
6.1.1 Program Performance Indicators.....	27
6.1.2 Program Tracking	28
6.1.3 Program Awareness and Marketing Strategies.....	28
6.1.4 Best Practices	28
6.1.5 Verify Program Impacts.....	29
6.2 Recommendations	29
6.2.1 Hire Implementation Contractor.....	29
6.2.2 Program Modifications.....	30
6.2.3 Engage Participating HVAC Dealers.....	30
Appendix A. Participating Dealer Survey Guide (a)	32
Appendix B. Participating Dealer Survey Guide (b).....	35
Appendix C. Participating Customer Survey Guide	37
Appendix D. Cost-Effectiveness Analysis Inputs.....	41

List of Tables

Table ES1 2011 Program Participation, Actual and Goals.....	v
Table ES2 Energy Savings, 2011	vi
Table 1 HVAC System Incentive Levels.....	2
Table 2 Detailed Program Budget, 2010-2012	2
Table 3 Program Participation Goals, 2010-2012	2
Table 4 Anticipated Energy and Demand Savings per Participant	3
Table 5 Overview of IPMVP Options	5
Table 6 Program Participation, 2011.....	11
Table 7 HVAC Installations by System Type and Size, 2011	11
Table 8 2011 Cost per Participant, Budgeted and Actual	12
Table 9 Consortium for Energy Efficiency Commercial HVAC Tier 1 Guidelines.....	13
Table 10 Most Active Participating HVAC Dealers	14
Table 11 Gross Savings per Unit, 2011.....	23
Table 12 Total Gross Demand and Energy Savings, 2011	23
Table 13 Net Demand and Energy Savings per Unit, 2011.....	24
Table 14 Installation Verification Site Visits, 2011	25
Table 15 Cost-Effectiveness Results, 2011	26
Table 16 Cost-Effectiveness Results if Planned Participation Achieved, 2011.....	26
Table 17 Kentucky Power Portfolio Cost-Effectiveness Results, 2011.....	27
Table 18 2011 Program Participation, Actual and Goals.....	27
Table 19 Energy Savings, 2011	29

List of Figures

Figure 1 Program Logic Model	7
Figure 2 Length of Time between Submitting Application and Receiving Rebate Check, n=13	9
Figure 3 HVAC Installations by System Type, 2011	11
Figure 4 HVAC Systems Rebated Monthly by System Type, 2011	12
Figure 5 Newspaper Advertisement.....	15
Figure 6 How Customers First Learned of the Program, n=13	15
Figure 7 How Participating HVAC Dealers First Learned of the Program.....	16
Figure 8 Customer Motivation for Participation, n=13	16
Figure 9 Reasons Participants Would Recommend the Contractor, n=13.....	18
Figure 10 Reasons Participant Would Recommend the Program, n=13	19
Figure 11 Participant Satisfaction with the Program, n=13	19
Figure 12 Participant Suggestions for Program Improvement, n=13.....	20
Figure 13 Likelihood of Non-Participating HVAC Dealer Submitting Rebate in 2012, n=8	21
Figure 14 Participating HVAC Dealer Preferred Contact Medium, n=7	21
Figure 15 Participating HVAC Dealer Satisfaction with the Program, n=7	22

Abbreviations

AEG	Applied Energy Group, Inc.
AEP	American Electric Power
CAC	Central Air Conditioner
CEE	Consortium for Energy Efficiency
EER	Energy Efficiency Ratio
EFLH	Equivalent Full Load Hours
EM&V	Evaluation Measurement and Verification
DSM	Demand Side Management
HP	Heat Pump
HSPF	Heating Season Performance Factor
HVAC	Heating Ventilation & Air Conditioning
IPMVP	International Performance Measurement and Verification Protocols
KPCO	Kentucky Power Company
NTG	Net-To-Gross Ratio
PSC	Public Service Commission
QA/QC	Quality Assurance/Quality Control
SEER	Seasonal Energy Efficiency Ratio

Definitions

Benefit-Cost Ratio: The ratio of total benefits of a program to the total costs discounted over some specified time period. The benefit-cost ratio gives a rough measure of the participant rate of return and provides an indicator of program risk. A ratio above one indicates a beneficial program.

Participant Cost Test: Measures the quantifiable benefits and costs to the customer due to participation in a program.

Program Administrator Cost Test: Measures the net costs of a demand-side management program as a resource option based on the costs incurred by the program administrator (including incentive costs), excluding any net costs incurred by the participant. The benefits are similar to the Total Resource Cost benefits, but costs are more narrowly defined.

Ratepayer Impact Measure (RIM) Cost Test: Measures what happens to customer bills or rates due to changes in utility revenues and operating costs caused by the program. Rates will go down if the change in revenues from the program is greater than the change in utility costs. Conversely, rates or bills will go up if revenues collected are less than the total costs incurred by the utility. The RIM test indicates the direction and magnitude of the expected change in customer bills or rate levels.

Total Resource Cost (TRC) Test: Measures the net costs of a demand side management program as a resource option based on the total costs of the program, including both the participant and utility costs.

British thermal unit (Btu): The amount of heat needed to raise one pound of water at maximum density one degree Fahrenheit. Btu is used to describe the power of heating and cooling systems, such as furnaces, stoves, barbecue grills, and air conditioners. Air conditioners for household use typically produce between 5,000 and 15,000 Btu. 1 watt is approximately 3.41 Btu/h.

Coincidence Factor: The ratio, expressed as a numerical value or as a percentage, of the simultaneous maximum demand of a group of electrical appliances or consumers within a specified period to the sum of their individual maximum demands within the same period.

Cost-effectiveness: A criterion that specifies that a technology or measure delivers a good or service at equal or lower cost than current practice, or the lowest cost alternative for the achievement of a given target.

Demand Side Management (DSM): Programs designed to provide incentives to end-use customers or curtailment service providers to enhance the ability and opportunity for reduction of load during peak hours.

Energy Efficiency Ratio (EER): average efficiency of the equipment under peak conditions. A measure of the relative efficiency of a heating or cooling appliance, such as an air conditioner, that is equal to the unit's output in Btu's per hour divided by its consumption of energy, measured in watts.

Equivalent Full Load Hours (EFLH): The number of hours a system operates at full load during one year for cooling or heating purposes. Expressed as total annual energy use divided by total peak load.

Evaluation Measurement and Verification (EM&V): A set of analyses used to assess energy efficiency programs in terms of energy and demand savings and cost-effectiveness. There are several approaches to EM&V, some of which have been codified as best practices (see IPMVP). Most energy efficiency programs are subject to some type of EM&V.

GRIDSMA[®]RT Programs: An AEP energy efficiency initiative that includes over 100 energy efficiency programs across the AEP service territory. The programs feature smart grid technologies such as smart meters, voltage optimization equipment and smart appliances that can reduce energy use.

Gross Energy Savings: Energy and demand savings seen by the participant at the meter. These are the appropriate program impacts to calculate bill reductions for the Participant Test.

Heating Season Performance Factor (HSPF): measure of seasonal average efficiency of equipment in heating mode.

Impact Evaluation: A method of evaluation that assesses any changes, intended or unintended that are directly attributable to an energy efficiency program.

International Performance Measurement and Verification Protocols (IPMVP): Provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. It may also be used by facility operators to assess and improve facility performance. Energy conservation measures covered in the protocols include fuel saving measures, water efficiency measures, load shifting and energy reductions through installation or retrofit of equipment, and/or modification of operating procedures.

Kilowatt (kW): A unit of power that describes the rate at which energy is generated or used. It quantifies the electric power required by an appliance or device such as a light bulb.

Kilowatt Hour (kWh): A unit of energy that describes how much electricity is consumed over a period of time. For example, if you turn on a 100 watt light bulb all day for 24 hours the light bulb consumed 2.4 kWh of electricity.

Net Energy Savings: The energy and demand savings attributable to the program, adjusted for free riders and spillover.

Net-to-Gross (NTG) Ratio: The ratio of net energy savings to gross energy savings indicates the overall effectiveness of an energy efficiency program. As the NTG ratio approaches one, the magnitude of the program impact increases.

Free Riders: Customers who participate in energy efficiency programs who would have engaged in the efficient behavior in the absence of the program. As a result, the presence of free riders tends to overestimate the energy savings of the program.

Spillover: Customers who engage in energy efficient behavior, but do not participate in the program, due to some influence of the program.

Process Evaluation: A method of evaluation that uses empirical data to assess the delivery of energy efficiency programs, verify goals and determine whether the program is implemented as designed.

Program Logic Model: Graphic representation of an energy efficiency program and its processes. Logic models shows the causal relationships or linkages among the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders critical to a program's performance.

Seasonal Energy Efficiency Ratio (SEER): average efficiency of the equipment during a typical cooling-season at the location of the measure. Ratio of the cooling output (Btu) divided by the power consumption (total electric energy input in watt-hours) during the same period. The higher the SEER, the more efficient the unit.

Executive Summary

Applied Energy Group, Inc ("AEG") was retained by Kentucky Power Company ("KPCO" or "Kentucky Power") to conduct a process, market and impact evaluation of its Small Commercial Heat Pump/Air Conditioner Incentive Program. The program offers financial incentives to small commercial customers (less than 100 kW) for upgrading to a new qualifying central air conditioner or heat pump system, up to a 5 ton unit. The system must meet the Consortium for Energy Efficiency ("CEE") guidelines and be installed by a participating KPCO HVAC dealer.

AEG designed the process and market evaluation to examine program processes and customer responses to the program. The evaluation identifies methods for gathering data and measuring program results and makes recommendations for program improvements. To arrive at the final recommendations, AEG performed the following tasks:

- Reviewed program materials, data and tracking methods.
- Updated program logic model and assessed program flow.
- Conducted interviews with KPCO staff.
- Conducted surveys and site visits with participating customers.
- Conducted surveys of participating HVAC dealers.

AEG designed the impact evaluation to assess the gross and net demand savings, gross and net energy savings, and the cost-effectiveness of installed measures. The evaluation verifies gross and net savings and measures installation. To verify program impacts, AEG performed the following tasks:

- Calculated the gross energy (kWh) and peak (kW) impacts by project using engineering calculations.
- Performed cost-effectiveness analysis using a benefit-cost analysis model.
- Conducted site inspections of a sample of installed projects.

Summary of Key Findings

The Small Commercial Heat Pump/Air Conditioner Program is designed to encourage the purchase of energy efficiency central air conditioners and heat pumps identified by the U.S Department of Energy, the U.S. Environmental Protection Agency and/or the Consortium for Energy Efficiency as being influential in energy efficiency. The program helps lower customer electric bills and allows KPCO to utilize its existing generating capacity more efficiently, thereby deferring or delaying the need for new generation.

Program Performance Indicators

In 2011, Kentucky Power rebated 24 small commercial central air conditioners and heat pumps through the Small Commercial Heat Pump/Air Conditioner Incentive Program at a much higher cost per unit than originally budgeted (\$980 versus \$575). The higher cost per participant may be attributed to the high fixed costs associated with promotional and evaluation activities that were independent of program participation.

Eighty-eight (88) percent of the systems installed were heat pumps and 13 percent were central air conditioners. The program was approved in August 2010, two months later than anticipated in the Kentucky PSC filing, and implemented in September. The first rebate was issued in April 2011. KPCO reached 53 percent of the revised 40 heat pump participant goal and 12 percent of the revised 25 air conditioner participant goal.

Table ES1 2011 Program Participation, Actual and Goals

	Actual	Original Goal	Revised Goal
Heat Pump	21	20	40
Central Air Conditioner	3	100	25
Total	24	120	65

In 2010 and 2011, 23 out of 101 participating HVAC dealers participated in the HVAC Diagnostic and Tune-Up Program or Small Commercial Heat Pump/Air Conditioner Incentive Program. One dealer performed 54 percent of the small commercial heat pump/air conditioner installations. The HVAC dealers surveyed noted that the KPCO dealer incentives and being listed on the KPCO website as a participating dealer were significant motivators for participation.

Program Tracking

Kentucky Power's program tracking system is comprised of three databases. The program log tracks all rebate application data, including customer information, dealer name and HVAC system data. The CEE guidelines provide minimum energy efficiency standards for commercial HVAC equipment. The minimum energy efficiency standards may apply to SEER and/or EER, depending upon the needs of the energy efficiency program.

Of the 21 heat pump systems rebated by Kentucky Power, 17 met the CEE Tier 1 SEER/EER and HSPF guidelines. Two (2) systems did not meet the guidelines and 2 had inadequate system efficiency information. Of the 3 central air conditioner systems rebated by Kentucky Power, 1 met the CEE Tier 1 SEER/EER guidelines. One (1) did not meet the guidelines and 1 had inadequate system efficiency information.

Program Awareness and Marketing Strategies

The marketing strategy for the program included a combination of Kentucky Power program staff and participating HVAC dealers. KPCO staff promoted the programs directly to HVAC dealers through fact sheets, calls and meeting-in person to discuss the program. In turn, the participating dealers were expected to promote the program to eligible customers. Additional marketing activities included direct mail, fact sheets, bill inserts, newspaper advertisements and community events.

According to survey respondents, customers most often learned of the program from the heating and cooling contractor (54%) followed closely by a Kentucky Power employee (46%). Ninety-two (92) percent of participating customers surveyed noted that information from the contractor was a crucial factor in their decision to purchase and install efficient HVAC equipment. Participating customers and HVAC dealers surveyed noted that the program would benefit from increased publicity and advertising.

Best Practices

Kentucky Power's program design and processes are consistent with industry standards that are considered best practice for similar programs. Given the nascent stage of Kentucky Power's program it is commendable that the program has received the level of support from the contractor community and satisfaction recognition from participating customers. The majority (approximately 72%) of energy efficiency programs targeted at commercial customers provide customer incentives for unitary HVAC equipment.¹

The challenges posed by lack of information are ubiquitous in energy efficiency programs. Investment in education and outreach boost awareness of the benefits of energy efficiency. Successful marketing strategies can increase program participation. Actively engaging key stakeholders, such as HVAC contractors or home/business owners, is crucial to the success of any energy efficiency program. Typically, programs will feature periodical stakeholder advisory meetings or other formal outreach that encourages participation and provides valuable feedback throughout the program.

Many energy efficiency programs suffer from lack of staff resources. Additional staff personnel may be necessary to ensure that program goals are met and that the program delivers the intended results. The increased program costs of additional staff are often recouped by improved performance.

Verify Program Impacts

The net-to-gross ratio is estimated at 78 percent, with 27 percent free ridership and 5 percent spillover. Program cost-effectiveness was greatly affected by low participation rates and program administration, marketing and evaluation costs that remained constant independent of program participation. If administrative expenses stay consistent, the cost-effective break-even point is 30 heat pump participants and 15 air conditioner participants. Heat pumps have shown to be more cost-effective than central air conditioners. If participation goals are achieved, especially for heat pumps, the program will be cost-effective and have a positive impact on the Kentucky Power service territory.

Table ES2 Energy Savings, 2011

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)	TRC
Program Total	78%	1.774	8.708	24,634	0.73

Installations of both heat pumps and air conditioners were inspected with building types including medical offices, retail showrooms, churches, and hotels. The sites inspected provided a representative sample of all program projects. Proper installation verification was confirmed at all locations.

Recommendations

AEG has several recommendations on how to improve the program. These include:

¹ Consortium for Energy Efficiency (2012). State of the Efficiency Program Industry: Budgets, Expenditures and Impacts 2011.

Hire Implementation Contractor

AEG recommends that Kentucky Power hire an implementation contractor to implement Kentucky Power's residential and small commercial HVAC programs, including, but not limited to, the Small Commercial Heat Pump/Air Conditioner Incentive Program, the Residential and Small Commercial HVAC Diagnostic and Tune-Up Program, the Residential High Efficiency Heat Pump Program, Mobile Home High Efficiency Heat Pump, and Mobile Home New Construction.

Kentucky Power has a small staff to run and oversee Kentucky Power's numerous energy efficiency programs. Some of the KPCO programs have implementation contractors that perform the day-to-day operations of the programs, but the residential and small commercial HVAC programs are run completely by KPCO staff. Therefore, KPCO staff is responsible for marketing and promotional activities, including visiting participating and potential HVAC dealers across the KPCO territory, processing rebate applications, tracking rebate applications and performing QA/QC inspections. Due to the limited resources, Kentucky Power has not yet conducted an inspection to ensure services are being performed properly.

The residential and small commercial HVAC programs share many similar components, including marketing and promotional activities and data tracking systems as well as the same participating HVAC dealers. Utilizing one implementation contractor to implement the HVAC programs will allow the programs to continue capitalizing on their similarities and increase the efficiency of program processes.

The implementation contractor will have, at a minimum, the following responsibilities:

- Develop program goals and budget.
- Develop marketing and promotional activities.
- Design and maintain a data tracking system.
- Process customer and contractor rebate applications.
- Engage and monitor participating HVAC dealers.
- Develop QA/QC procedures and conduct random inspections of completed work.

Kentucky Power program staff and the implementation contractor should work with the Commercial Incentive Program implementation contractor to ensure that the Small Commercial Heat Pump/Air Conditioner Incentive Program does not compete with the Commercial Incentive Express Program. If it is determined that competition exists, the programs should be examined to determine if the Small Commercial HP/AC Incentive Program should be absorbed into the Commercial Incentive Express Program.

Program Modifications

AEG recommends that Kentucky Power clarify the program requirements. To receive a rebate, the HVAC systems must meet the CEE guidelines, which provide minimum energy efficiency standards for commercial HVAC equipment. The minimum energy efficiency standards may apply to SEER and/or EER, depending upon the needs of the energy efficiency program. Kentucky Power does not specify whether HVAC systems must meet both the SEER and EER requirements. AEG recommends that

Kentucky Power and the implementation contractor consider modifying the program requirement, such that HVAC systems must meet the CEE Tier 1 SEER and HSPF guidelines. The Kentucky Power program website should be updated to reflect any program requirement modifications.

AEG recommends increasing rebate processing oversight conducted by Kentucky Power and the implementation contractor to ensure compliance with program requirements. In particular, oversight activities should ensure that HVAC equipment qualifies for a rebate and equipment efficiency data is correctly recorded and tracked. Of the 24 systems rebated, 3 did not meet the CEE Tier 1 guidelines and 3 had inadequate system efficiency information.

Engage Participating HVAC Dealers

AEG recommends that Kentucky Power and the implementation contractor actively engage participating HVAC dealers and remove non-participating HVAC dealers from the participating HVAC dealer list if they have not actively participated in a KPCO HVAC program within the most recent 12 months.

HVAC dealer participation is crucial to the program; 92 percent of survey respondents noted that information from the contractor was a crucial factor in their decision to purchase and install efficient HVAC equipment. There are currently 101 HVAC dealers participating in the HVAC programs. In 2010 and 2011, only 23 dealers participated in the HVAC Diagnostic and Tune-Up Program or the Small Commercial Heat Pump/Air Conditioner Incentive Program.

AEG recommends collaboration between Kentucky Power and the implementation contractor to engage contractors and explore modifying the marketing and promotional activities. Kentucky Power and the implementation contractor should explore cooperative marketing with the participating contractors to potentially leverage contractor's marketing experience. Cooperative marketing would be offered on a temporary basis and the impact on participation reviewed before permanent changes were made to the program.

1. Introduction

Applied Energy Group, Inc. ("AEG") was retained by Kentucky Power Company ("Kentucky Power" or "KPCO") to conduct a comprehensive evaluation of its 2010-2012 Demand Side Management ("DSM") Program Portfolio.² The 2010-2012 DSM Program Portfolio includes the Residential Efficient Products Program, Residential and Small Commercial HVAC Diagnostic and Tune-up Program, Commercial Incentive Program, Small Commercial High Efficiency Heat Pump and Air Conditioner Program, and the Residential and Small Commercial Load Management Pilot Program. The DSM programs will be evaluated concurrently and individual program Evaluation, Measurement and Verification ("EM&V") reports will be filed with the Kentucky Public Service Commission ("PSC") by the August 15, 2012 regulatory filing deadline.

Kentucky Power is an electric utility that serves approximately 175,000 customers in all or part of 20 eastern Kentucky counties.³ The utility is part of the American Electric Power ("AEP") system, which is one of the largest electric utilities in the United States.⁴ The 2010-2012 DSM Program Portfolio was implemented to help Kentucky Power and AEP reduce electricity use and peak demand, help customers lower their electricity bills, and encourage long-term change in the market through the adoption of energy efficiency technologies and services.

The Small Commercial Heat Pump/Air Conditioner Incentive Program offers small commercial (less than 100 kW) financial incentives for upgrading to a new qualifying central air conditioner or heat pump system, up to a 5 ton unit. The systems, which must meet the Consortium for Energy Efficiency ("CEE") guidelines, must be installed by a participating KPCO HVAC dealer. The program is designed to encourage the purchase of energy efficiency central air conditioners and heat pumps.

This report describes the key findings from the process, market and impact evaluation and provides recommendations for improving program performance and operations. Section 2 provides a program description and Section 3 described the process, market and impact evaluation methodology. Sections 4 and 5 present the process, market and impact evaluation findings. Key findings and recommendations are described in Section 6.

2. Program Description

The Small Commercial Heat Pump/Air Conditioner Incentive Program offers small commercial customers (less than 100 kW) financial incentives for upgrading to a new qualifying central air conditioner or heat pump system, up to a 5 ton unit. The system must be installed by a participating KPCO HVAC dealer and meet the current Consortium for Energy Efficiency guidelines for energy efficiency.

² Kentucky Power's 2010-2012 DSM programs were approved in Case No. 2010-00095 and Case No. 2010-00198.

³ Kentucky Power. Facts, Figures & Bios. Accessed at www.kentuckypower.com/info/facts/

⁴ American Electric Power delivers electricity to more than 5 million customers in 11 states and ranks among the nation's largest generators of electricity, with almost 38,000 megawatts of generating capacity in the U.S.

Customer incentives are presented in Table 1. KPCO participating HVAC dealers are eligible for a \$50 rebate for each system installed (dealer will only receive incentive if customer rebate application is approved). The dealer must be a state-licensed contractor. Heat pump incentives are limited to customers whose primary heating source is electricity. Customers are limited to one rebate per eligible unit every three years.

Table 1 HVAC System Incentive Levels

Equipment Type	Incentive
Central Air Conditioner	
≤36,000 Btu/h	\$250
36,000 ≤ 65,000 Btu/h	\$400
Heat Pump	
≤36,000 Btu/h	\$300
36,000 ≤ 65,000 Btu/h	\$450

The program is designed to encourage the purchase of energy efficiency central air conditioners and heat pumps identified by the U.S Department of Energy, the U.S. Environmental Protection Agency and/or the Consortium for Energy Efficiency as being influential in energy efficiency. The program helps lower customer electric bills and allows KPCO to utilize its existing generating capacity more efficiently, thereby deferring or delaying the need for new generation.

The Kentucky Public Service Commission ("PSC") approved a three-year budget and participation goals for the Small Commercial Heat Pump/Air Conditioner Incentive Program. Tables 2 and 3 present the program budgets and participations goals for 2010 through 2012 by system type. The program budgets were revised from the original filing to \$47,100 in 2011 and \$50,470 in 2012. The participation goals were revised from the original filing to 65 in 2011, 25 central air conditioners and 40 heat pumps, and 60 in 2012, 20 central air conditioners and 40 heat pumps. Table 4 shows the anticipated energy and demand savings per participant by system type as originally filed.⁵

Table 2 Detailed Program Budget, 2010-2012

	2010	2011	2012
Equipment/Vendor	\$3,000	\$6,000	\$6,000
Customer Incentive	\$24,500	\$49,000	\$49,000
Promotion	\$5,700	\$12,000	\$12,000
Evaluation	\$2,000	\$2,000	\$6,000
Total	\$35,200	\$69,000	\$73,000

Table 3 Program Participation Goals, 2010-2012

	2010	2011	2012
Central Air Conditioner	50	100	100
Heat Pump	10	20	20

⁵ See Case No. 2010-00095, Case No. 2011-00300 and Case No. 2012-00051.

Table 4 Anticipated Energy and Demand Savings per Participant

	Summer kW	Winter kW	kWh
Central Air Conditioner	0.164	-	313
Heat Pump	0.164	0.350	1,240

3. Evaluation Methodology

AEG designed the process, market and impact evaluation to determine the efficacy of program procedures and systems, evaluate the achievement of program objectives, provide insight into and recommendations for program improvement and verify the direct impacts of program activities.

The process and market evaluation identifies whether key elements, such as incentive levels, program delivery, program tracking mechanisms and quality assurance/quality control ("QA/QC") procedures are performing as designed and identifies issues or opportunities to improve these key elements. The goals of the process and market evaluation are to:

- Examine key performance indicators to identify participation or program issues;
- Conduct a comprehensive review of program tracking or monitoring systems to review the accuracy of and trends in data;
- Determine awareness levels as a way to refine marketing strategies and reduce barriers to program participation;
- Assist program implementers and managers to structure programs and achieve cost-effective savings while maintaining high levels of customer satisfaction;
- Provide recommendations for changing the program's structure, management, administration, design, delivery, operations or goals; and

Impact evaluations verify the energy and demand savings directly associated with a program and assess the cost-effectiveness of the DSM program. The goals of the impact evaluation are to:

- Verify the annual energy and coincident peak capacity savings and total resource benefit claims made by Kentucky Power; and
- Provide verification and documentation of DSM program impacts.

To arrive at the final recommendations, AEG carried out the following research activities.

Review Program Materials

AEG reviewed current program materials, documents and processes, including the rebate applications and marketing and outreach materials. The review served as the basis for understanding whether the program has been implemented as planned. The review was particularly important for preparing the interview guides and survey instruments for other process evaluation tasks.

Program Logic Model

AEG developed a program logic model based on a review of program materials and discussions with Kentucky Power program staff. The model shows the linkages between the program components,

including activities, outputs, outcomes and key stakeholders. The model also highlights potential external influences and program inputs.

Program Tracking and Database Review

AEG reviewed current Kentucky Power rebate application review and processing, program tracking and reporting, and tracking databases.

Kentucky Power Staff Interview

AEG conducted a comprehensive, group interview with Kentucky Power program staff in November 2011. The purpose of this interview was to get staff impressions of program implementation activities, program performance, marketing and customer awareness of the program, program data and tracking mechanisms, and opportunities for improving the program. Individual interviews with program staff, as well as informal discussions regarding program performance, were also conducted between December 2011 and March 2012. Individual interviews focused on program design and delivery issues, program performance, potential areas of improvements, and overall program effectiveness.

Participating Dealer Interview

AEG administered a 10 to 12 minute telephone survey to a sample of participating HVAC dealers. The survey provided an assessment of customer satisfaction, identified potential areas for improvement and provided insight about customer attitudes toward energy efficiency and conservation issues. The survey also provided insight on marketing and coordination efforts, application processes, and the usefulness of support materials from Kentucky Power. The participating HVAC dealer survey guides can be found in Appendices A and B.

Currently, 101 HVAC dealers are participating in the HVAC Diagnostic and Tune-Up Program and Small Commercial Heat Pump/Air Conditioner Incentive Program. Twenty-one (21) HVAC dealers submitted a rebate for one or both of the programs. AEG conducted 17 surveys of participating HVAC dealers, 9 with dealers that submitted a rebate in 2011 and 8 with dealers that did not submit a rebate in 2011.

Participating Customer Surveys

AEG administered a 10 to 12 minute telephone survey to a sample of program participants to assess program experience and awareness, customer satisfaction, barriers to participation, free ridership and areas for potential program improvement. The participating customer survey guide can be found in Appendix C.

Kentucky Power provided data for 24 program participants that received a rebate in 2011. The sample included 21 unique electric accounts, which were identified by the participant's account number and address. AEG calculated the sample size at a 90 percent confidence interval with an error margin of +/- 10 percent. Participants were then randomly selected based on unique identifiers determined by Microsoft Excel's random number generator. Thirteen (13) surveys were completed. AEG conducted site visits and inspections of seven participants (which includes eight installations) to assess services rendered and verify installation.

Review Engineering or Deemed Savings Assumptions

AEG reviewed the engineering and/or deemed savings assumptions utilized by AEP to calculate program energy and demand impacts. Kentucky Power's initial program filing deemed savings assumptions were reviewed to ensure consistence with the impact evaluation results.

Gross Energy and Demand Impacts

AEG determined the gross energy and demand savings of a representative sample based on Option A of the International Performance Measurement and Verification Protocols ("IPMVP")⁶ outlined in Table 5.

Table 5 Overview of IPMVP Options

IPMVP M&V Option	Measure Performance Characteristics	Data Requirements
Option A: Engineering calculations using spot or short-term measurements, and/or historical data	Constant performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • Spot measurements • Run-time hour measurements
Option B: Engineering calculations using metered data.	Constant or variable performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • End-use metered data
Option C: Analysis of utility meter (or sub-meter) data using techniques from simple comparison to multivariate regression analysis.	Variable performance	<ul style="list-style-type: none"> • Verified installation • Utility metered or end-use metered data • Engineering estimate of savings input to SAE model
Option D: Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering	Variable performance	<ul style="list-style-type: none"> • Verified installation • Spot measurements, run-time hour monitoring, and/or end-use metering to prepare inputs to models • Utility billing records, end-use metering, or other indices to calibrate models

Engineering calculations referenced from the *State of Illinois Technical Reference Manual*, using Kentucky Power specific inputs, were utilized to calculate gross energy and demand impacts for central air conditioners and heat pumps.

Net Energy and Demand Impacts

AEG adjusted the gross energy and demand savings to reflect estimates of free ridership and spillover. Free ridership and spillover were determined from the participating customer interviews; see Section 5 for a detailed explanation.

Cost-Effectiveness Analysis

AEG analyzed the cost-effectiveness of the Small Commercial Heat Pump/Air Conditioner Incentive Program utilizing Bencost, an updated version of a public domain model that AEG customized for Kentucky Power. Bencost is an input-output model that calculates four standard California cost-effectiveness tests, the Total Resource Cost, Participant Test, Utility Test and Rate Impact Measure Test.

⁶ IPMVP provides best practice techniques for verifying results of energy efficiency projects, i.e. verifying savings attributed to energy efficiency projects.

The analysis was conducted using Kentucky Power specific inputs, including avoided costs, discount rates, participation and incentives. Cost-effectiveness inputs and outputs are detailed in Appendix D.

4. Process and Market Evaluation Findings

The process and market evaluation identifies whether key elements, such as incentive levels, program delivery, program tracking mechanisms and QA/QC procedures are performing as designed. When potential deficiencies in these areas arise, the process and market evaluation identifies opportunities for improving these key elements.

4.1 Program Logic Model

Program logic models are graphic representations of an energy efficiency program and its processes. Logic models show the causal relationships or linkages between the problem or situation the program is designed to address, the intervention (inputs and outputs) and the program's impacts (short, intermediate and long-term outcomes). A logic model helps identify partnerships and stakeholders that are critical to a program's performance.⁷

Key elements of a program logic model include:

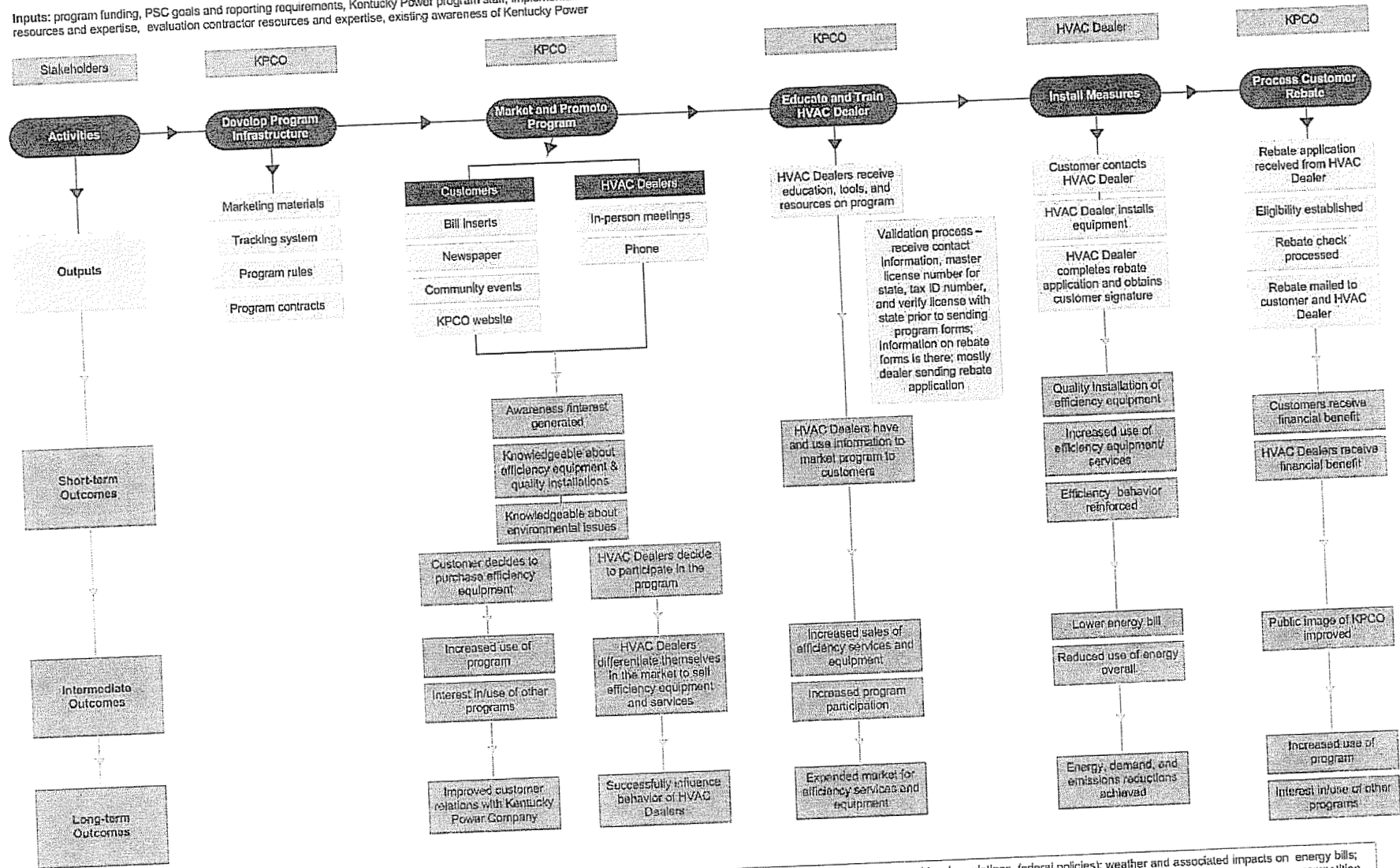
- **Inputs.** Resources that program stakeholders contribute to a program, such as knowledge, skills, expertise, finances or equipment.
- **Outputs.** Program activities and number of people reached, based on program goals.
- **Outcomes.** Short-term, intermediate or long-term results of the program outputs. Assists evaluators and program administrators in establishing program results.
- **External Influences.** Factors outside the utility's control that may influence the program outcomes. They help to identify important program partnerships as well as the issue(s) the program can realistically influence. The factors help determine which evaluation measures will accurately reflect project outcomes or any other goals that must be met to address the problem or situation.

In the logic model presented in Figure 1, program activities are oriented sequentially across the top of the page from the left to the right. The sequence of program activities is important. For example, the program's infrastructure, including its advertising materials, tracking systems, program rules, and contracts must be developed before the program can be marketed and customers recruited. The performance outputs and outcomes are oriented vertically from top to bottom. The box on the bottom right contains the external factors outside the utility's control that may affect program performance.

⁷ McCawley, P. (2001). *The Logic Model for Program Planning and Evaluation*. Moscow: University of Idaho Extension.

Figure 1 Program Logic Model

Inputs: program funding, PSC goals and reporting requirements, Kentucky Power program staff, implementation contractor resources and expertise, evaluation contractor resources and expertise, existing awareness of Kentucky Power



4.1.1 Activities and Outputs

There are five main activities in the Small Commercial Heat Pump/Air Conditioner Incentive Program. The program activities and their corresponding outputs help to establish linkages between the situation that the program is designed to address and the program's intended outcomes. Therefore, activities and outputs are discussed together.

Develop Program Infrastructure

Activities include gathering market knowledge, setting program goals, designing the program, establishing program rules, developing marketing approaches and content, and establishing institutional and operating structures. Kentucky Power staff, with input from AEP, designed the program, including rebate applications, data tracking system and marketing materials.

Market and Promote Program

The marketing strategy for the program included a combination of Kentucky Power program staff and participating HVAC dealers. Kentucky Power staff promoted the programs directly to HVAC dealers, mailing program fact sheets as well as calling and meeting in-person with dealers to discuss the programs. Additional marketing activities included direct mail, fact sheets, bill inserts, newspaper advertisements and community events. Participating HVAC dealers were encouraged, and expected, to promote the program to eligible customers.

Educate and Train Contractors

Kentucky Power program staff developed relationships and maintained direct contact with participating HVAC dealers. Kentucky Power program staff educated dealers on the Small Commercial Heat Pump/Air Conditioner Incentive Program, including the eligible customers, qualifying equipment, rebate forms and rebate processing. Program staff also provided guidance on KCPO tools and resources, such as program paperwork, KCPO website, as well as how to use energy efficiency as a sales tool. Kentucky Power maintains a list of participating dealers on the DSM Program website.

Install Measures

The customer learned of the program directly from the participating dealer or some other source, such as KPCO marketing or word of mouth. The customer purchased an eligible heat pump and/or air conditioner system from a participating HVAC dealer and the dealer installed the equipment. After the system was installed, the customer received the rebate application from the HVAC dealer. The dealer was responsible for completing and faxing the paperwork to KPCO program staff.

Eight out of nine participating HVAC dealers surveyed completed and submitted the rebate application for the customer. One HVAC dealer had the customer submit the rebate application.

Process Customer Rebate

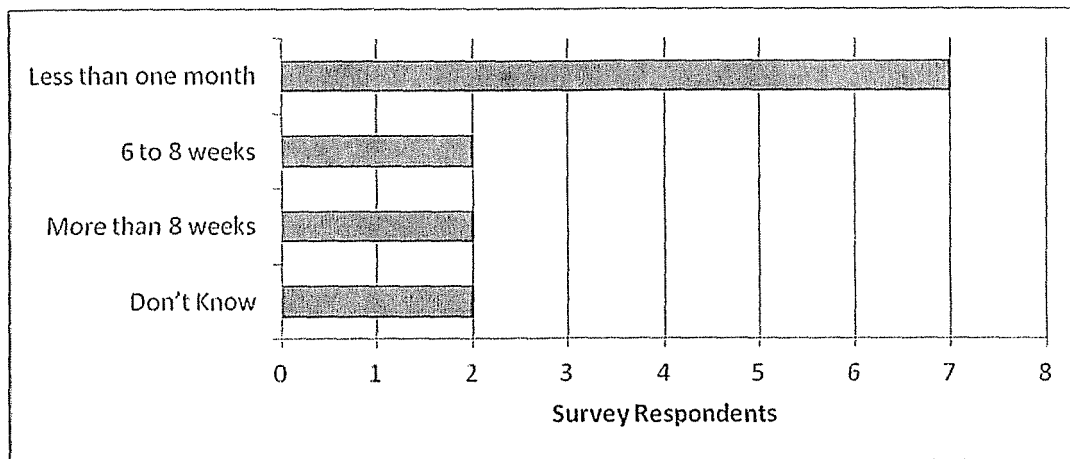
Customer rebates were processed by the Kentucky Power program staff. Staff reviewed the rebate applications to ensure the application was complete and the customer/dealer was eligible for an incentive. The application data was entered into the program tracking system and a payment request submitted to KPCO program staff for review. Once approved, the customer/dealer data was submitted

to AEP's Accounting Group and a rebate check issued and mailed. According to Kentucky Power program staff,

It generally took one to two weeks for the customer to receive the rebate check, once the application was received by Kentucky Power.

According to participating customers, it often took less than one month to receive the rebate check from the time the application was submitted.

Figure 2 Length of Time between Submitting Application and Receiving Rebate Check, n=13



Kentucky Power maintained the right to conduct inspections on a sample of equipment that received diagnostic and tune-up services to ensure services are being performed properly and therefore the energy savings are being achieved. To-date no inspections have been conducted.

4.1.2 Outcomes

Outcomes are the result of program partners and target audiences responding to the program outputs.

Short-term Outcomes

When the program is marketed and promoted, awareness and interest in efficient HVAC equipment may increase among customers and HVAC dealers. Customers may become more knowledgeable about energy efficient equipment and quality installation. Other short-term outcomes include the HVAC dealers having information to market the program to customers, increased use of energy efficient equipment and services, and the financial benefit the customer and HVAC dealer receives by participating in the program. The program may lead to an increased commitment to energy efficiency.

Intermediate Outcomes

Intermediate outcomes may include increased use of the program, interest in, and use of, other KPCO efficiency programs, increased sales of energy efficient HVAC equipment and reduced household energy consumption.

Long-term Outcomes

The long-term outcomes may include energy and demand savings, influence behavior of HVAC dealers, and an expanded market for energy efficient HVAC equipment. Additional outcomes include reduced utility emissions, fewer greenhouse gases emitted. Kentucky Power may enhance its public image as a utility that responds to customer needs without sacrificing consideration of environmental issues.

4.1.3 External Factors

Documenting external factors outside the control of Kentucky Power and its stakeholders improves program planning and evaluation by identifying important program partners, the activities the program can realistically influence, which evaluation measures will accurately reflect project outcomes, and other needs that must be met.

- Changes in political priorities (e.g. codes and standards, state and local regulations, federal policies, perceptions of energy and climate change);
- Weather and associated impacts on customer actions and energy bills;
- Energy prices and regulation;
- Changes in utility rate structures;
- Perceptions in the value of energy efficiency;
- Competition among targeted HVAC dealers;
- HVAC dealer business practices and interest in energy efficient technology; and
- Cost, performance and availability of efficient technologies and services.

4.1.4 Best Practices

Program administrators encounter common challenges that hinder energy efficiency programs from achieving maximum benefits, including, but not limited to:

- Lack of information and awareness of energy efficiency benefits.
- Limited resources / High initial costs energy efficient technologies.
- Competing priorities among customers and program administrators.
- Lack of clear, well-communicated program goals that correspond to overall organizational goals.

Best practices can provide ideas and/or tools to overcome these and other program barriers. Some key best practices include, but are not limited to, the following:

- Coordinate with other energy efficiency program administrators to overcome market barriers.
- Increase awareness by investing in education, outreach and marketing activities.
- Solicit stakeholder input and feedback to optimize program design and delivery.
- Develop reliable program tracking systems to support evaluation and implementation.

4.2 Program Performance

In 2011, 24 customer HVAC systems were rebated under the Small Commercial Heat Pump/Air Conditioner Incentive Program. Heat pumps accounted for 87.5 percent of systems installed and central air conditioners accounted for 12.5 percent (see Figure 3). Kentucky Power rebated 21 heat pumps in

2011, achieving 53 percent of the revised 40 participant goal, and 3 central air conditioners, achieving 12 percent of the revised 25 participant goal.

The program was expected to be approved by the Kentucky PSC in June 2010.⁸ However, the program was approved in August 2010 and implemented by Kentucky Power program staff in September. In September and October 2010, Kentucky Power issued introduction letters and incentive forms to participating HVAC dealers and conducted follow-up phone calls. The first rebates were issued in April 2011.

Table 6 Program Participation, 2011

	Actual	Original Goal	Revised Goal
Heat Pump	21	20	40
Central Air Conditioner	3	100	25
Total	24	120	65

Figure 3 HVAC Installations by System Type, 2011

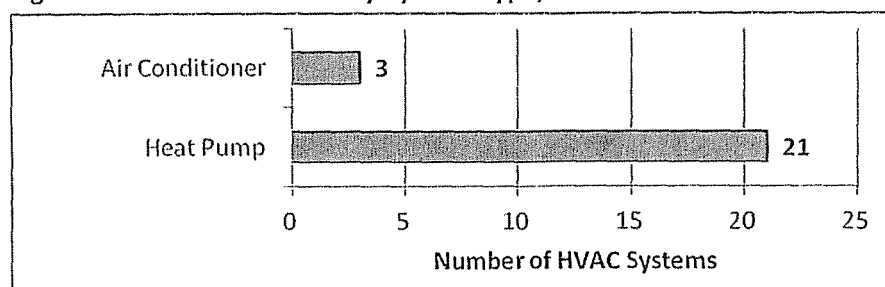


Table 7 presents the HVAC installations by system type and size. Sixty-two (62) percent of heat pumps were sized less than 36,000 Btu/h.

Table 7 HVAC Installations by System Type and Size, 2011

	Heat Pump	Central Air Conditioner
Less than 36,000 Btu/h	13	1
36,000 to 65,000 Btu/h	8	2

Energy efficiency programs that offer services for cooling measures typically experience increased participation during the summer months, when the outside temperature is hottest and cooling equipment is used on a consistent basis. During the summer, customers that use space cooling equipment may find the program essential. Therefore, a customer is more likely to purchase and install a central air conditioner during the spring and summer months. While only three central air conditioners were rebated in 2011, they were purchased and installed in the warmer months.

Heat pumps provide cooling and heating to customers. Therefore, customers will purchase and install heat pumps year round, but primarily during the spring and fall seasons in preparation for the summer and winter seasons. Heat pumps rebates spiked in the spring and again in the fall.

⁸ See Case No. 2010-00095.

Figure 4 presents the number of systems rebated by system type and sector. If the summer or winter months are mild, as compared to the historic temperature, customers will not be as likely to utilize their cooling and heating equipment. Therefore, customer participation in the Small Commercial Heat Pump/Air Conditioner Incentive Program would decrease.

Figure 4 HVAC Systems Rebated Monthly by System Type, 2011

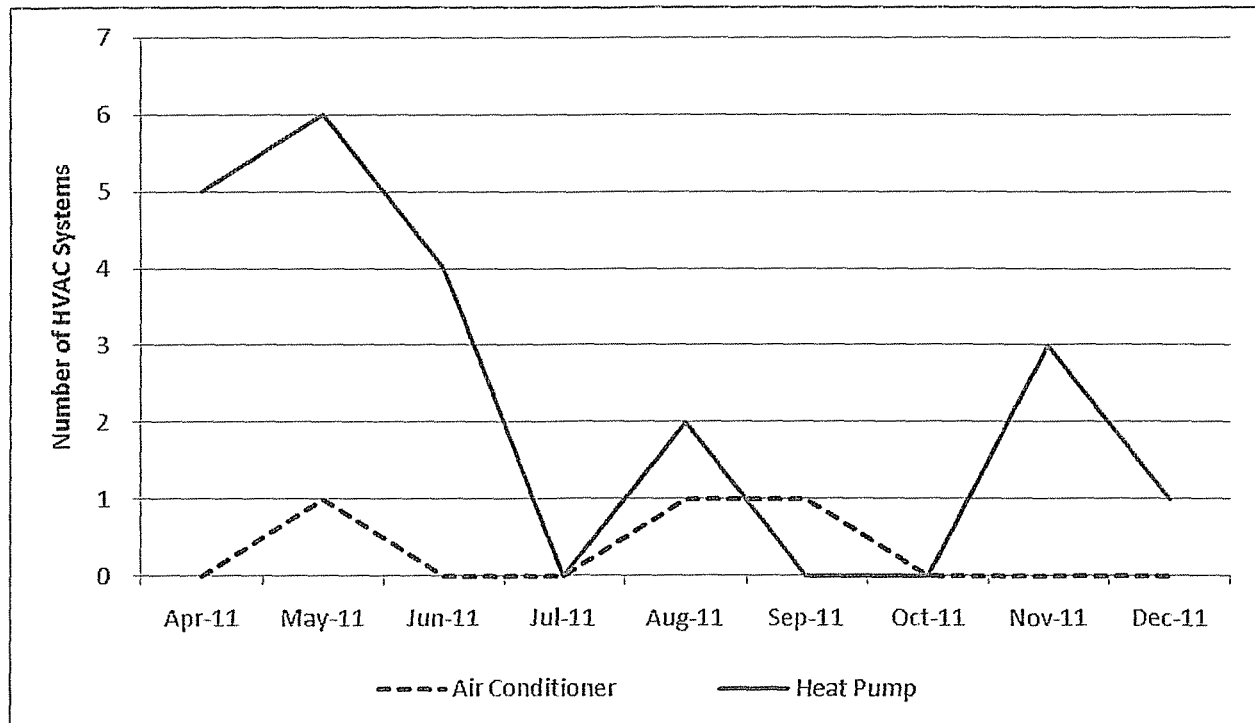


Table 8 presents the budget and budgeted cost per participant as compared to the actual expenditures and actual cost per participant. The actual 2011 expenditures were \$23,516 compared to the original approved budget of \$69,000.⁹ However, the actual cost per participant was significantly higher than budgeted. The higher cost per participant may be attributed to the high fixed costs associated with promotional and evaluation activities, that were independent of program participation.

Table 8 2011 Cost per Participant, Budgeted and Actual

	Budgeted	Actual
Equipment/Vendor	\$6,000	\$1,150
Customer Incentive	\$49,000	\$7,950
Promotion	\$12,000	\$9,636
Evaluation	\$2,000	\$4,780
Total Cost (\$)	\$69,000	\$23,516
Participation	120	24
Cost (\$) per Participant	\$575	\$980

⁹ See Case No. 2010-00095.

The Consortium for Energy Efficiency guidelines provide minimum energy efficiency standards for commercial HVAC equipment. The minimum energy efficiency standards may apply to SEER and/or EER, depending upon the needs of the energy efficiency program.

Table 9 Consortium for Energy Efficiency Commercial HVAC Tier 1 Guidelines

Equipment	System Type	SEER	EER	HSPF
Central Air Conditioner	Split System	14	12	n/a
Central Air Conditioner	Single Package	14	11.6	n/a
Heat Pump	Split System	14	12	8.5
Heat Pump	Single Package	14	11.6	8

Of the 21 heat pump systems rebated by Kentucky Power,

- 8 met the SEER, EER and HSPF guidelines.
- 9 met the SEER and HSPF guidelines.
- 1 met only the EER guideline.
- 1 met only the HSPF guideline.
- 2 did not provide adequate efficiency information (1 was missing HSPF information but did not meet the EER or SEER guidelines and 1 was missing EER and HSPF but met the SEER guideline).
- A split heat pump was rebated at \$300 although the unit was 48,000 Btu/h and should have been rebated at \$450.

Of the 3 central air conditioner systems rebated by Kentucky Power,

- 1 met only the SEER guideline.
- 1 did not the guidelines.
- 1 did not provide efficiency information.

There were 101 HVAC dealers participating in the Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program and HVAC Diagnostic and Tune-Up Program. In 2010 and 2011, 23 out of 101 participating HVAC dealers participated in at least one of the programs.¹⁰ Of these, 8 received a rebate for installing an efficient HVAC system. One dealer performed 54 percent of the small commercial heat pump/air conditioner system installations.

¹⁰ The 101 participating HVAC dealers may also participate in the Residential Heat Pump/Air Conditioner Program. However, the Residential Heat Pump/Air Conditioner Program was not evaluated and these results pertain only to the HVAC Diagnostic and Tune-up Program and Small Commercial Heat Pump/Air Conditioner Program.

Table 10 Most Active Participating HVAC Dealers

Contractor	HVAC Systems	
	Rebated	% of Total
Breathitt Mechanical	13	54%
Appalachian Refrigeration	3	13%
Cadco Heating & Air Conditioning	2	8%
Kentucky Wide Heating & Cooling	2	8%
Elliot Supply & Glass, Inc	1	4%
Buckner HVAC	1	4%
Yoders Htg & Cooling	1	4%
Howard Htg & Cooling	1	4%
Total	24	100%

4.3 Program Marketing

Kentucky Power marketed the programs in conjunction with the HVAC Diagnostic and Tune-Up Program as part of a broader initiative under Kentucky Power's GRID SMART® Programs. Kentucky Power marketed the program to residential and small commercial customers as well as HVAC dealers within the KPCO service territory. Customers could search for participating HVAC dealers by geographic location on the KPCO SMART Programs website.

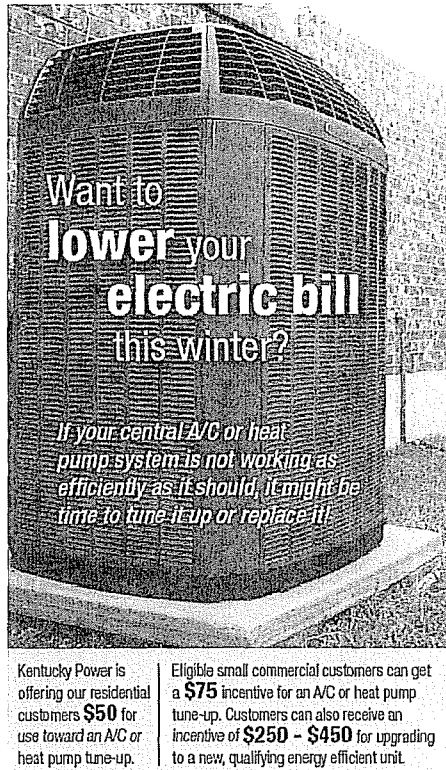
The participating dealers and potential participant pool were the same for both the Small Commercial HVAC Diagnostic and Tune-Up Program and the Small Commercial Heat Pump/Air Conditioner Incentive Program; therefore, these programs were marketed together.

In 2010 and 2011, Kentucky Power marketed the program through the following program outputs:

- **HVAC Dealer Outreach.** Kentucky Power staff promoted the programs directly to HVAC dealers. Outreach included mailing program fact sheets and telephoning or personally meeting with prospective dealers to discuss the programs.
- **Bill Inserts** were included in residential and small commercial customer bills in July and November 2011.
- **Newspaper Advertisements** were run in fifty media outlets during the fall and summer of 2011.
- **Community Events.** KPCO staff members attended community events in multiple counties, promoting the DSM Programs and distributing program fact sheets and CFLs. Overall, these events were attended by 400 to 450 residential customers per event.
- **Internet.** Kentucky Power markets the program through kentuckypower.com/save
- **KPCO Employee Communications.** Posters and email blasts are utilized to help KPCO employees become more familiar with the DSM Programs. KPCO employees are encouraged to promote programs when in the local community.

Participating HVAC dealers increased by approximately 10 percent after the newspaper advertisements were run due to customer interest in the program.

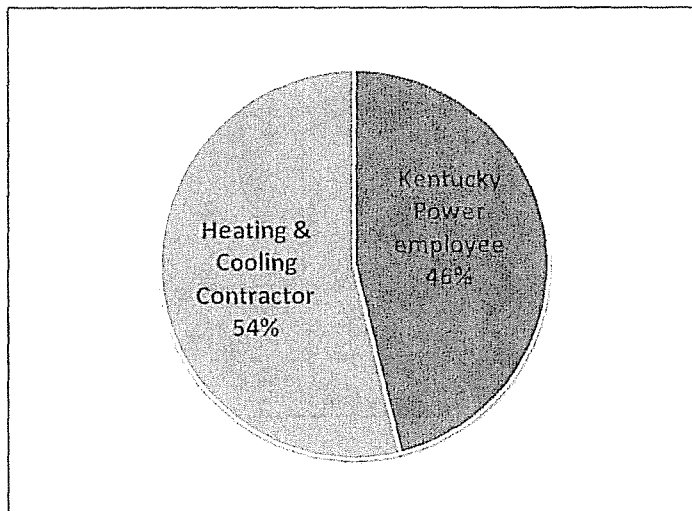
Figure 5 Newspaper Advertisement



4.3.1 Program Awareness

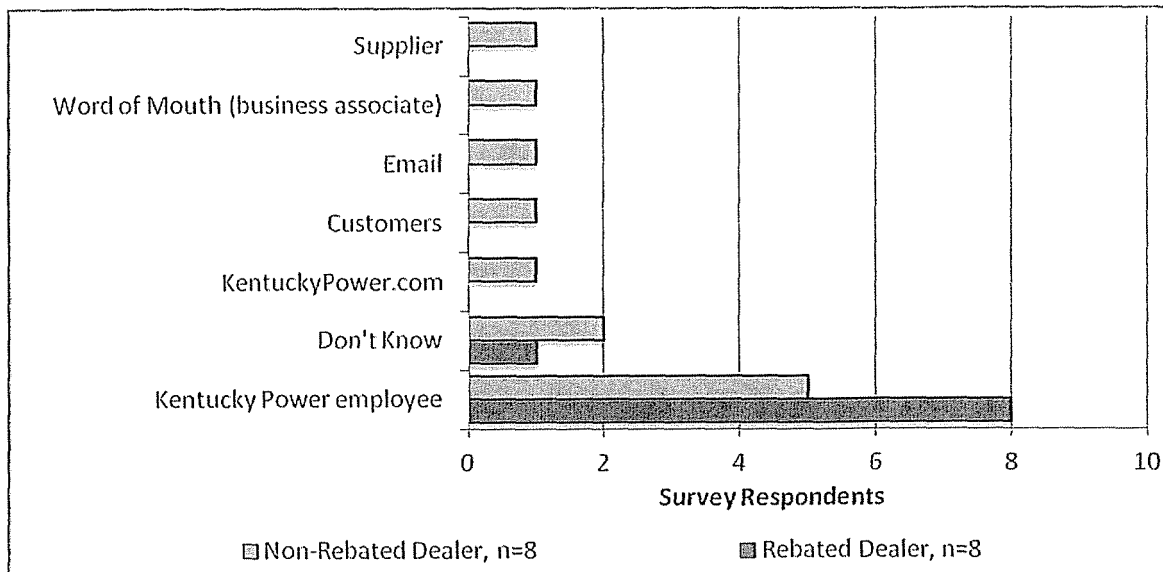
According to survey respondents, customers most often learned of the program from the heating and cooling contractor, followed closely by Kentucky Power. Kentucky Power refers to participating heating and cooling contractors as 'participating HVAC dealers.' Only 1 survey respondent reported that they learned of the program from the participating HVAC dealer. The remaining 6 respondents told the interviewer that they learned of the program from a 'heating and cooling contractor.'

Figure 6 How Customers First Learned of the Program, n=13



Participating HVAC dealers most often learned about the program through a Kentucky Power employee. Participating dealers that did not receive a rebate in 2011 noted other means, such as word of mouth, email and KentuckyPower.com.

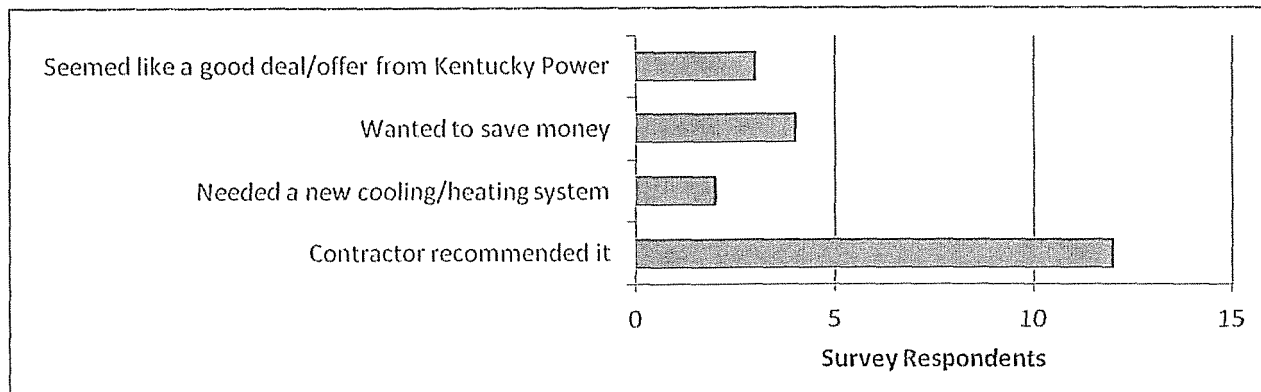
Figure 7 How Participating HVAC Dealers First Learned of the Program



4.3.2 Motivation for Participation

Ninety-two (92) percent of participating customers surveyed cited that their primary reason for participating in the Small Commercial Heat Pump/Air Conditioner Incentive Program was that the contractor recommended it. Additionally, 77 percent of participating customers noted that information from the contractor was a crucial factor in their decision to purchase and install the efficient equipment. The Small Commercial Heat Pump/Air Conditioner Incentive Program was designed such that the Kentucky Power program staff marketed the program to HVAC dealers. In turn, the participating HVAC dealers were encouraged, and expected, to promote the program to eligible customers.

Figure 8 Customer Motivation for Participation, n=13



According to participating HVAC dealers surveyed (n=7), the main factors motivating customer participation were:

- Energy savings (38%)
- Bill savings (31%)
- Comfort (15%)
- Environmental issues (8%)
- The customer's bottom line (8%)¹¹

Ninety-two (92 percent) of participating HVAC dealers surveyed stated that their primary reason for participating in both the KPCO Small Commercial Heat Pump/Air Conditioner Incentive Program and the HVAC Diagnostic and Tune-up Program was that the programs were good for customers. Participating HVAC dealer rebates were also a significant motivator.

According to the 7 participating HVAC dealers surveyed, 57 percent of HVAC dealers noted that the dealer incentive was very important in their decision to participate.

4.4 Program Tracking & Incentive Processing

Kentucky Power submitted bi-annual reports to the Kentucky PSC with each program's progress to-date, including participation, estimated energy and demand savings, and budget. The utility also reviewed actual, projected and summary program data with the DSM Collaborative on a quarterly basis.

Customer rebate applications were processed by Kentucky Power program staff. Staff reviewed the applications for completeness and eligibility of the customer/dealer. Applications were reviewed based on the date received and the DSM Program. Each customer application was assigned a unique identifier. The hard-copy rebate applications were labeled with the assigned unique identifier and payment request number then grouped and stored into a binder.

Kentucky Power's program tracking system was comprised of three databases:

KCPO Customer Records (MACCS) is an internal intranet-based database. A note is entered in the customer record with the DSM Program and the date the rebate application was received. KPCO Customer Service Representative's can access the note if a customer calls about their rebate status. Data from the rebate application is entered into the DEMO page, including the equipment type, tonnage, date, square footage of home. KPCO program staff utilizes the data to monitor program performance.

Program Log is an Excel-based database that contains data from the rebate application. The database is available on a shared drive, only to specific KPCO staff. Each KPCO DSM Program has a program log, containing data from the rebate application. Kentucky Power collects the following data:

- Customer Information: name, account number, address (service and mailing), unique identification number, phone number, contact person, peak billing demand, total square

¹¹ The customer's bottom line is financial (i.e. the financial benefit of purchasing and installing the efficient equipment and participating in the Kentucky Power program outweighed the cost of the service).

footage of A/C equipment zone, weekly hours of operation, whether there is a programmable thermostat/controls.

- Dealer Name
- Cooling/Heating Unit Information
 - Equipment type, size, efficiency level (SEER, EER & HSPF), brand and ARI reference number.
 - Model number of outdoor condenser, indoor evaporator and furnace.

Electronic Payment Request (PeopleSoft). Each rebate application has two payment requests, one for the customer and one for the dealer. The payment request includes the accounting code, unique identification number, customer/dealer name and address, dealer Federal Tax ID and rebate amount.

Prior to approval, the Electronic Payment Request was reviewed by the Kentucky Power program coordinator. The coordinator ensured the account number, program account, rebate amount and unique identifier were correct. Once approved, the Electronic Payment Request was submitted electronically to the AEP Accounting Group in Canton, Ohio and a rebate check issued and mailed.

4.5 Program Satisfaction

Overall, participants and HVAC dealers were very satisfied with the Small Commercial Heat Pump/Air Conditioner Incentive Program.

4.5.1 Participating Customer Satisfaction

Ninety-two (92) percent of customers surveyed would recommend their contractor to someone else, 18 percent had already recommended them (see Figure 9). All participating customers surveyed would recommend the program to others. As shown in Figure 10, participants noted that the efficient equipment saves money and participation in the program is simple.

Figure 9 Reasons Participants Would Recommend the Contractor, n=13

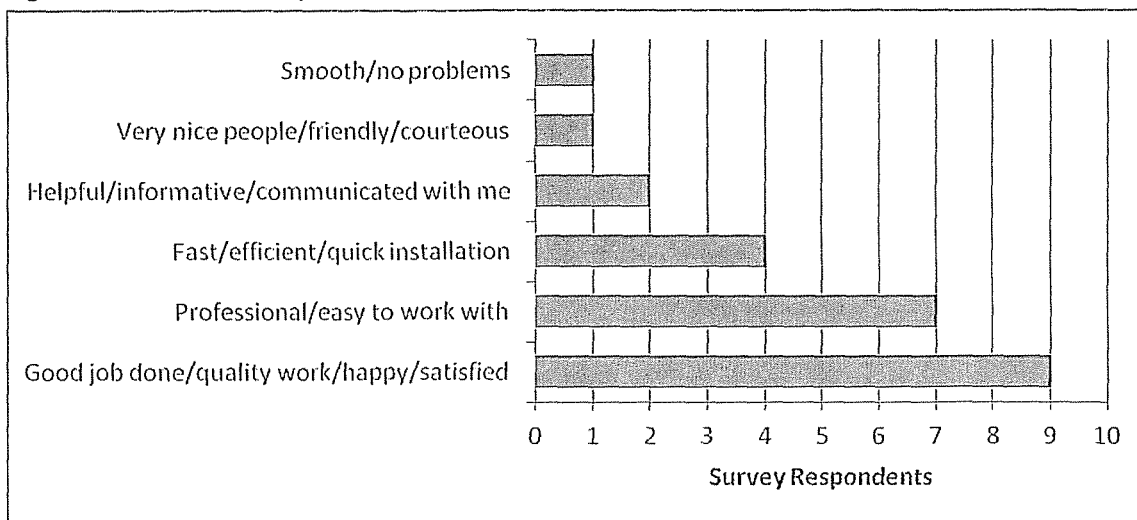
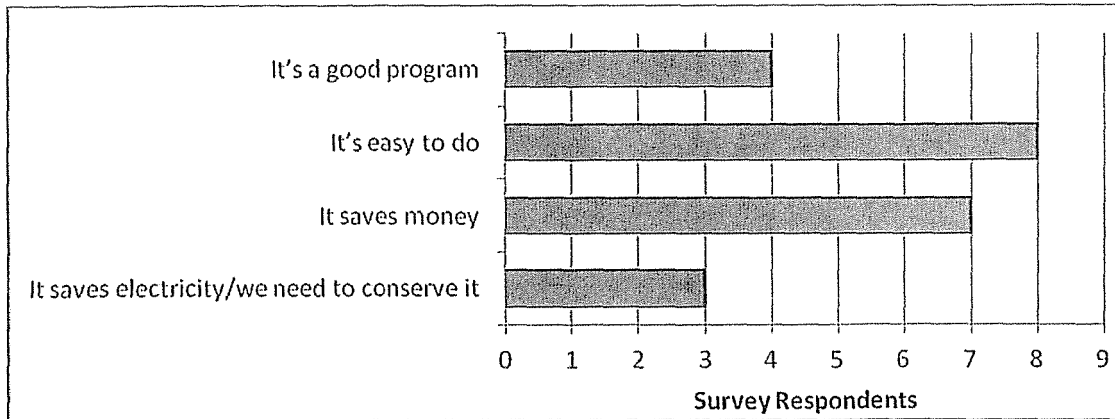
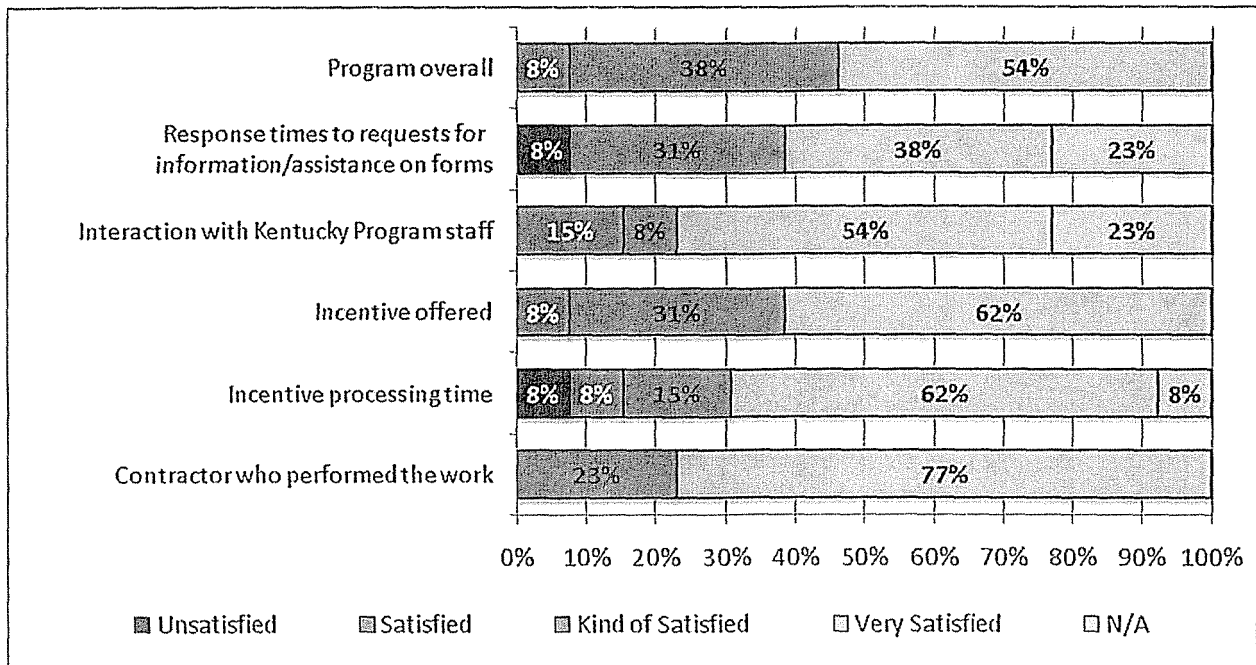


Figure 10 Reasons Participant Would Recommend the Program, n=13

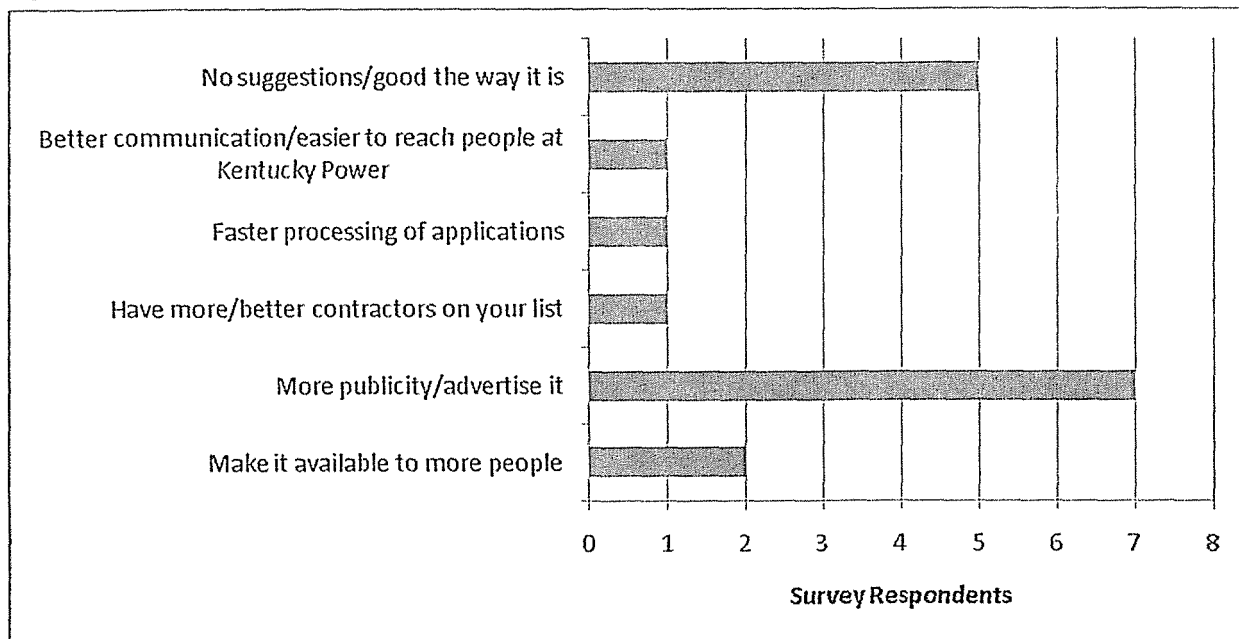


Based on the participant survey, participants are very satisfied with the contractor, the incentive offered and the incentive processing time. The areas that may be improved include response times to information requests/assistance with rebate forms and interaction with Kentucky Power program staff.

Figure 11 Participant Satisfaction with the Program, n=13



Most participating customers surveyed felt that the Small Commercial Heat Pump/Air Conditioner Incentive Program is good the way it is. However, participants suggested increased publicity and advertising.

Figure 12 Participant Suggestions for Program Improvement, n=13

4.5.2 Participating Dealer Satisfaction

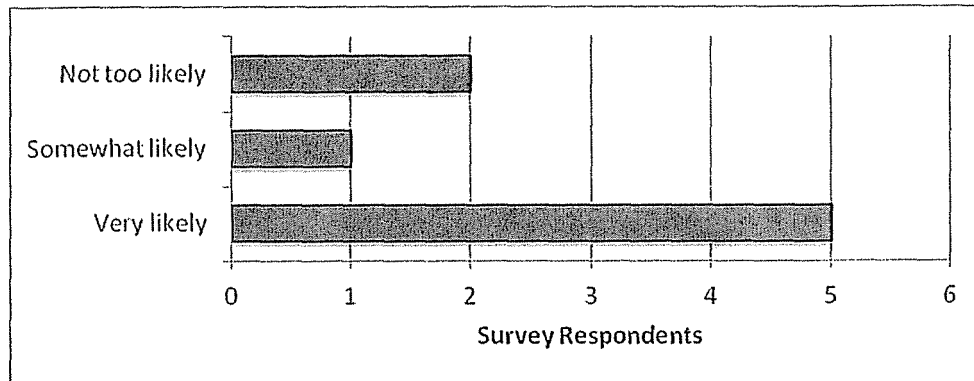
HVAC dealer participation was a key element to the Small Commercial Heat Pump/Air Conditioner Incentive Program. Participating HVAC dealers promoted the program to eligible customers and installed the efficient heat pumps/air conditioners. Seventy-seven (77) percent of participants surveyed noted that the HVAC dealer provided information that was a crucial factor in deciding to purchase and install the efficient equipment.

In 2010 and 2011, 23 out of 101 participating HVAC dealers received a rebate for participating in the HVAC Diagnostic and Tune-Up Program or the Small Commercial Heat Pump/Air Conditioner Program.¹² AEG conducted surveys of eight dealers that did not submit a rebate in 2011. According to these dealers, there were a variety of reasons for not submitting a rebate application, ranging from an illness causing a drop in work to not having many KPCO customers. Sixty-three (63) percent of these dealers think that it is very likely that they will submit a rebate application in 2012.

According to 86 percent of participating HVAC dealers surveyed, it is very likely that program participation will increase in 2012.

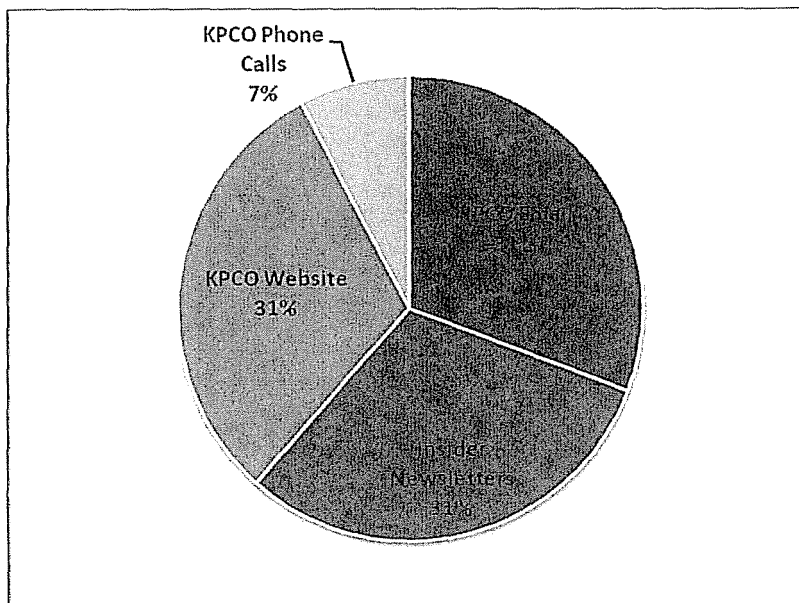
¹² The 101 participating HVAC dealers may also participate in the Residential Heat Pump/Air Conditioner Program. However, the Residential Heat Pump/Air Conditioner Program was not evaluated and these results pertain only to the HVAC Diagnostic and Tune-up Program and Small Commercial Heat Pump/Air Conditioner Program.

Figure 13 Likelihood of Non-Participating HVAC Dealer Submitting Rebate in 2012, n=8



It is very important to HVAC dealers that they are listed on the KPCO website as a participating dealer. Participating dealers prefer being notified of program updates via email, the KPCO program website and newsletters rather than via a phone call.

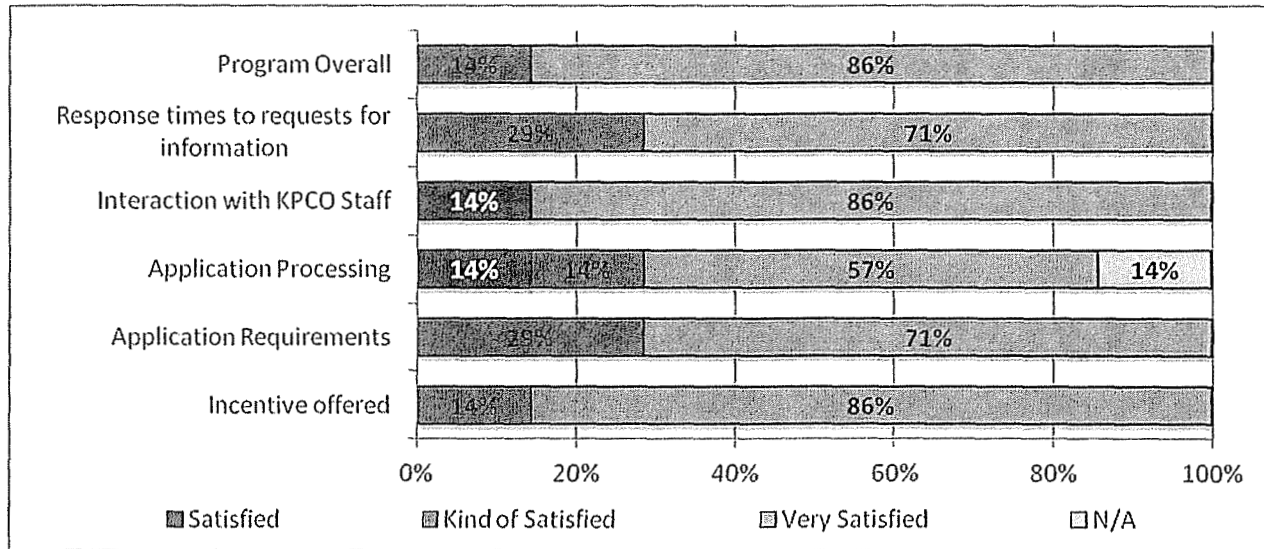
Figure 14 Participating HVAC Dealer Preferred Contact Medium, n=7



The participating HVAC dealers surveyed are satisfied with the program. The areas that may be improved include HVAC dealer interaction with KPCO program staff and application processing. Participating HVAC dealers recommended additional advertising and 'getting the information out.'

According to the HVAC dealers, the Small Commercial Heat Pump/Air Conditioner Incentive Program was good for business.

Figure 15 Participating HVAC Dealer Satisfaction with the Program, n=7



5. Impact Evaluation Findings

Impact evaluations verify the energy and demand savings directly associated with a program and assess the cost-effectiveness of the DSM program.

5.1 Gross Energy and Demand Savings

AEG determined the gross energy and demand savings of each individual project based on the International Performance Measurement and Verification Protocols ("IPMVP") Option A. Option A involves engineering calculations of gross savings using historical data. Engineering calculations referenced from the *State of Illinois Technical Reference Manual*, using Kentucky Power specific inputs, were utilized to calculate gross energy and demand impacts. Gross impacts were calculated for central air conditioners and heat pumps rebated.

The equations used to determine gross energy impacts for central air conditioners ("CAC") are:

$$CAC \text{ Gross Energy Impacts} = \text{Tons} \times \left(\frac{12}{SEER_b} - \frac{12}{SEER_e} \right) \times EFLH_c$$

$$CAC \text{ Gross Demand Impacts} = \text{Tons} \times \left(\frac{12}{EER_b} - \frac{12}{EER_e} \right) \times CF$$

The equations used to determine gross energy impacts for heat pumps ("HP") are:

$$HP \text{ Gross Energy Impacts} = \frac{kBtu}{h} \times \left(\frac{1}{HSPF_b} - \frac{1}{HSPF_e} \right) \times EFLH_h + \frac{kBtu}{h} \times \left(\frac{1}{SEER_b} - \frac{1}{SEER_e} \right) \times EFLH_c$$

$$HP \text{ Summer Demand Impacts} = \frac{kBtu}{h} \times \left(\frac{1}{EER_b} - \frac{1}{EER_e} \right) \times CF$$

$$HP \text{ Winter Demand Impacts} = \frac{kBtu}{h} \times \left(\frac{1}{HSPF_b} - \frac{1}{HSPF_e} \right) \times CF$$

Where:

Tons = capacity of equipment in tons of cooling capacity

kBtu/h = capacity of equipment in kBtu per hour

SEER_b = Seasonal Energy Efficiency Ratio of the baseline equipment

SEER_e = Seasonal Energy Efficiency Ratio of the energy efficiency equipment

EER_b = Energy Efficiency Ratio of the baseline equipment

EER_e = Energy Efficiency Ratio of the energy efficiency equipment

HSPF_b = Heating Seasonal Performance Factor of the baseline equipment

HSPF_e = Heating Seasonal Performance Factor of the energy efficiency equipment

EFLH_c = cooling mode equivalent full load hours

EFLH_h = heating mode equivalent full load hours

CF = coincidence factor

Gross impacts were calculated for each individual heat pump and central air conditioner system rebated. Individual project gross impacts and total gross impacts by equipment type are detailed in the tables below.

Table 11 Gross Savings per Unit, 2011

Measure	Number of Units	Gross Summer Savings per Unit (kW)	Gross Winter Savings Per Unit (kW)	Gross Energy Savings per Unit
Split HP 13 SEER 11 EER 4 Tons	1	0.00	0.59	1,189
Split HP 13 SEER 13 EER 3 Tons	1	0.22	0.44	892
Split HP 15 SEER 10.6 EER 2 Tons	2	0.00	0.29	860
Split HP 15 SEER 12.5 EER 3 Tons	1	0.09	0.36	992
Split HP 15 SEER EER 3 Tons	1	0.00	0.44	1,291
Split HP 15 SEER 12.5 EER 4 Tons	2	0.18	0.59	1,721
Split HP 15 SEER 12.5 EER 5 Tons	1	0.22	0.90	2,480
Split HP 15 SEER 12.5 EER 5 Tons	1	0.22	0.82	2,318
Split HP 15 SEER 13 EER 4 Tons	2	0.30	0.90	2,357
Split HP 15.75 SEER 13 EER 2.5 Tons	1	0.18	0.37	1,178
Split HP 16 SEER 11.1 EER 1.5 Tons	2	0.00	0.22	726
Split HP 16 SEER 10.6 EER 2 Tons	1	0.00	0.29	968
Split HP 17.5 SEER 10 EER 2.5 Tons	2	0.00	0.74	2,137
Split HP 19 SEER 11.2 EER 1.5 Tons	1	0.00	0.54	1,562
Packaged HP 13 SEER 7.7 EER 3 Tons	1	0.00	0.44	892
Packaged HP 14 SEER 11.5 EER 3.5 Tons	1	0.00	0.51	1,290
Split AC 13 SEER 11.5 EER 5 Tons	1	0.15	0.00	356
Packaged AC SEER EER 6 Tons	1	0.18	0.00	427
Packaged AC 14 SEER 11.5 EER 2 Tons	1	0.06	0.00	142

Table 12 Total Gross Demand and Energy Savings, 2011

Measure	Gross Summer Savings (kW)	Gross Winter Savings (kW)	Gross Energy Savings (kWh)
Heat Pumps	1.88	11.16	30,656
Central Air Conditioners	0.39	-	926
Program Total	2.27	11.16	31,582

5.2 Net Energy and Demand Savings

Net energy and demand savings are the gross savings attributable to the Small Commercial Heat Pump/Central Air Conditioner Incentive Program, not accounting for impacts resulting from other influences such as free ridership or spillover. Net impacts were calculated by applying a net-to-gross ("NTG") factor to gross impacts.

$$NTG\ Ratio = 1 - Free\ Ridership + Spillover$$

Free ridership and spillover were gleaned from the HVAC Diagnostic and Tune-Up Program. The free ridership and spillover was not calculated from the participant survey for one primary reason, the Small Commercial Heat Pump/Central Air Conditioner Incentive Program offers rebates to eligible customers to encourage the purchase and installation of more efficient, higher cost HVAC equipment. However, approximately 60 percent of the HVAC equipment rebated did not meet the Consortium for Energy Efficiency Tier 1 energy efficiency guidelines. Additionally, the program had low participation and a statistically valid sample consisted of 13 participants. Therefore, the participant survey does not accurately represent the importance of the incentive (an indicator of free ridership) to a participant that met the energy efficiency guidelines and paid a higher cost for the more efficient HVAC equipment. Additionally, the survey does not accurately reflect the additional efficient activities (an indicator of spillover) of a participant that met the energy efficiency guidelines.

As a result, the HVAC Diagnostic and Tune-Up Program net-to-gross ratio of 78 percent for small commercial participants was applied to the Small Commercial Heat Pump/Central Air Conditioner Incentive Program. As a comparison, Black Hills Colorado utilizes a net-to-gross ratio of 80 percent for small commercial heat pumps and air conditioners. Table 14 presents the net demand and energy savings achieved.

Table 13 Net Demand and Energy Savings per Unit, 2011

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)
Heat Pumps	78%	1.469	8.708	23,912
Central Air Conditioners	78%	0.305	-	722
Program Total		1.774	8.708	24,634

5.3 Program Site Inspections and Installation Verification

AEG performed site inspections and installation verifications on eight fully installed projects to ensure proper installation, perform quality assurance/quality control, and verify application information of the installed equipment.

Installations of both heat pumps and central air conditioners were inspected with building types including medical offices, retail showrooms, churches, and hotels. The sites inspected provided a representative sample of all program projects. Proper installation verification was confirmed at all locations. Table 15 describes the building and unit type for sites visited.

Table 14 Installation Verification Site Visits, 2011

Building Type	Unit Type
Medical Office	15 SEER Heat Pump
Retail Showroom	17.5 SEER Heat Pump
Retail Showroom	17.5 SEER Heat Pump
Medical Office	14 SEER Heat Pump
Medical Office	15 SEER Heat Pump
Hotel	13 SEER CAC
Retail Store	13 SEER Heat Pump
Church	15 SEER Heat Pump

5.4 Program Cost-Effectiveness

Cost-effectiveness analysis compares the costs and benefits of efficient equipment with those of baseline (non-efficient) equipment. Cost-effectiveness analysis indicates whether the efficient technology(s) improve a customer's financial position, decreases overall energy costs to ratepayers, or raises society's well-being. A program is considered cost-effective if the benefit-cost ratio is greater than 1.0.

AEG analyzed the cost-effectiveness of the Small Commercial Heat Pump/Air Conditioner Program utilizing four standard cost-effectiveness tests taken from the California Standard Practices Manual.¹³ Each test analyzes cost-effectiveness from a different perspective and answering a separate question:

- **Participant Cost Test:** Compares customer costs and benefits of installing the measure. Will the participant benefit over the life of the measure?
- **Program Administrator Cost Test (Utility Cost Test):** Comparison of program administrator costs to supply-side resource benefits. Will utility costs to save energy be less than utility costs to deliver the same amount of energy?
- **Ratepayer Impact Measure:** Measures the impact of the DSM program on utility rates if rates were to be adjusted to account for the program. Comparison of utility program costs and bill reductions associated with energy savings to supply-side resource benefits. Will customer rates increase?
- **Total Resource Cost Test:** Comparison of program administrator and customer costs to utility resource savings. Will the total costs of energy in the utility service territory decrease?

Results from the impact evaluation, utilizing IPMVP best practices, are utilized in the four cost-effectiveness tests taken from the California Standard Practices Manual.

Kentucky Power specific inputs, including avoided costs, discounts rates, participation and incentives, were used to conduct the cost-effectiveness analysis. Bencost, an updated version of a public domain model that AEG customized for Kentucky Power, was utilized to perform the cost-effectiveness modeling (see Appendix D). Bencost is an input-output model that calculates all four cost-effectiveness

¹³ The California Standard Practices Manual details cost-effectiveness guidelines and procedures for standardized cost-effectiveness evaluations.

tests. All program costs and benefits are discounted to present-day dollar values in order to accurately compare future benefits with current costs.

Table 15 Cost-Effectiveness Results, 2011

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Ratepayer Impact Measure Test	0.37	\$48,879	\$18,032	-\$30,847
Utility Cost Test	0.75	\$23,966	\$18,032	-\$5,934
Participant Cost Test	3.01	\$8,068	\$24,266	\$16,198
Total Resource Cost Test	0.76	\$23,634	\$18,032	-\$5,602

It needs to be noted that very low avoided costs, especially the extremely low capacity costs in the Kentucky Power service territory, have a significant negative impact on the program's cost-effectiveness. The 2012 Kentucky Power capacity cost is \$6/kW-year, compared to a PJM average of over \$100/kW-year. This cost differential partially accounts for the low benefit-cost ratios.

The Small Commercial Heat Pump/Air Conditioner Program's cost-effectiveness was also greatly affected by the low participation rates in the program. In 2011, Kentucky Power rebated 21 heat pumps, achieving 53 percent of the revised 40 participant goal, and 3 central air conditioners, achieving 12 percent of the revised 25 participant goal. The low participation greatly affects the program savings while many program costs were constant. Program administration, marketing, and evaluation costs remain constant independent of program participation. If the planned participation levels were achieved, the program would be cost-effective and pass the TRC test. Table 17 provides the cost-effectiveness if full program participation was achieved.

Table 16 Cost-Effectiveness Results if Planned Participation Achieved, 2011

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Ratepayer Impact Measure Test	0.47	\$96,543	\$45,343	-\$51,200
Utility Cost Test	1.34	\$33,816	\$45,343	\$11,527
Participant Cost Test	2.56	\$22,750	\$58,198	\$35,448
Total Resource Cost Test	1.18	\$38,316	\$45,343	\$7,027

Going forward, reaching participation goals in the Small Commercial Heat Pump/Air Conditioner Program is vital to reaching acceptable cost-effectiveness levels. If administrative expenses stay consistent, the participation cost effective break-even point for the program is 30 heat pump participants and 15 air conditioner participants.¹⁴ Also, in the Kentucky Power service territory heat pumps have shown to be more cost-effective than central air conditioners. Because of this, there should be more focus on driving heat pump participation in the program. If participation goals are achieved, especially for heat pumps, the program will be cost-effective and have a positive impact on the Kentucky Power service territory.

Although the Small Commercial Heat Pump/Air Conditioner Program did not have a cost-effectiveness ratio greater than 1.0, the entire portfolio being evaluated is cost-effective in 2011. Table 16 provides

¹⁴ Note: for each additional heat pump participant, the cost-effectiveness will increase from the break-even point.

the cost-effectiveness for the 2010-2012 Demand Side Management Program Portfolio being evaluated by AEG.¹⁵

Table 17 Kentucky Power Portfolio Cost-Effectiveness Results, 2011

Test	B/C Ratio	Total Costs	Total Benefits	Net Benefits
Utility Cost Test	2.13	\$720,104	\$1,533,730	\$813,626
Ratepayer Impact Measure Test	0.44	\$3,507,956	\$1,533,730	-\$1,974,227
Participant Test	5.13	\$486,703	\$2,499,101	\$2,012,397
Total Resource Cost Test	1.57	\$975,217	\$1,533,730	\$558,512

6. Key Findings and Recommendations

6.1 Summary of Key Findings

The Small Commercial Heat Pump/Air Conditioner Program is designed to encourage the purchase of energy efficiency central air conditioners and heat pumps identified by the U.S Department of Energy, the U.S. Environmental Protection Agency and/or the Consortium for Energy Efficiency as being influential in energy efficiency. The program helps lower customer electric bills and allows KPCO to utilize its existing generating capacity more efficiently, thereby deferring or delaying the need for new generation.

6.1.1 Program Performance Indicators

In 2011, Kentucky Power rebated 24 small commercial central air conditioners and heat pumps through the Small Commercial Heat Pump/Air Conditioner Incentive Program at a much higher cost per unit than originally budgeted (\$980 versus \$575). The higher cost per participant may be attributed to the high fixed costs associated with promotional and evaluation activities that were independent of program participation.

Eighty-eight (88) percent of the systems installed were heat pumps and 13 percent were central air conditioners. The program was approved in August 2010, two months later than anticipated in the Kentucky PSC filing, and implemented in September. The first rebate was issued in April 2011. KPCO reached 53 percent of the revised 40 heat pump participant goal and 12 percent of the revised 25 air conditioner participant goal.

Table 18 2011 Program Participation, Actual and Goals

	Actual	Original Goal	Revised Goal
Heat Pump	21	20	40
Central Air Conditioner	3	100	25
Total	24	120	65

¹⁵ The 2010-2012 Demand Side Management Program Portfolio being evaluated includes the Small Commercial Heat Pump/Air Conditioner Program, Residential Efficient Products Program, Commercial Incentive Program, and Residential and Small Commercial HVAC Diagnostic and Tune-Up Program.

In 2010 and 2011, 23 out of 101 participating HVAC dealers participated in the HVAC Diagnostic and Tune-Up Program or Small Commercial Heat Pump/Air Conditioner Incentive Program. One dealer performed 54 percent of the small commercial heat pump/air conditioner installations. The HVAC dealers surveyed noted that the KPCO dealer incentives and being listed on the KPCO website as a participating dealer were significant motivators for participation.

6.1.2 Program Tracking

Kentucky Power's program tracking system is comprised of three databases. The program log tracks all rebate application data, including customer information, dealer name and HVAC system data. The CEE guidelines provide minimum energy efficiency standards for commercial HVAC equipment. The minimum energy efficiency standards may apply to SEER and/or EER, depending upon the needs of the energy efficiency program.

Of the 21 heat pump systems rebated by Kentucky Power, 17 met the CEE Tier 1 SEER/EER and HSPF guidelines. Two (2) systems did not meet the guidelines and 2 had inadequate system efficiency information. Of the 3 central air conditioner systems rebated by Kentucky Power, 1 met the CEE Tier 1 SEER/EER guidelines. One (1) did not meet the guidelines and 1 had inadequate system efficiency information.

6.1.3 Program Awareness and Marketing Strategies

The marketing strategy for the program included a combination of Kentucky Power program staff and participating HVAC dealers. KPCO staff promoted the programs directly to HVAC dealers through fact sheets, calls and meeting-in person to discuss the program. In turn, the participating dealers were expected to promote the program to eligible customers. Additional marketing activities included direct mail, fact sheets, bill inserts, newspaper advertisements and community events.

According to survey respondents, customers most often learned of the program from the heating and cooling contractor (54%) followed closely by a Kentucky Power employee (46%). Ninety-two (92) percent of participating customers surveyed noted that information from the contractor was a crucial factor in their decision to purchase and install efficient HVAC equipment. Participating customers and HVAC dealers surveyed noted that the program would benefit from increased publicity and advertising.

6.1.4 Best Practices

Kentucky Power's program design and processes are consistent with industry standards that are considered best practice for similar programs. Given the nascent stage of Kentucky Power's program it is commendable that the program has received the level of support from the contractor community and satisfaction recognition from participating customers. The majority (approximately 72%) of energy efficiency programs targeted at commercial customers provide customer incentives for unitary HVAC equipment.¹⁶

The challenges posed by lack of information are ubiquitous in energy efficiency programs. Investment in education and outreach boost awareness of the benefits of energy efficiency. Successful marketing

¹⁶ Consortium for Energy Efficiency (2012). State of the Efficiency Program Industry: Budgets, Expenditures and Impacts 2011.

strategies can increase program participation. Actively engaging key stakeholders, such as HVAC contractors or home/business owners, is crucial to the success of any energy efficiency program. Typically, programs will feature periodical stakeholder advisory meetings or other formal outreach that encourages participation and provides valuable feedback throughout the program.

Many energy efficiency programs suffer from lack of staff resources. Additional staff personnel may be necessary to ensure that program goals are met and that the program delivers the intended results. The increased program costs of additional staff are often recouped by improved performance.

6.1.5 Verify Program Impacts

The net-to-gross ratio is estimated at 78 percent, with 27 percent free ridership and 5 percent spillover. Program cost-effectiveness was greatly affected by low participation rates and program administration, marketing and evaluation costs that remained constant independent of program participation. If administrative expenses stay consistent, the cost-effective break-even point is 30 heat pump participants and 15 air conditioner participants. Heat pumps have shown to be more cost-effective than central air conditioners. If participation goals are achieved, especially for heat pumps, the program will be cost-effective and have a positive impact on the Kentucky Power service territory.

Table 19 Energy Savings, 2011

Measure	NTG Ratio	Net Summer Savings (kW)	Net Winter Savings (kW)	Net Energy Savings (kWh)	TRC
Program Total	78%	1.774	8.708	24,634	0.73

Installations of both heat pumps and air conditioners were inspected with building types including medical offices, retail showrooms, churches, and hotels. The sites inspected provided a representative sample of all program projects. Proper installation verification was confirmed at all locations.

6.2 Recommendations

AEG has several recommendations on how to improve the program. These include:

6.2.1 Hire Implementation Contractor

AEG recommends that Kentucky Power hire an implementation contractor to implement Kentucky Power's residential and small commercial HVAC programs, including, but not limited to, the Small Commercial Heat Pump/Air Conditioner Incentive Program, the Residential and Small Commercial HVAC Diagnostic and Tune-Up Program, the Residential High Efficiency Heat Pump Program, Mobile Home High Efficiency Heat Pump, and Mobile Home New Construction.

Kentucky Power has a small staff to run and oversee Kentucky Power's numerous energy efficiency programs. Some of the KPCO programs have implementation contractors that perform the day-to-day operations of the programs, but the residential and small commercial HVAC programs are run completely by KPCO staff. Therefore, KPCO staff is responsible for marketing and promotional activities, including visiting participating and potential HVAC dealers across the KPCO territory, processing rebate applications, tracking rebate applications and performing QA/QC inspections. Due to the limited

resources, Kentucky Power has not yet conducted an inspection to ensure services are being performed properly.

The residential and small commercial HVAC programs share many similar components, including marketing and promotional activities and data tracking systems as well as the same participating HVAC dealers. Utilizing one implementation contractor to implement the HVAC programs will allow the programs to continue capitalizing on their similarities and increase the efficiency of program processes.

The implementation contractor will have, at a minimum, the following responsibilities:

- Develop program goals and budget.
- Develop marketing and promotional activities.
- Design and maintain a data tracking system.
- Process customer and contractor rebate applications.
- Engage and monitor participating HVAC dealers.
- Develop QA/QC procedures and conduct random inspections of completed work.

Kentucky Power program staff and the implementation contractor should work with the Commercial Incentive Program implementation contractor to ensure that the Small Commercial Heat Pump/Air Conditioner Incentive Program does not compete with the Commercial Incentive Express Program. If it is determined that competition exists, the programs should be examined to determine if the Small Commercial HP/AC Incentive Program should be absorbed into the Commercial Incentive Express Program.

6.2.2 Program Modifications

AEG recommends that Kentucky Power clarify the program requirements. To receive a rebate, the HVAC systems must meet the CEE guidelines, which provide minimum energy efficiency standards for commercial HVAC equipment. The minimum energy efficiency standards may apply to SEER and/or EER, depending upon the needs of the energy efficiency program. Kentucky Power does not specify whether HVAC systems must meet both the SEER and EER requirements. AEG recommends that Kentucky Power and the implementation contractor consider modifying the program requirement, such that HVAC systems must meet the CEE Tier 1 SEER and HSPF guidelines. The Kentucky Power program website should be updated to reflect any program requirement modifications.

AEG recommends increasing rebate processing oversight conducted by Kentucky Power and the implementation contractor to ensure compliance with program requirements. In particular, oversight activities should ensure that HVAC equipment qualifies for a rebate and equipment efficiency data is correctly recorded and tracked. Of the 24 systems rebated, 3 did not meet the CEE Tier 1 guidelines and 3 had inadequate system efficiency information.

6.2.3 Engage Participating HVAC Dealers

AEG recommends that Kentucky Power and the implementation contractor actively engage participating HVAC dealers and remove non-participating HVAC dealers from the participating HVAC dealer list if they have not actively participated in a KPCO HVAC program within the most recent 12 months.

HVAC dealer participation is crucial to the program; 92 percent of survey respondents noted that information from the contractor was a crucial factor in their decision to purchase and install efficient HVAC equipment. There are currently 101 HVAC dealers participating in the HVAC programs. In 2010 and 2011, only 23 dealers participated in the HVAC Diagnostic and Tune-Up Program or the Small Commercial Heat Pump/Air Conditioner Incentive Program.

AEG recommends collaboration between Kentucky Power and the implementation contractor to engage contractors and explore modifying the marketing and promotional activities. Kentucky Power and the implementation contractor should explore cooperative marketing with the participating contractors to potentially leverage contractor's marketing experience. Cooperative marketing would be offered on a temporary basis and the impact on participation reviewed before permanent changes were made to the program.

Appendix A. Participating Dealer Survey Guide (a)

Good morning/afternoon/evening, I'm _____ with Applied Energy Group. We are conducting a survey of Kentucky Power's HVAC Diagnostic and Tune-Up Program and Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program. I'd like to talk with you about your experience with the programs and get some feedback. This is NOT a sales effort, but for research purposes only. The survey should take about 10 minutes. All comments will remain confidential.

According to our records, you ARE currently participating in one or both of these programs as a participating dealer. Is that correct?

- Yes 1 (CONTINUE)
 No 2 (THANK THEM FOR THEIR TIME AND END CALL)
 Don't Know 3 (ASK TO SPEAK WITH SOMEONE KNOWLEDGEABLE ABOUT THE PROGRAM, THEN REPEAT INTRO)

If the dealer does not recall the program(s): "These programs provide incentives to residential and small business customers to purchase and install energy efficient HVAC equipment and/or receive diagnostic and tune-up service for their heating or cooling equipment."

Program Awareness and Participation

1. Which Kentucky Power program is your company involved with?
 - a) HVAC Diagnostic and Tune-Up Program **(3)**
 - b) Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program
 - c) Both **(4)**
2. How did you first learn about the program(s)? Mark all mentioned
 - a) Kentucky Power employee **(7)**
 - b) KentuckyPower.com
 - c) gridSMART
 - d) News Article
 - e) Customers
 - f) Email
 - g) Word of Mouth (business associates)
 - h) Trade Association
 - i) Supplier
 - j) Community event/meeting/presentation
 - k) Don't Know **(1)**
3. Why did you decide to participate in the program(s)?

"Good for customers" (6)

"It's a good way to help the customers." (1)

"Good outreach to customers (helps sell)" (1)

"Good for business." (1)
4. How long have you been involved in the program(s)? Read answer categories
 - a) Less than 1 Month
 - b) 1 – 3 Months
 - c) 4 – 6 Months **(1)**
 - d) More than 6 Months **(4)**

e) Unsure (2)

Program Performance

5. About how many projects have you completed for the....
 - a) HVAC Diagnostic and Tune-Up Program (n/a)
 - b) Small Commercial High Efficiency Heat Pump/Air Conditioner Program (n/a)
6. What type of equipment is installed/serviced *most frequently* under the....
 - a) HVAC Diagnostic and Tune-Up Program ("**Heat Pump**" 4)
 - b) Small Commercial High Efficiency Heat Pump/Air Conditioner Program ("**Heat Pump**" 1)
7. How influential have the customer program incentives been in moving projects forward in 2011?

Read answers

 - a. Very influential (2)
 - b. Somewhat influential (5)
 - c. Not too influential
 - d. Not at all influential
8. About what percentage of your 2011 business can be attributed to the Kentucky Power programs?

"15 to 20 percent." (2)
9. Besides the customer incentive, what are the main factors driving program participation for customers? Read answers, mark all that apply
 - a) Energy savings (5)
 - b) Comfort (2)
 - c) Environmental issues (1)
 - d) The bottom line (1)
 - e) Other "**Bill Savings**" (4)
10. Thinking about the future, how likely is it that program participation will increase among customers in 2012? Read answer categories
 - a) Very likely (6)
 - b) Somewhat likely
 - c) Not too likely (1)
 - d) Not at all likely
11. Do you usually complete and submit the customer rebate form on the customer's behalf?
 - a) Yes (6)
 - b) No

"Not all the time"

Program Satisfaction

12. Please rate your satisfaction with the following program components on a five-point scale, where "1" means "Not at all satisfied" and "5" means "Very satisfied." How satisfied are you with the:

	1	2	3	4	5	Don't Know/Refused
a) Incentive offered				1	6	
b) Application Requirements				2	5	
c) Application Processing			1	1	4	
d) Interaction with Kentucky Power			1		6	
e) Response times to requests for information				2	5	
f) Program overall				1	6	

Comments (verbatim)

"Kentucky Power staff is hard to get in touch with"

13. How important was the dealer incentive in getting you to participate in the program? Read answers
- a) Very important **(4)**
 - b) Somewhat important **(2)**
 - c) Not too important **(1)**
 - d) Not at all important
14. What changes should be made to the program to make it more attractive to customers?
- "Getting the information out."***
- "Less time to requalify, as of now there is a 3 year wait between services."***
- "Overall look at house instead of just heat pump."***

Communication with Kentucky Power

15. How important is it to you that your company is listed on the Kentucky Power website as a participating program dealer? Read answers
- a) Very important **(6)**
 - b) Somewhat important
 - c) Not too important **(1)**
 - d) Not at all important
16. What other types of marketing assistance from Kentucky Power would be helpful to your company in selling energy efficient equipment or services?
- "Mail box stuffer" (1)***
17. What is your preferred medium of contact from Kentucky Power for program updates or information about program? Read answers
- a) Emails from Kentucky Power **(4)**
 - b) Insider newsletters **(4)**
 - c) Kentucky Power website **(4)**
 - d) Calls from Kentucky Power **(1)**
18. What are your primary sources of information on energy efficiency equipment and services?
- a) Online **(5)**
 - b) Publications **(2)**
 - c) Trade shows **(1)**
 - d) Other ***"Magazines"*** **(1)**

Dealer Demographics

Finally, I'd like to ask you a couple of questions about your business.

19. How long have you been in business?
20. How many employees do you have?

Thank you for taking the time to answer my questions.

Appendix B. Participating Dealer Survey Guide (b)

Good morning/afternoon/evening, I'm _____ with Applied Energy Group. We are conducting a survey of Kentucky Power's HVAC Diagnostic and Tune-Up Program and Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program. I'd like to talk with you about your experience with the programs and get some feedback. This is NOT a sales effort, but for research purposes only. The survey should take about 10 minutes. All comments will remain confidential.

According to our records, you ARE a Kentucky Power participating dealer. Is that correct?

- Yes 1 (CONTINUE)
 No 2 (THANK THEM FOR THEIR TIME AND END CALL)
 Don't Know 3 (ASK TO SPEAK WITH SOMEONE KNOWLEDGEABLE ABOUT THE PROGRAM, THEN REPEAT INTRO)

If the dealer does not recall the program(s): "These programs provide incentives to residential and small business customers to purchase and install energy efficient HVAC equipment and/or receive diagnostic and tune-up service for their heating or cooling equipment."

Program Awareness and Participation

1. How did you first learn about the program(s)? Mark all mentioned
 - a) Kentucky Power employee (5)
 - b) KentuckyPower.com (1)
 - c) gridSMART
 - d) News Article
 - e) Customers (1)
 - f) Email (1)
 - g) Word of Mouth (business associates) (1)
 - h) Trade Association
 - i) Supplier (1)
 - j) Community event/meeting/presentation
 - k) Don't Know (2)
2. Why did you decide to participate in the program(s)?

"Good program,/good program for customers" (6)

"Rebates" (1)
3. How long have you been involved in the program(s)? Read answer categories
 - a) Less than 1 Month
 - b) 1 – 3 Months
 - c) 4 –6 Months
 - d) More than 6 Months (8)

Program Performance

4. Do you perform HVAC diagnostic and tune-up services for residential or small commercial customers in Kentucky Power service territory?
 - a) Yes (7)
 - b) No (1)
5. Do you install energy efficient heat pumps or central air conditioners for small commercial customers in Kentucky Power service territory?

- a) Yes **(7)**
- b) No **(1)**

Continue If answered 'YES'to Q4 or Q5. Otherwise, go to Q8.

6. Why have you not submitted any rebate applications?

"Not many accounts with Kentucky Power." (1)

"The tune-ups are hard to do. The people do not feel like doing the paperwork." (1)

"Haven't had anyone who has wanted it yet." (1)

"We have" (2)

"Sick" (2)

"Not Sure" (1)

7. How likely do you think it is that your company will submit a rebate application in 2012? READ ANSWERS

- a) Very likely **(5)**
- b) Somewhat likely **(1)**
- c) Not too likely **(2)**
- d) Not at all likely

Dealer Demographics

Finally, I'd like to ask you a couple of questions about your business.

- 8. How long have you been in business?
- 9. How many employees do you have?

Appendix C. Participating Customer Survey Guide

Good morning/afternoon/evening, I'm _____ with Applied Energy Group. We are conducting a survey of Kentucky Power's Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program. I'd like to talk with you about your impression of the program and get some feedback. This is NOT a sales effort, but for research purposes only. The survey should only take 10 minutes. All comments will remain confidential.

According to our records, you participated in the Small Commercial High Efficiency Heat Pump/Air Conditioner Incentive Program. Were you involved with the decision to participate in this program or is there someone else in your business that made that decision?

Involved with/made decision 1 (CONTINUE)

Someone else decided 2 (ASK TO SPEAK TO THAT PERSON, REPEAT INTRO)

If the customer does not recall the program: "The program provides rebates to customers who purchase a qualifying air conditioner or heat pump."

1. How would you classify your type of business? Read answer categories

- a) Big Box
- b) Restaurant
- c) Hotel **(1)**
- d) Office **(1)**
- e) Retail **(4)**
- f) Other (verbatim)

Church

Real Estate

Independent Company

Rental

Program Participation

2. What kind of efficient equipment did you have installed in your business as part of this program?

- a) Central air conditioner (go to Q3) **(1)**
- b) Heat Pump (go to Q4) **(5)**
- c) Both (ask Q3 & Q4) **(7)**

3. How many incentives did you receive for an efficient air conditioner?

- a) 1 **(9)**
- b) 2

4. How many incentives did you receive for an efficient heat pump?

- a) 1 **(8)**
- b) 2 **(1)**

5. How did you first become aware of the Small Commercial Heat Pump/Air Conditioner Incentive Program? Indicate first mention

- a) Participating HVAC Dealer **(7)**
- b) Kentucky Power employee **(7)**
- c) KentuckyPower.com
- d) News Article
- e) Email
- f) Kentucky Power Bill Insert

- g) Word of Mouth (Friend / Neighbor)
- h) Community event/meeting/presentation

Free Ridership

6. Prior to learning about this program, did you have specific plans to install a _____ [central air conditioner/heat pump]?
 - a) Yes **(13)**
 - b) No (go to Q9)
7. Was it necessary to change your plans to qualify for the program?
 - a) Yes **(3)**
 - b) No (go to Q9) **(10)**
8. What changes were made? *Probe for timing, quantity and efficiency*
9. How important was the Kentucky Power incentive in your decision to buy the efficient _____ [central air conditioner/heat pump]? *Read answer categories*
 - a) Very important **(4)**
 - b) Somewhat important **(2)**
 - c) Only slightly important **(3)**
 - d) Not important at all **(3)**
 - e) Don't know **(1)**
10. If you had not received the Kentucky Power incentive, how likely is it you would have purchased the exact same equipment? *Read answer categories*
 - a) Very likely **(8)**
 - b) Somewhat likely **(3)**
 - c) Not likely **(2)**
11. If you had not received the Kentucky Power incentive, how likely is it you would have purchased the exact same quantity of equipment? *Read answer categories*
 - a) Very likely **(7)**
 - b) Somewhat likely **(2)**
 - c) Not likely **(3)**
 - d) Don't know **(1)**

Spillover

12. Since receiving the Kentucky Power incentive, has your business purchased additional efficient heating or cooling equipment?
 - a) Yes
 - b) No (go to Q15) **(12)**
 - c) Don't know/refused **(1)**
13. What type of equipment have you purchased?
14. What influence did the Kentucky Power program have on the decision? *Read answer categories*
 - a) Had no influence **(4)**
 - b) Had some influence **(5)**
 - c) Had a large influence **(4)**

Program Awareness

15. Why did you decide to participate in the program? *Mark all that apply – DO NOT READ*
 - a) Contractor recommended it **(12)**
 - b) Needed a new cooling/heating system **(2)**
 - c) Wanted to save money **(4)**

- d) Seemed like a good deal/offer from Kentucky Power **(3)**
 - e) Wanted to save energy
16. Was the information you received from the HVAC dealer [or contractor] a crucial factor in the decision to install this high efficiency equipment at the time you did?
- a) Yes **(10)**
 - b) No **(3)**
17. About how long did it take to receive the incentive, from the time the equipment was installed until you received the rebate? *Read answer categories*
- a) Less than one month **(7)**
 - b) 4 to 6 weeks
 - c) 6 to 8 weeks **(2)**
 - d) More than 8 weeks **(2)**
 - e) Don't know/Refused **(2)**

Customer Satisfaction

18. Please rate your satisfaction with the following program components on a five-point scale, where "5" means "Very Satisfied" and "1" means "Very Dissatisfied." How satisfied are you with the:

	1	2	3	4	5	Don't Know	N/A
Contractor who performed the work				3	10		
Incentive processing time	1		1	2	8	1	
Incentive offered			1	4	8		
Interaction with Kentucky Program staff			2	1	7	2	1
Response times to requests for information/assistance on forms	1			4	5	2	1
Program overall			1	5	7		

19. Would you recommend this contractor to someone else?
- a) Yes **(12)**
 - b) No **(1)**
20. Why do you say that? *Mark all that apply*
- a) Good job done/quality work/happy/satisfied **(9)**
 - b) Professional/easy to work with **(7)**
 - c) Very nice people/friendly/courteous **(1)**
 - d) Helpful/information/answered my questions/communicated with me **(2)**
 - e) Fast/efficient/quick installation **(4)**
 - f) Smooth/no problems **(1)**
 - g) Timely/came when they said/finished on time
 - h) Good customer service overall
 - i) Have already recommended them **(2)**
 - j) They are the ones who told me about the program
 - k) Other (verbatim)
"Took a while for them to get the equipment installed"
21. Based on your experience with the program, would you recommend this program to others?
- a) Yes **(13)**
 - b) No
22. Why do you say that? *Mark all that apply*
- a) It saves electricity/we need to conserve it. **(3)**
 - b) It saves money. **(7)**

- c) It's easy to do. **(8)**
- d) It's a good program **(4)**
- e) I have recommended it
- f) People I recommended it to haven't been able to get into the program

23. How could the program be improved?

- a) Make it available to more people **(2)**
- b) More publicity/advertise it **(7)**
- c) Have more/better contractors on your list **(2)**
- d) Faster processing of applications **(1)**
- e) Explain the program/paperwork more
- f) Better communication/easier to reach people at Kentucky Power **(1)**
- g) No suggestions/good the way it is **(5)**

Thank you for taking the time to answer my questions!

Appendix D. Cost-Effectiveness Analysis Inputs

Table E1: General Bencost Model KPCO Rate Inputs

BENEFIT COST TEST FOR CONSERVATION PROGRAMS -- Cost-Effectiveness Analysis				
Company:		Kentucky Power Company		
General Inputs				
Input Data			Source	
Electric Retail Rate (\$/kWh) =		\$0.08599	Residential	Kentucky Power Cost & Rate
		\$0.07402	Commercial	Kentucky Power Cost & Rate
		\$0.08001	All Classes	
Variable O&M (\$/kWh) =		\$0.00000		
	Escalation Rate =		3.00%	
Environmental Damage Factor =		\$0.0097		
	Escalation Rate =		3.00%	
Participant Discount Rate =		15.00%		KPCO Data Request from AEP Load Research
Utility Discount Rate =		7.47%		KPCO Data Request from AEP Load Research
Social Discount Rate =		7.47%		KPCO Data Request from AEP Load Research
General Input Data Year =		2011		
Project Analysis Year 1 =		2011		
Residential and Small Commercial Energy Losses		8.7%		KPCO email dated 4/20/12 from Alan Graves
Residential and Small Commercial Peak Losses		10.7%		KPCO email dated 4/20/12 from Alan Graves

TABLE E2: BENCOST MODEL COMMODITY COST INPUTS¹⁷

Year	Avoided Energy Commodity Cost (\$/kWh)	Avoided Capacity Cost (\$/kW-year)	Avoided Electric Retail Rate (\$/kWh)
2011	\$0.0395	\$40.15	\$0.080
2012	\$0.0403	\$6.01	\$0.080
2013	\$0.0399	\$10.12	\$0.082
2014	\$0.0432	\$45.99	\$0.084
2015	\$0.0447	\$124.83	\$0.086
2016	\$0.0510	\$124.83	\$0.088
2017	\$0.0520	\$69.30	\$0.090
2018	\$0.0528	\$80.15	\$0.092
2019	\$0.0540	\$89.71	\$0.094
2020	\$0.0547	\$97.91	\$0.096
2021	\$0.0561	\$104.70	\$0.098
2022	\$0.0658	\$110.03	\$0.100
2023	\$0.0670	\$113.83	\$0.103
2024	\$0.0691	\$116.04	\$0.105
2025	\$0.0707	\$118.13	\$0.108
2026	\$0.0716	\$120.25	\$0.110
2027	\$0.0731	\$122.42	\$0.113
2028	\$0.0746	\$124.62	\$0.115
2029	\$0.0761	\$126.86	\$0.118
2030	\$0.0779	\$129.15	\$0.120
2031	\$0.0788	\$130.70	\$0.123
2032	\$0.0788	\$132.26	\$0.126
2033	\$0.0788	\$133.85	\$0.129
2034	\$0.0788	\$135.46	\$0.132
2035	\$0.0788	\$137.08	\$0.135

TABLE E3: BENCOST MODEL INPUTS

General Inputs	Specific-Project Inputs
Retail Rate (\$/kWh)	Utility Project Costs (\$)
Non-Electric Fuel Retail Rate (\$/Fuel Unit)	Administrative Costs (\$)
Commodity Cost (\$/kWh)	Incentive Costs (\$)
Demand Cost (\$/kW/Yr)	Total Utility Project Costs (\$)
Peak Reduction Factor (%)	Direct Participant Project Costs (\$/Participant)
Variable O&M (\$/kWh)	Participant Non-Energy Costs (Annual \$/Part)
Non-Electric Fuel Cost (\$/Fuel Unit)	Participant Non-Energy Savings (Annual \$/Part)
Non-Electric Fuel Loss Factor	Project Life (Years)
Electric Environmental Damage Factor (\$/kWh)	Avg. kWh/Participant Saved
Participant Discount Rate (%)	Avg. Non-Electric Fuel Units/Part. Saved
Utility Discount Rate (%)	Avg. Additional Non-Electric Fuel Units/Part. Saved
Societal Discount Rate (%)	Number of Participants
General Input Data Year	Total Annual kWh Saved
Project Analysis Year	Incentive/Participant
Growth and Escalation Factors (%)	

¹⁷ Avoided cost inputs provided by Kentucky Power (AEP) Load Forecasting Group through a data request.

TABLE E4: BENECOST MODEL OUTPUTS

General Outputs	Benefit-Cost Test Outputs (Per Test)
Coincident Utility Peak Demand Reduction	Net Present Value of Benefits - Costs
Annual Utility Energy Reduction	Benefit-Cost Ratio
Total Utility Demand Reduction	Total Benefits
Total Utility Energy Reduction	Total Costs
Levelized Costs per kWh	
Levelized Costs per kW	
Annual Participant Savings	
Simple Payback	

KENTUCKY POWER COMPANY DERIVATION OF 3 SECTOR SURCHARGES FOR 3 YR EXPERIMENT		Exhibit C				PAGE 1 of 22
RESIDENTIAL SECTOR	TOTAL YEARS 1 thru 16	YEAR 17 (2012) 1st HALF	YEAR 17 (2012) 3rd QTR	YEAR 17 (2012) 4th QTR	TOTAL	
	(1)	(2)	(3)	(4)	(5)	
1 CURRENT PERIOD AMOUNT TO BE RECOVERED	\$16,909,146	\$1,418,175	\$798,837	\$796,064	\$19,922,222	
2 CUMULATIVE (OVER)/UNDER COLLECTION	0	20,161	508,711	864,987	-	
3 18 MOS. RETROACTIVE(OVER)/UNDER ADJUSTMENT	(41,824)	0	0	0	(41,824)	
4 TOTAL TO BE RECOVERED	16,867,322	1,438,336	1,307,548	1,661,051	19,880,398	
5 TOTAL AMOUNT RECOVERED	16,846,815	929,625	0	0	17,776,440	
6 EXPECTED FUTURE RECOVERIES	0	0	442,561	1,263,159	1,705,720	
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	\$20,161	\$508,711	\$864,987	\$397,892	\$397,892	
	=====	=====	=====	=====	=====	
10 AMOUNT TO BE RECOVERED				\$1,661,051		
11 ADJ. ESTIMATED SECTOR KWH - YEAR 17			535,788,000	620,412,000		
SURCHARGE RANGE (\$ PER KWH)						
12 FLOOR (CARRYOVER)	COL. 4, L 2 / COL. 4, L 11			0.001394		
13 MIDPOINT - proposed rate			0.000826	0.002036		
14 CEILING (TOTAL COST)	COL. 4, L 4 / COL. 4, L 11			0.002677		
COMMERCIAL SECTOR	TOTAL YEARS 1 thru 16	YEAR 17 (2012) 1st HALF	YEAR 17 (2012) 3rd QTR	YEAR 17 (2012) 4th QTR	TOTAL	
	(1)	(2)	(3)	(4)	(5)	
15 CURRENT PERIOD AMOUNT TO BE RECOVERED	\$3,267,224	\$405,550	\$503,148	\$959,276	\$5,135,198	
16 CUMULATIVE (OVER)/UNDER COLLECTION	0	(100,405)	(466,391)	(161,230)	0	
17 18 MOS. RETROACTIVE(OVER)/UNDER ADJUSTMENT	1,520	0	0	0	1,520	
18 TOTAL TO BE RECOVERED	3,268,744	305,145	36,757	798,046	5,136,718	
19 TOTAL AMOUNT RECOVERED	3,356,384	771,536	0	0	4,127,920	
20 EXPECTED FUTURE RECOVERIES	0	0	197,987	318,523	516,510	
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	(\$100,405)	(\$466,391)	(\$161,230)	\$479,523	\$479,523	
	=====	=====	=====	=====	=====	
23 AMOUNT TO BE RECOVERED				\$798,046		
24 ADJ. ESTIMATED SECTOR KWH - YEAR 17			368,005,800	355,891,200		
SURCHARGE RANGE (\$ PER KWH)						
25 FLOOR (CARRYOVER)				(0.000453)		
26 MIDPOINT - proposed rate			0.000538	0.000895		
27 CEILING (TOTAL COST)				0.002242		
INDUSTRIAL SECTOR	TOTAL YEARS 1 thru 16	YEAR 17 (2012) 1st HALF	YEAR 17 (2012) 3rd QTR	YEAR 17 (2012) 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 17			776,910,400	836,948,000		
SURCHARGE RANGE (\$ PER KWH)						
38 FLOOR (CARRYOVER)				0.000000		
39 MIDPOINT			0.000000	0.000000		
40 CEILING (TOTAL COST) - proposed rate				0.000000		

YEAR 1	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACT. PROGRAM	NET LOST REV/YR	TOTAL ENERGY SAVINGS	NET LOST REVENUE	TOTAL NET * LOST	EFFICIENCY INCENTIVE (EX. C, PG.19C)	MAXIMIZING INCENTIVE	TOTAL *	TOTAL EST. COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER (2)	PER PARTICIPANT (3)	COSTS (4)	(KWH/PARTIC) (5)	KWH/YR (6)	(\$/KWH) (7)	REVENUES (8)	(9)	(5% of COSTS) (10)	INCENTIVE (11)	RECOVERED (12)
	(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	552	148	\$221.65	\$122,351	2,690	398,120	\$0.03	\$12,397	\$43,177		\$43,177	\$177,925
Energy Fitness	223	101	\$1,026.88	\$228,994	5,570	562,570	\$0.03	\$17,513	\$0	\$11,450	\$11,450	\$257,957
Targeted Energy Efficiency - All Electric	74	35	\$372.19	\$27,542	680	23,800	\$0.03	\$744	\$719		\$719	\$29,005
- Non-All Electric												
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	91	19	\$1,258.51	\$114,524	0	0			\$0	\$5,726	\$5,726	\$120,250
Smart Audit - Class 1	5	1	\$1,875.40	\$9,377	0	0			\$0	\$469	\$469	\$9,846
- Class 2	1	0	\$5,794.00	\$5,794	22,000	0	\$0.04	\$0	\$506		\$506	\$6,300
Smart Financing - Existing Building	0	0		\$0	30,600	0	\$0.04	\$0	\$0	\$0	\$0	\$0
Smart Financing - New Building												
TOTAL COMMERCIAL PROGRAMS	97	20		\$129,695		0		\$0	\$506	\$6,195	\$6,701	\$136,396
	=====	=====		=====		=====		=====	=====	=====	=====	=====
INDUSTRIAL PROGRAMS -												
(w/Est. Opt-Outs Removed)	15	1	\$149.40	\$2,241	0	0			\$0	\$112	\$112	\$2,353
Smart Audit - Class 1	2	1	\$8,980.00	\$17,960	0	0			\$0	\$898	\$898	\$18,858
Smart Audit - Class 2	0	0		\$3,919	28,200	0	\$0.04	\$0	\$196		\$196	\$4,115
Smart Financing - General	0	0		\$0	164,800	0	\$0.03	\$0	\$0	\$0	\$0	\$0
Smart Financing - Compressed Air System												
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.

[illegible]

[illegible]

[illegible]

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

[illegible]

Year 2000												
KENTUCKY POWER COMPANY												
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM												
<div> <div>Exhibit C</div> <div>PAGE 6A of</div> <div>22</div> </div>												
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.19C)	MAXIMIZING INCENTIVE	TOTAL * INCENTIVE	TOTAL EST. COSTS TO BE RECOVERED
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3)	COSTS (4)	(KWH/PARTIC) (5)	KWH/HALF (6)	(\$/KWH) (7)	REVENUES (8)	(9)	(5% of COSTS) (10)	(11)	(12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
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	\$325,055
	=====	=====		=====		=====		=====	=====	=====	=====	=====
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												

[illegible]

Year 2001												
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM												Exhibit C PAGE 7B of 22
YEAR 6 (2nd Half)	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.19C)	MAXIMIZING INCENTIVE (5% of COSTS)	TOTAL * INCENTIVE (11) (9)+(10)	TOTAL EST. COSTS TO BE RECOVERED (12) (4)+(8)+(11)
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER ** (2)	PER PARTICIPANT (3) (1)X(3)	COSTS (4)	(KWH/PARTIC) (5)	KWH/HALF (6) (2)X(5)	(\$/KWH) (7)	REVENUES (8) (6)X(7)	(9)	(10)	(11)	(12)
RESIDENTIAL PROGRAMS	0	535	\$0.00	\$0	706	377,710	\$0.03112	\$11,754	\$0	\$0	\$0	\$11,754
Energy Fitness - All Electric	88	486	\$1,018.86	\$89,660	630	306,180	\$0.03111	\$9,525	\$0	\$4,483	\$4,483	\$103,668
Targeted Energy Efficiency - 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	131	966	\$454.04	\$59,479	0	0	n/a	\$0	\$0	\$2,974	\$2,974	\$62,453
Smart Audit - Class 1	5	111	\$9,817.20	\$49,086	0	0	n/a	\$0	\$0	\$2,454	\$2,454	\$51,540
- Class 2	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 - Existing Building	18	34	\$1,799.28	\$32,387	14,102	479,468	\$0.04277	\$20,507	\$4,722	\$0	\$4,722	\$57,616
Smart Financing - New Building	169	1,220		\$165,916		1,927,206		\$81,819	\$8,210	\$5,428	\$13,638	\$261,373
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	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.

[illegible]

Year 2003												Exhibit C PAGE 9A of	22
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM													
YEAR 8 (1st HALF)	NEW PARTICIPANT	CUMULATIVE PARTICIPANT	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL PROGRAM	NET LOST REV/HALF	TOTAL ENERGY SAVINGS KWH/HALF	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)	(KWH/ PARTICIPANT) (5)	KWH/HALF (6)	(\$/KWH) (7)	REVENUES (8)	(EX. C, PG.19C) (9)	(5% of COSTS) (10)	INCENTIVE (11)	RECOVERED (12)	
				(1)X(3)		(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(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	100	467	\$849.84	\$84,984	1,028	480,076	\$0.03111	\$14,935	\$0	\$4,249	\$4,249	\$104,168	
- Non-All Electric	7	151	\$79.29	\$555	314	47,414	\$0.03124	\$1,481	\$30	\$0	\$30	\$2,066	
Compact Fluorescent Bulb	0	0	\$0.00		0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0	
High - Efficiency Heat Pump													
- Resistance Heat	0	94	\$0.00	\$0	1,200	112,800	\$0.03114	\$3,513	\$0	\$0	\$0	\$3,513	
- Non Resistance Heat	0	0	\$0.00	\$0	447	0	\$0.03116	\$0	\$0	\$0	\$0	\$0	
High - Efficiency Heat Pump													
- Mobile Home	34	268	\$379.41	\$12,900	1,144	306,592	\$0.03110	\$9,535	\$983	\$0	\$983	\$23,418	
Mobile Home New Construction ***													
- Heat Pump	46	460	\$482.61	\$22,200	1,808	831,680	\$0.03110	\$25,865	\$187	\$0	\$187	\$48,252	
- Air Conditioner	0	0	\$0.00	\$0	157	0	\$0.03124	\$0	\$0	\$0	\$0	\$0	
Modified Energy Fitness	101	23	\$142.72	\$14,415	1,194	27,462	\$0.03116	\$856	\$2,127	\$0	\$2,127	\$17,398	
TOTAL RESIDENTIAL PROGRAMS	288	1,463		\$135,054		1,806,024		\$56,185	\$3,327	\$4,249	\$7,576	\$198,815	
	=====	=====		=====		=====		=====	=====	=====	=====	=====	
COMMERCIAL PROGRAMS													
Smart Audit - Class 1	0	620	\$0.00	\$0	0	0	n/a	\$0	\$0	\$0	\$0	\$0	
- Class 2	0	73	\$0.00	\$0	0	0	n/a	\$0	\$0	\$0	\$0	\$0	
Smart Financing - Existing Building	0	110	\$0.00	\$0	13,282	1,461,020	\$0.04235	\$61,874	\$0	\$0	\$0	\$61,874	
Smart Financing - New Building	0	49	\$0.00	\$0	14,101	690,949	\$0.04277	\$29,552	\$0	\$0	\$0	\$29,552	
TOTAL COMMERCIAL PROGRAMS	0	852		\$0		2,151,969		\$91,426	\$0	\$0	\$0	\$91,426	
	=====	=====		=====		=====		=====	=====	=====	=====	=====	
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	288	2,315		\$135,054		3,957,993		\$147,611	\$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													
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM												Exhibit C PAGE 9B of	22
YEAR 8 (2nd HALF)	NEW	CUMULATIVE	TOTAL ESTIMATED	TOTAL ACTUAL	NET LOST	TOTAL	NET	TOTAL	EFFICIENCY	MAXIMIZING		TOTAL	
	PARTICIPANT	PARTICIPANT	PROGRAM COSTS	PROGRAM	REV/HALF	ENERGY SAVINGS	REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	COSTS TO BE	
PROGRAM DESCRIPTIONS	NUMBER	NUMBER **	PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/HALF	(\$/KWH)	REVENUES	(EX. C, PG.19C)	(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	0	\$0.00	\$0	706	0	\$0.03112	\$0	\$0	\$0	\$0	\$0	
Targeted Energy Efficiency													
- All Electric	69	473	\$974.94	\$67,271	1,028	486,244	\$0.03111	\$15,127	\$0	\$3,364	\$3,364	\$85,762	
- Non-All Electric	69	167	\$76.10	\$5,251	316	52,772	\$0.03124	\$1,649	\$295	\$0	\$295	\$7,195	
Compact Fluorescent Bulb	0	0	\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0	
High - Efficiency Heat Pump													
- Resistance Heat	0	63	\$0.00	\$0	1,200	75,600	\$0.03114	\$2,354	\$0	\$0	\$0	\$2,354	
- Non Resistance Heat	0	0	\$0.00	\$0	446	0	\$0.03116	\$0	\$0	\$0	\$0	\$0	
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 ***													
- Heat Pump	64	419	\$649.59	\$41,574	1,810	758,390	\$0.03110	\$23,586	\$260	\$0	\$260	\$65,420	
- Air Conditioner	1	0	\$150.00	\$150	158	0	\$0.03124	\$0	\$0	\$0	\$0	\$150	
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 22
YEAR 9 (1st HALF)	NEW	CUMULATIVE	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL PROGRAM	NET LOST	TOTAL ENERGY SAVINGS	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ACTUAL
	PARTICIPANT	PARTICIPANT	PER PARTICIPANT COSTS	COSTS	REV/QTR	KWH/ HALF	REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	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.19C) (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	\$8,788	\$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)												
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	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												
KENTUCKY POWER COMPANY											Exhibit C	
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											PAGE 10B of 22	
YEAR 9 (2nd HALF)	NEW	CUMULATIVE	TOTAL ESTIMATED	TOTAL ACTUAL	NET LOST	TOTAL	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ACTUAL
	PARTICIPANT	PARTICIPANT	PROGRAM COSTS	PROGRAM	REV/QTR	ENERGY SAVINGS	REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER **	PER PARTICIPANT	COSTS	(KWH/PARTIC)	KWH/ HALF	(\$/KWH)	REVENUES	(EX. C. PG.19C)	(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	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.												

[illegible]

[illegible]

Year 2006												Exhibit C PAGE 12B of	22
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM													
YEAR 11 (2nd HALF)	NEW	CUMULATIVE	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL	NET LOST	TOTAL ENERGY SAVINGS	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ACTUAL	
	PARTICIPANT	PARTICIPANT		PROGRAM	REV/QTRS		REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	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.19C) (9)	(5% of COSTS) (10) (4)X(5%)	INCENTIVE (11) (9)+(10)	RECOVERED (12) (4)+(8)+(11)	
RESIDENTIAL PROGRAMS	0	0	\$0.00	\$0	706	0	\$0.03112	\$0	\$0	\$0	\$0	\$0	
Energy Fitness													
Targeted Energy Efficiency	87	481	\$1,147.46	\$99,829	896	430,976	\$0.03111	\$13,408	\$0	\$4,991	\$4,991	\$118,228	
- All Electric	46	254	\$84.00	\$3,864	266	67,564	\$0.03124	\$2,111	\$908	\$0	\$908	\$6,883	
- 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	245	\$460.00	\$20,700	1,144	280,280	\$0.03110	\$8,717	\$3,564	\$0	\$3,564	\$32,981	
- Mobile Home													
Mobile Home New Construction ***	94	460	\$544.15	\$51,150	1,808	831,680	\$0.03110	\$25,865	\$11,746	\$0	\$11,746	\$88,761	
- Heat Pump	0	2	\$0.00	\$0	158	316	\$0.03124	\$10	\$0	\$0	\$0	\$10	
- Air Conditioner													
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	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	
- Class 2	0	0	\$0.00	\$0	0	0	\$0.00000	\$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													
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													
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 13B of	22
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM													
YEAR 12 (2nd Half)	NEW	CUMULATIVE	TOTAL ESTIMATED PROGRAM COSTS	TOTAL ACTUAL PROGRAM	NET LOST	TOTAL ENERGY SAVINGS	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ACTUAL	
	PARTICIPANT	PARTICIPANT			REV/QTRS		REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	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.19C) (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	100	421	\$879.82	\$87,982	896	377,216	\$0.04346	\$16,394	\$0	\$4,399	\$4,399	\$108,775	
- Non-All Electric	50	151	\$89.58	\$4,479	276	41,676	\$0.04362	\$1,818	\$987	\$0	\$987	\$7,284	
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	209	\$450.00	\$20,250	1,144	239,096	\$0.04346	\$10,391	\$3,564	\$0	\$3,564	\$34,205	
Mobile Home New Construction ***													
- Heat Pump	129	426	\$551.94	\$71,200	1,808	770,208	\$0.04348	\$33,489	\$16,120	\$0	\$16,120	\$120,809	
- Air Conditioner	0	0	\$0.00	\$0	158	0	\$0.04343	\$0	\$0	\$0	\$0	\$0	
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	\$0.00	\$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	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.													

[illegible]

[illegible]

Year 2009													
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											Exhibit C PAGE 15A of	22	
	NEW	CUMULATIVE	AVERAGE ACTUAL	TOTAL ACTUAL	NET LOST	TOTAL ENERGY	NET	TOTAL	EFFICIENCY	MAXIMIZING		TOTAL	
	PARTICIPANT	PARTICIPANT	PROGRAM COSTS	PROGRAM	REV/QTRS	SAVINGS	REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	ACTUAL	
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/ HALF	(\$/KWH)	REVENUES	(EX. C, PG.19C)	(5% of COSTS)	INCENTIVE	RECOVERED	
	(1)	(2)	(3) (4) / (1)	(4)	(5)	(6) (2)X(5)	(7)	(8)	(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	575	**	\$1,060.16	\$126,159	1,016	584,200	\$0.04346	\$25,389	\$9,189	\$0	\$9,189	\$160,737
- Non-All Electric	22	210	**	\$93.27	\$2,052	568	119,280	\$0.04352	\$5,191	\$1,357	\$0	\$1,357	\$8,600
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	299	**	\$449.18	\$27,400	875	261,625	\$0.04350	\$11,381	\$8,539	\$0	\$8,539	\$47,320
Mobile Home New Construction													
- Heat Pump	88	552	**	\$552.84	\$48,650	861	475,272	\$0.04351	\$20,679	\$9,816	\$0	\$9,816	\$79,145
- Air Conditioner	0	0	\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0	
Modified Energy Fitness	425	2,775	**	\$383.51	\$162,993	435	1,207,125	\$0.04345	\$52,450	\$21,152	\$0	\$21,152	\$236,595
High Efficiency Heat Pump													
- Resistance Heat Replacement	28	7	***	\$305.36	\$8,550	1,879	13,153	\$0.04349	\$572	\$13,387	\$0	\$13,387	\$22,509
- Heat Pump Replacement	61	16	***	\$442.62	\$27,000	301	4,816	\$0.04353	\$210	\$0	\$1,350	\$1,350	\$28,560
Energy Education for Student Program (NEED)	0	0	***	\$0.00	\$8,139	92	0	\$0.04370	\$0	\$0	\$0	\$0	\$8,139
Community Outreach Program (CFL)	926	149	***	\$5.84	\$5,404	92	13,708	\$0.04370	\$599	\$4,621	\$0	\$4,621	\$10,624
TOTAL RESIDENTIAL PROGRAMS	1,730	4,583		\$416,347		2,679,179		\$116,471	\$68,061	\$1,350	\$69,411	\$602,229	
	=====	=====		=====		=====		=====	=====	=====	=====	=====	
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	1,730	4,583		\$416,347		2,679,179		\$116,471	\$68,061	\$1,350	\$69,411	\$602,229	
	=====	=====		=====		=====		=====	=====	=====	=====	=====	
* Lost revenue and efficiency incentives are based on prospective values.													
** Cumulative participants include a reduction for the cumulative participants as of 07/01/2006.													
*** Cumulative participants include a reduction for the cumulative participants as of 01/01/2009 (High Efficiency Heat Pump, Energy Education for Students and Community Outreach Program (CFL)).													

Year 2009													
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											Exhibit C PAGE 15B of	22	
YEAR 14 (2nd HALF)	NEW	CUMULATIVE		AVERAGE ACTUAL	TOTAL ACTUAL	NET LOST	TOTAL ENERGY SAVINGS	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING	TOTAL ACTUAL	
	PARTICIPANT	PARTICIPANT		PROGRAM COSTS	PROGRAM	REV/QTRS		REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER		PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/ HALF	(\$/KWH)	REVENUES	(EX. C, PG.19C)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				(4) / (1)			(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(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	140	620	**	\$993.48	\$139,087	1,016	629,920	\$0.04346	\$27,376	\$10,811	\$0	\$10,811	\$177,274
- Non-All Electric	61	200	**	\$101.34	\$6,182	568	113,600	\$0.04352	\$4,944	\$3,762	\$0	\$3,762	\$14,888
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	99	342	**	\$449.49	\$44,500	874	298,908	\$0.04350	\$13,002	\$13,859	\$0	\$13,859	\$71,361
Mobile Home New Construction													
- Heat Pump	103	556	**	\$544.17	\$56,050	860	478,160	\$0.04351	\$20,805	\$11,490	\$0	\$11,490	\$88,345
- Air Conditioner	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
Modified Energy Fitness	375	2,631	**	\$372.99	\$139,871	435	1,144,485	\$0.04345	\$49,728	\$18,664	\$0	\$18,664	\$208,263
High Efficiency Heat Pump													
- Resistance Heat Replacement	63	60	***	\$514.29	\$32,400	1,879	112,740	\$0.04349	\$4,903	\$30,120	\$0	\$30,120	\$67,423
- Heat Pump Replacement	156	144	***	\$451.92	\$70,500	300	43,200	\$0.04353	\$1,880	\$0	\$3,525	\$3,525	\$75,905
Energy Education for Student Program (NEED)	1,130	558	***	\$8.00	\$9,045	92	51,336	\$0.04370	\$2,243	\$5,627	\$0	\$5,627	\$16,915
Community Outreach Program (CFL)	2,818	2,501	***	\$10.19	\$28,715	92	230,092	\$0.04370	\$10,055	\$14,062	\$0	\$14,062	\$52,832
TOTAL RESIDENTIAL PROGRAMS	4,945	7,612			\$526,350		3,102,441		\$134,936	\$108,395	\$3,525	\$111,920	\$773,206
	=====	=====			=====		=====		=====	=====	=====	=====	=====
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	4,945	7,612			\$526,350		3,102,441		\$134,936	\$108,395	\$3,525	\$111,920	\$773,206
	=====	=====			=====		=====		=====	=====	=====	=====	=====
* Lost revenue and efficiency incentives are based on prospective values.													
** Cumulative participants include a reduction for the cumulative participants as of 01/01/2007.													
*** Cumulative participants include a reduction for the cumulative participants as of 01/01/2009 (High Efficiency Heat Pump, Energy Education for Students and Community Outreach Program (CFL)).													

Year 2010												
KENTUCKY POWER COMPANY											Exhibit C	
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											PAGE 16A of	22
YEAR 15 (1st HALF)	NEW	CUMULATIVE		AVERAGE ACTUAL	TOTAL	NET LOST	TOTAL	NET	TOTAL	EFFICIENCY	MAXIMIZING	
	PARTICIPANT	PARTICIPANT		PROGRAM COSTS	PROGRAM	REV/QTRS	ENERGY SAVINGS	REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *
PROGRAM DESCRIPTIONS	NUMBER	NUMBER		PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/ QTR	(\$/KWH)	REVENUES	(EX. C. PG.19C)	(5% of COSTS)	INCENTIVE
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
				(4) / (1)			(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)
												(12)
												(4)+(8)+(11)
RESIDENTIAL PROGRAMS												
Energy Fitness	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
Targeted Energy Efficiency												
- All Electnc	174	720	**	\$1,161.51	\$202,103	1,016	731,520	\$0.04346	\$31,792	\$13,436	\$0	\$13,436
- Non-All Electnc	31	237	**	\$114.10	\$3,537	568	134,616	\$0.04352	\$5,858	\$1,912	\$0	\$1,912
Compact Fluorescent Bulb	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
High - Efficiency Heat Pump												
- Resistance Heat	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
- Non Resistance Heat	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
High - Efficiency Heat Pump												
- Mobile Home	97	416	**	\$422.16	\$40,950	875	364,000	\$0.04350	\$15,834	\$13,579	\$0	\$13,579
Mobile Home New Construction												
- Heat Pump	115	621	**	\$527.83	\$60,700	861	534,681	\$0.04351	\$23,264	\$4,462	\$0	\$4,462
- Air Conditioner	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
Modified Energy Fitness	501	2,762	**	\$392.89	\$196,836	435	1,201,470	\$0.04345	\$52,204	\$24,935	\$0	\$24,935
High Efficiency Heat Pump												
- Resistance Heat Replacement	97	135	***	\$450.00	\$43,650	1,879	253,665	\$0.04349	\$11,032	\$46,376	\$0	\$46,376
- Heat Pump Replacement	272	348	***	\$416.73	\$113,350	301	104,748	\$0.04353	\$4,560	\$0	\$5,668	\$5,668
Energy Education for Student Program (NEED)	488	1,299	***	\$50.99	\$24,881	73	94,827	\$0.04327	\$4,103	\$2,430	\$0	\$2,430
Community Outreach Program (CFL)	2,644	4,482	***	\$16.10	\$42,564	91	407,862	\$0.04376	\$17,848	\$13,194	\$0	\$13,194
TOTAL RESIDENTIAL PROGRAMS	4,419	11,020			\$728,571		3,827,389		\$166,495	\$120,324	\$5,668	\$125,992
	=====	=====			=====		=====		=====	=====	=====	=====
COMMERCIAL PROGRAMS												
Smart Audit - Class 1	0	0		\$0.00	\$0	0	0	n/a	\$0	\$0	\$0	\$0
- Class 2	0	0		\$0.00	\$0	0	0	n/a	\$0	\$0	\$0	\$0
Smart Financing - Existing Building	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
Smart Financing - New Building	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
TOTAL COMMERCIAL PROGRAMS	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
Smart Financing - Compressed Air System	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
TOTAL INDUSTRIAL PROGRAMS	0	0			\$0		0		\$0	\$0	\$0	\$0
	=====	=====			=====		=====		=====	=====	=====	=====
TOTAL COMPANY	4,419	11,020			\$728,571		3,827,389		\$166,495	\$120,324	\$5,668	\$125,992
	=====	=====			=====		=====		=====	=====	=====	=====
* Lost revenue and efficiency incentives are based on prospective values.												
** Cumulative participants include a reduction for the cumulative participants as of 01/01/2007.												
*** Cumulative participants include a reduction for the cumulative participants as of 01/01/2009 (High Efficiency Heat Pump, Energy Education for Students and Community Outreach Program (CFL)).												

Year 2010													
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM												Exhibit C PAGE 16B-1 of	22
YEAR 15 (2nd HALF)	NEW	CUMULATIVE		AVERAGE ACTUAL	TOTAL ACTUAL	NET LOST	TOTAL	NET	TOTAL	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/ QTRs	(\$/KWH)	REVENUES	(EX. C. PG.19C)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				(4) / (1)			(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(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	172	787	**	\$809.62	\$139,254	1,016	799,592	\$0.05746	\$45,945	\$13,282	\$0	\$13,282	\$198,481
- Non-All Electric	23	242	**	\$102.35	\$2,354	568	137,456	\$0.05746	\$7,898	\$1,419	\$0	\$1,419	\$11,671
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	136	496	**	\$469.49	\$63,850	875	434,000	\$0.05750	\$24,955	\$19,039	\$0	\$19,039	\$107,844
Mobile Home New Construction													
- Heat Pump	119	617	**	\$558.82	\$66,500	861	531,237	\$0.05745	\$30,520	\$13,274	\$0	\$13,274	\$110,294
- Air Conditioner	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
Modified Energy Fitness	699	2,939	**	\$317.39	\$221,857	435	1,278,465	\$0.05752	\$73,537	\$34,789	\$0	\$34,789	\$330,183
High Efficiency Heat Pump													
- Resistance Heat Replacement	155	264	***	\$326.00	\$50,530	1,879	496,056	\$0.05748	\$28,513	\$74,106	\$0	\$74,106	\$153,149
- Heat Pump Replacement	237	621	***	\$559.79	\$132,670	301	186,921	\$0.05750	\$10,748	\$0	\$6,634	\$6,634	\$150,052
Energy Education for Student Program (NEED)	1,059	1,220	***	\$5.55	\$5,880	74	90,280	\$0.05714	\$5,159	\$5,274	\$0	\$5,274	\$16,313
Community Outreach Program (CFL)	2,167	3,516	***	\$6.72	\$14,570	91	319,956	\$0.05768	\$18,455	\$10,813	\$0	\$10,813	\$43,838
Residential Efficient Products													
- Compact Fluorescent Lamp (CFL)	0	0		\$0.00	\$0	0	0	\$0.05818	\$0	\$0	\$0	\$0	\$0
- Specialty Bulbs	0	0		\$0.00	\$0	0	0	\$0.05793	\$0	\$0	\$0	\$0	\$0
- LED Lights	0	0		\$0.00	\$0	0	0	\$0.05854	\$0	\$0	\$0	\$0	\$0
HVAC Diagnostic & Tune-Up													
- Air Conditioner	0	0		\$0.00	\$0	0	0	\$0.05749	\$0	\$0	\$0	\$0	\$0
- Heat Pump	28	3		\$101.79	\$2,850	371	1,113	\$0.05749	\$64	\$319	\$0	\$319	\$3,233
Residential Load Management (Pilot Program)													
- Air Conditioner	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
- Water Heating	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
TOTAL RESIDENTIAL PROGRAMS	4,795	10,705			\$700,315		4,275,076		\$245,794	\$172,315	\$6,634	\$178,949	\$1,125,058
	=====	=====			=====		=====		=====	=====	=====	=====	=====

[illegible]

Year 2011												
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											Exhibit C PAGE 17A-1 of	22
YEAR 16 (1st HALF)	NEW	CUMULATIVE	AVERAGE ACTUAL	TOTAL ACTUAL	NET LOST	TOTAL ENERGY SAVINGS	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ACTUAL
	PARTICIPANT	PARTICIPANT	PROGRAM COSTS	PROGRAM	REV/QTRS		REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/ QTR	(\$/KWH)	REVENUES	(EX. C, PG.19C)	(5% of COSTS)	INCENTIVE (11)	RECOVERED (12)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			(4) / (1)			(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(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	110	814	\$692.04	\$76,124	1,050	854,700	\$0.05746	\$49,111	\$16,253	\$0	\$16,253	\$141,488
- Non-All Electric	6	208	\$140.17	\$841	448	93,184	\$0.05746	\$5,354	\$0	\$42	\$42	\$6,237
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	94	442	\$502.11	\$47,198	1,403	620,126	\$0.05750	\$35,657	\$27,615	\$0	\$27,615	\$110,470
Mobile Home New Construction												
- Heat Pump	68	624	\$680.15	\$46,250	731	456,144	\$0.05745	\$26,205	\$6,393	\$0	\$6,393	\$78,848
- Air Conditioner	0	0	\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
Modified Energy Fitness	645	3,039	\$346.52	\$223,503	283	860,037	\$0.05752	\$49,469	\$9,456	\$0	\$9,456	\$282,428
High Efficiency Heat Pump												
- Resistance Heat Replacement	154	328	** \$452.59	\$69,699	728	238,784	\$0.05748	\$13,725	\$12,030	\$0	\$12,030	\$95,454
- Heat Pump Replacement	212	608	** \$429.25	\$91,000	923	561,184	\$0.05750	\$32,268	\$25,033	\$0	\$25,033	\$148,301
Energy Education for Student Program (NEED)	938	2,034	** \$12.40	\$11,635	48	97,632	\$0.05714	\$5,579	\$1,613	\$0	\$1,613	\$18,827
Community Outreach Program (CFL)	2,518	5,442	** \$19.93	\$50,179	50	272,100	\$0.05768	\$15,695	\$9,871	\$0	\$9,871	\$75,745
Residential Efficient Products												
- Compact Fluorescent Lamp (CFL)	77,764	20,801	\$1.82	\$141,810	17	353,617	\$0.05818	\$20,573	\$24,107	\$0	\$24,107	\$186,490
- Specialty Bulbs	0	0	\$0.00	\$8	15	0	\$0.05793	\$0	\$0	\$0	\$0	\$8
- LED Lights	0	0	\$0.00	\$259	21	0	\$0.05854	\$0	\$0	\$0	\$0	\$259
HVAC Diagnostic & Tune-Up												
- Air Conditioner	64	19	\$50.00	\$3,200	155	2,945	\$0.05749	\$169	\$84	\$0	\$84	\$3,453
- Heat Pump	290	148	\$72.24	\$20,950	371	54,908	\$0.05749	\$3,157	\$3,300	\$0	\$3,300	\$27,407
Residential Load Management (Pilot Program)												
- Air Conditioner	0	0	\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
- Water Heating	0	0	\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
TOTAL RESIDENTIAL PROGRAMS	82,863	34,507		\$782,656		4,465,361		\$256,962	\$135,755	\$42	\$135,797	\$1,175,415
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Year 2011												
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											Exhibit C PAGE 17B-1 of	22
YEAR 16 (2nd HALF)	NEW	CUMULATIVE	AVERAGE ESTIMATED PROGRAM COSTS	TOTAL ESTIMATED PROGRAM COSTS	NET LOST REV/QTRS	TOTAL ENERGY SAVINGS KWH/ QTRs	NET LOST REVENUE (\$/KWH)	TOTAL NET * LOST	EFFICIENCY INCENTIVE (EX. C, PG.19C)	MAXIMIZING INCENTIVE (5% of COSTS)	TOTAL *	TOTAL ESTIMATED COSTS TO BE
PROGRAM DESCRIPTIONS	PARTICIPANT NUMBER (1)	PARTICIPANT NUMBER (2)	PER PARTICIPANT COSTS (3) (4) / (1)	COSTS (4)	(KWH/ PARTICIPANT) (5)	(6) (2)X(5)	(7)	REVENUES (8) (6)X(7)	(9)	(10) (4)X(5%)	INCENTIVE (11) (9)+(10)	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												
- All Electric	141	769	\$1,428.37	\$201,400	526	404,494	\$0.05749	\$23,254	\$20,833	\$0	\$20,833	\$245,487
- Non-All Electric	23	195	\$114.30	\$2,629	224	43,680	\$0.05746	\$2,510	\$0	\$131	\$131	\$5,270
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	114	552	\$417.85	\$47,635	702	387,504	\$0.05750	\$22,281	\$33,491	\$0	\$33,491	\$103,407
Mobile Home New Construction												
- Heat Pump	92	603	\$500.38	\$46,035	365	220,095	\$0.05749	\$12,653	\$8,649	\$0	\$8,649	\$67,337
- Air Conditioner	0	0	\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
Modified Energy Fitness	556	3,354	\$397.49	\$221,004	142	476,268	\$0.05757	\$27,419	\$8,151	\$0	\$8,151	\$256,574
High Efficiency Heat Pump												
- Resistance Heat Replacement	121	483	\$480.50	\$58,140	365	176,295	\$0.05745	\$10,128	\$9,453	\$0	\$9,453	\$77,721
- Heat Pump Replacement	194	678	\$466.22	\$90,446	461	312,558	\$0.05750	\$17,972	\$22,908	\$0	\$22,908	\$131,326
Energy Education for Student Program (NEED)	958	3,383	\$12.90	\$12,361	24	81,192	\$0.05750	\$4,669	\$1,648	\$0	\$1,648	\$18,678
Community Outreach Program (CFL)	2,397	3,845	\$3.89	\$9,335	26	99,970	\$0.05765	\$5,763	\$9,396	\$0	\$9,396	\$24,494
Residential Efficient Products												
- Compact Fluorescent Lamp (CFL)	55,928	28,215	\$3.06	\$170,927	8	225,720	\$0.05818	\$13,132	\$17,338	\$0	\$17,338	\$201,397
- Specialty Bulbs	0	0	\$0.00	\$26	7	0	\$0.05793	\$0	\$0	\$0	\$0	\$26
- LED Lights	0	0	\$0.00	\$1,125	10	0	\$0.05854	\$0	\$0	\$0	\$0	\$1,125
HVAC Diagnostic & Tune-Up												
- Air Conditioner	168	101	\$142.19	\$23,888	78	7,878	\$0.05749	\$453	\$220	\$0	\$220	\$24,561
- Heat Pump	440	178	\$118.61	\$52,188	185	32,930	\$0.05749	\$1,893	\$5,007	\$0	\$5,007	\$59,088
Residential Load Management (Pilot Program)												
- Air Conditioner	6	1	\$8,624.83	\$51,749	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$51,749
- Water Heating	4	1	\$12,937.25	\$51,749	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$51,749
TOTAL RESIDENTIAL PROGRAMS	61,142	42,358		\$1,040,637		2,468,584		\$142,127	\$137,094	\$131	\$137,225	\$1,319,989
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Year 2012												
KENTUCKY POWER COMPANY											Exhibit C	
ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											PAGE 18A-1 of	22
YEAR 17 (1st half)	NEW	CUMULATIVE	AVERAGE ESTIMATED	TOTAL ESTIMATED	NET LOST	TOTAL ENERGY SAVINGS	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ESTIMATED
	PARTICIPANT	PARTICIPANT	PROGRAM COSTS	PROGRAM	REV/QTRS		REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/ QTRs	(\$/KWH)	REVENUES	(EX. C. PG.19C)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			(4) / (1)			(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(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	142	854	\$1,210.97	\$171,958	980	836,920	\$0.05749	\$48,115	\$15,221	\$0	\$15,221	\$235,294
- Non-All Electric	13	165	\$101.00	\$1,313	437	72,105	\$0.05746	\$4,143	\$0	\$66	\$66	\$5,522
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	110	439	\$478.64	\$52,650	1,291	566,749	\$0.05750	\$32,588	\$26,043	\$0	\$26,043	\$111,281
Mobile Home New Construction												
- Heat Pump	79	575	\$550.00	\$43,450	841	483,575	\$0.05749	\$27,801	\$6,554	\$0	\$6,554	\$77,805
- Air Conditioner	0	0	\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
Modified Energy Fitness	646	3,301	\$322.61	\$208,408	325	1,072,825	\$0.05757	\$61,763	\$4,115	\$0	\$4,115	\$274,286
High Efficiency Heat Pump												
- Resistance Heat Replacement	88	208	\$455.11	\$40,050	670	139,360	\$0.05745	\$8,006	\$3,458	\$0	\$3,458	\$51,514
- Heat Pump Replacement	217	378	\$466.59	\$101,250	848	320,544	\$0.05750	\$18,431	\$19,218	\$0	\$19,218	\$138,899
Energy Education for Student Program (NEED)	525	2,677	\$17.61	\$9,245	110	294,470	\$0.05750	\$16,932	\$1,664	\$0	\$1,664	\$27,841
Community Outreach Program (CFL)	2,335	5,934	\$9.68	\$22,614	124	735,816	\$0.05765	\$42,420	\$11,138	\$0	\$11,138	\$76,172
Residential Efficient Products												
- Compact Fluourescent Lamp (CFL)	51,481	32,225	\$3.27	\$168,572	23	741,175	\$0.05818	\$43,122	\$43,759	\$0	\$43,759	\$255,453
- Specialty Bulbs	0	0	\$0.00	\$19	15	0	\$0.05793	\$0	\$0	\$1	\$1	\$20
- LED Lights	0	0	\$0.00	\$584	21	0	\$0.05854	\$0	\$0	\$29	\$29	\$613
HVAC Diagnostic & Tune-Up												
- Air Conditioner	147	69	\$121.90	\$17,919	62	4,278	\$0.05749	\$246	\$0	\$896	\$896	\$19,061
- Heat Pump	324	255	\$109.32	\$35,419	234	59,670	\$0.05749	\$3,430	\$0	\$1,771	\$1,771	\$40,620
Residential Load Management (Pilot Program)												
- Air Conditioner	36	17	\$1,441.58	\$51,897	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$51,897
- Water Heating	32	15	\$1,621.78	\$51,897	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$51,897
TOTAL RESIDENTIAL PROGRAMS	56,175	47,112		\$977,245		5,327,487		\$306,997	\$131,170	\$2,763	\$133,933	\$1,418,175
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Year 2012													
KENTUCKY POWER COMPANY											Exhibit C		
ESTIMATED SECTOR SURCHARGES FOR 3											PAGE		
YEAR PROGRAM											18B-1 of	22	
YEAR 17 (3rd QTR)	NEW	CUMULATIVE	AVERAGE ESTIMATED PROGRAM COSTS	TOTAL ESTIMATED PROGRAM	NET LOST REV/QTRS	TOTAL ENERGY SAVINGS (KWH/ PARTICIPANT)	NET LOST REVENUE (\$/KWH)	TOTAL NET * LOST	EFFICIENCY INCENTIVE (EX. C, PG.19C)	MAXIMIZING INCENTIVE (5% of COSTS)		TOTAL ESTIMATED COSTS TO BE	
	PARTICIPANT	PARTICIPANT									TOTAL *		
PROGRAM DESCRIPTIONS	NUMBER (1)	NUMBER (2)	PER PARTICIPANT (3) (4) / (1)	COSTS (4)	(KWH/ PARTICIPANT) (5)	KWH/ QTRs (6) (2)X(5)	(7)	REVENUES (8) (6)X(7)	(9)	(10) (4)X(5%)	INCENTIVE (11) (9)+(10)	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													
- All Electric	67	873	**	\$966.73	\$64,771	491	428,643	\$0.05749	\$24,643	\$7,182	\$0	\$7,182	\$96,596
- Non-All Electric	6	146	**	\$40.67	\$244	218	31,828	\$0.05746	\$1,829	\$0	\$12	\$12	\$2,085
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	48	566		\$417.31	\$20,031	646	365,636	\$0.05747	\$21,013	\$11,364	\$0	\$11,364	\$52,408
Mobile Home New Construction													
- Heat Pump	57	553	**	\$552.25	\$31,478	420	232,260	\$0.05747	\$13,348	\$4,729	\$0	\$4,729	\$49,555
- Air Conditioner	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$0
Modified Energy Fitness	320	3,372		\$383.49	\$122,718	163	549,636	\$0.05751	\$31,610	\$2,038	\$0	\$2,038	\$156,366
High Efficiency Heat Pump													
- Resistance Heat Replacement	40	132	**	\$444.83	\$17,793	336	44,352	\$0.05750	\$2,550	\$1,572	\$0	\$1,572	\$21,915
- Heat Pump Replacement	143	286		\$436.05	\$62,355	425	121,550	\$0.05746	\$6,984	\$12,664	\$0	\$12,664	\$82,003
Energy Education for Student Program (NEED)	400	1,193		\$11.23	\$4,491	56	66,808	\$0.05730	\$3,828	\$1,268	\$0	\$1,268	\$9,587
Community Outreach Program (CFL)	1,650	3,010	**	\$14.56	\$24,021	62	186,620	\$0.05758	\$10,746	\$7,871	\$0	\$7,871	\$42,638
Residential Efficient Products													
- Compact Fluourescent Lamp (CFL)	41,388	69,883	**	\$2.10	\$86,906	12	838,596	\$0.05739	\$48,127	\$35,180	\$0	\$35,180	\$170,213
- Specialty Bulbs	16	3		\$64.31	\$1,029	7	21	\$0.05793	\$1	\$5	\$0	\$5	\$1,035
- LED Lights	23	4		\$0.96	\$22	10	40	\$0.05854	\$2	\$0	\$1	\$1	\$25
HVAC Diagnostic & Tune-Up													
- Air Conditioner	78	95	**	\$171.95	\$13,412	32	3,040	\$0.05714	\$174	\$0	\$671	\$671	\$14,257
- Heat Pump	176	170	**	\$117.87	\$20,745	117	19,890	\$0.05744	\$1,142	\$0	\$1,037	\$1,037	\$22,924
Residential Load Management (Pilot Program)													
- Air Conditioner	35	50		\$1,103.29	\$38,615	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$38,615
- Water Heating	35	46		\$1,103.29	\$38,615	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$38,615
TOTAL RESIDENTIAL PROGRAMS	44,482	80,382		\$547,246		2,888,920		\$165,997	\$83,873	\$1,721	\$85,594	\$798,837	
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Year 2012												
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											Exhibit C PAGE 18C-1 of	22
YEAR 17 (4th QTR)	NEW	CUMULATIVE	AVERAGE ESTIMATED PROGRAM COSTS	TOTAL ESTIMATED PROGRAM	NET LOST	TOTAL ENERGY SAVINGS	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ESTIMATED
	PARTICIPANT	PARTICIPANT			REV/QTRS		REVENUE	LOST	INCENTIVE	INCENTIVE	TOTAL *	COSTS TO BE
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/ QTRs	(\$/KWH)	REVENUES	(EX. C. PG.19C)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			(4) / (1)			(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(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	66	839	**	\$981.38	\$64,771	491	411,949	\$0.05749	\$23,683	\$7,075	\$0	\$95,529
- Non-All Electric	6	105	**	\$40.67	\$244	218	22,890	\$0.05746	\$1,315	\$0	\$12	\$1,571
Compact Fluorescent Bulb	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
High - Efficiency Heat Pump												
- Resistance Heat	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
- Non Resistance Heat	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
High - Efficiency Heat Pump												
- Mobile Home	52	265	**	\$419.60	\$21,819	646	171,190	\$0.05747	\$9,838	\$12,311	\$0	\$43,968
Mobile Home New Construction												
- Heat Pump	54	558	**	\$552.26	\$29,822	420	234,360	\$0.05747	\$13,469	\$4,480	\$0	\$47,771
- Air Conditioner	0	0		\$0.00	\$0	0	0	\$0.00000	\$0	\$0	\$0	\$0
Modified Energy Fitness	250	3,515		\$383.50	\$95,874	163	572,945	\$0.05751	\$32,950	\$1,593	\$0	\$130,417
High Efficiency Heat Pump												
- Resistance Heat Replacement	47	141	**	\$444.83	\$20,907	336	47,376	\$0.05750	\$2,724	\$1,847	\$0	\$25,478
- Heat Pump Replacement	115	207	**	\$436.04	\$50,145	425	87,975	\$0.05746	\$5,055	\$10,184	\$0	\$65,384
Energy Education for Student Program (NEED)	1,075	1,890		\$16.71	\$17,964	56	105,840	\$0.05730	\$6,065	\$3,408	\$0	\$27,437
Community Outreach Program (CFL)	815	4,584	**	\$14.56	\$11,865	62	284,208	\$0.05758	\$16,365	\$3,888	\$0	\$32,118
Residential Efficient Products												
- Compact Fluorescent Lamp (CFL)	41,368	113,938	**	\$2.10	\$86,906	12	1,367,256	\$0.05739	\$78,467	\$35,180	\$0	\$200,553
- Specialty Bulbs	9	8		\$64.33	\$579	7	56	\$0.05793	\$3	\$3	\$0	\$585
- LED Lights	752	316		\$0.94	\$704	10	3,160	\$0.05854	\$185	\$0	\$35	\$924
HVAC Diagnostic & Tune-Up												
- Air Conditioner	25	31	**	\$171.96	\$4,299	32	992	\$0.05714	\$57	\$0	\$215	\$4,571
- Heat Pump	250	411		\$117.87	\$29,467	117	48,087	\$0.05744	\$2,762	\$0	\$1,473	\$33,702
Residential Load Management (Pilot Program)												
- Air Conditioner	39	92	**	\$1,103.28	\$43,028	0	0	\$0.00000	\$0	\$0	\$0	\$43,028
- Water Heating	39	88	**	\$1,103.28	\$43,028	0	0	\$0.00000	\$0	\$0	\$0	\$43,028
TOTAL RESIDENTIAL PROGRAMS	44,982	126,988		\$521,422		3,358,284		\$192,938	\$79,969	\$1,735	\$81,704	\$796,064
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Year 2012												
KENTUCKY POWER COMPANY ESTIMATED SECTOR SURCHARGES FOR 3 YEAR PROGRAM											Exhibit C PAGE 18C-2 of	22
YEAR 17 (4th QTR)	NEW	CUMULATIVE	AVERAGE ESTIMATED PROGRAM COSTS	TOTAL ESTIMATED PROGRAM	NET LOST	TOTAL ENERGY SAVINGS	NET LOST	TOTAL NET *	EFFICIENCY	MAXIMIZING		TOTAL ESTIMATED
	PARTICIPANT	PARTICIPANT			REV/QTRS			LOST		INCENTIVE	INCENTIVE	
PROGRAM DESCRIPTIONS	NUMBER	NUMBER	PER PARTICIPANT	COSTS	(KWH/ PARTICIPANT)	KWH/ QTRs	(\$/KWH)	REVENUES	(EX. C, PG.19C)	(5% of COSTS)	INCENTIVE	RECOVERED
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			(4) / (1)			(2)X(5)		(6)X(7)		(4)X(5%)	(9)+(10)	(4)+(8)+(11)
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
Commercial A/C & Heat Pump Program												
- Air Conditioner Replacement	3	3	\$551.67	\$1,655	63	189	\$0.07458	\$14	\$0	\$83	\$83	\$1,752
- Heat Pump Replacement	14	7	\$773.57	\$10,830	297	2,079	\$0.07441	\$155	\$0	\$542	\$542	\$11,527
HVAC Diagnostic & Tune-Up												
- Air Conditioner	5	10	** \$241.60	\$1,208	58	580	\$0.07461	\$43	\$0	\$60	\$60	\$1,311
- Heat Pump	14	18	\$169.29	\$2,370	174	3,132	\$0.07438	\$233	\$0	\$119	\$119	\$2,722
Commercial Load Management (Pilot Program)												
- Air Conditioner	6	4	\$1,042.17	\$6,253	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$6,253
- Water Heating	6	4	\$1,042.17	\$6,253	0	0	\$0.00000	\$0	\$0	\$0	\$0	\$6,253
Commercial Incentive	108	43	** \$8,075.73	\$872,179	4,394	188,942	\$0.07235	\$13,670	\$0	\$43,609	\$43,609	\$929,458
TOTAL COMMERCIAL PROGRAMS	156	89		\$900,748		194,922	\$14,115	\$0	\$44,413	\$44,413	\$959,276	
	=====	=====		=====		=====	=====	=====	=====	=====	=====	=====
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	\$0
	=====	=====		=====		=====	=====	=====	=====	=====	=====	=====
TOTAL COMPANY	45,138	127,077		\$1,422,170		3,553,206	\$207,053	\$79,969	\$46,148	\$126,117	\$1,755,340	
	=====	=====		=====		=====	=====	=====	=====	=====	=====	=====
* Lost revenue and efficiency incentives are based on prospective values.												
** Cumulative participants include a reduction for the cumulative participants as of 01/01/2009 (High Efficiency Heat Pump, Energy Education for Students and Community Outreach Program (CFL)).												

[illegible]

KENTUCKY POWER COMPANY DERIVATION FOR 3 YEAR DSM EXPERIMENT CALCULATION OF EFFICIENCY INCENTIVE																												Exhibit C PAGE 19B of		22																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
PROGRAM DESCRIPTIONS	YEAR 14 (35)		YEAR 15 (39)		YEAR 16 (40)		YEAR 17 (41)		YEAR 18 (42)		YEAR 19 (43)		YEAR 20 (44)		YEAR 21 (45)		YEAR 22 (46)		YEAR 23 (47)		YEAR 24 (48)		YEAR 25 (49)		YEAR 26 (50)		YEAR 27 (51)		YEAR 28 (52)		YEAR 29 (53)		YEAR 30 (54)		YEAR 31 (55)		YEAR 32 (56)		YEAR 33 (57)		YEAR 34 (58)		YEAR 35 (59)		YEAR 36 (60)		YEAR 37 (61)		YEAR 38 (62)		YEAR 39 (63)		YEAR 40 (64)		YEAR 41 (65)		YEAR 42 (66)		YEAR 43 (67)		YEAR 44 (68)		YEAR 45 (69)		YEAR 46 (70)		YEAR 47 (71)		YEAR 48 (72)		YEAR 49 (73)		YEAR 50 (74)		YEAR 51 (75)		YEAR 52 (76)		YEAR 53 (77)		YEAR 54 (78)		YEAR 55 (79)		YEAR 56 (80)		YEAR 57 (81)		YEAR 58 (82)		YEAR 59 (83)		YEAR 60 (84)		YEAR 61 (85)		YEAR 62 (86)		YEAR 63 (87)		YEAR 64 (88)		YEAR 65 (89)		YEAR 66 (90)		YEAR 67 (91)		YEAR 68 (92)		YEAR 69 (93)		YEAR 70 (94)		YEAR 71 (95)		YEAR 72 (96)		YEAR 73 (97)		YEAR 74 (98)		YEAR 75 (99)		YEAR 76 (100)		YEAR 77 (101)		YEAR 78 (102)		YEAR 79 (103)		YEAR 80 (104)		YEAR 81 (105)		YEAR 82 (106)		YEAR 83 (107)		YEAR 84 (108)		YEAR 85 (109)		YEAR 86 (110)		YEAR 87 (111)		YEAR 88 (112)		YEAR 89 (113)		YEAR 90 (114)		YEAR 91 (115)		YEAR 92 (116)		YEAR 93 (117)		YEAR 94 (118)		YEAR 95 (119)		YEAR 96 (120)		YEAR 97 (121)		YEAR 98 (122)		YEAR 99 (123)		YEAR 100 (124)		YEAR 101 (125)		YEAR 102 (126)		YEAR 103 (127)		YEAR 104 (128)		YEAR 105 (129)		YEAR 106 (130)		YEAR 107 (131)		YEAR 108 (132)		YEAR 109 (133)		YEAR 110 (134)		YEAR 111 (135)		YEAR 112 (136)		YEAR 113 (137)		YEAR 114 (138)		YEAR 115 (139)		YEAR 116 (140)		YEAR 117 (141)		YEAR 118 (142)		YEAR 119 (143)		YEAR 120 (144)		YEAR 121 (145)		YEAR 122 (146)		YEAR 123 (147)		YEAR 124 (148)		YEAR 125 (149)		YEAR 126 (150)		YEAR 127 (151)		YEAR 128 (152)		YEAR 129 (153)		YEAR 130 (154)		YEAR 131 (155)		YEAR 132 (156)		YEAR 133 (157)		YEAR 134 (158)		YEAR 135 (159)		YEAR 136 (160)		YEAR 137 (161)		YEAR 138 (162)		YEAR 139 (163)		YEAR 140 (164)		YEAR 141 (165)		YEAR 142 (166)		YEAR 143 (167)		YEAR 144 (168)		YEAR 145 (169)		YEAR 146 (170)		YEAR 147 (171)		YEAR 148 (172)		YEAR 149 (173)		YEAR 150 (174)		YEAR 151 (175)		YEAR 152 (176)		YEAR 153 (177)		YEAR 154 (178)		YEAR 155 (179)		YEAR 156 (180)		YEAR 157 (181)		YEAR 158 (182)		YEAR 159 (183)		YEAR 160 (184)		YEAR 161 (185)		YEAR 162 (186)		YEAR 163 (187)		YEAR 164 (188)		YEAR 165 (189)		YEAR 166 (190)		YEAR 167 (191)		YEAR 168 (192)		YEAR 169 (193)		YEAR 170 (194)		YEAR 171 (195)		YEAR 172 (196)		YEAR 173 (197)		YEAR 174 (198)		YEAR 175 (199)		YEAR 176 (200)		YEAR 177 (201)		YEAR 178 (202)		YEAR 179 (203)		YEAR 180 (204)		YEAR 181 (205)		YEAR 182 (206)		YEAR 183 (207)		YEAR 184 (208)		YEAR 185 (209)		YEAR 186 (210)		YEAR 187 (211)		YEAR 188 (212)		YEAR 189 (213)		YEAR 190 (214)		YEAR 191 (215)		YEAR 192 (216)		YEAR 193 (217)		YEAR 194 (218)		YEAR 195 (219)		YEAR 196 (220)		YEAR 197 (221)		YEAR 198 (222)		YEAR 199 (223)		YEAR 200 (224)		YEAR 201 (225)		YEAR 202 (226)		YEAR 203 (227)		YEAR 204 (228)		YEAR 205 (229)		YEAR 206 (230)		YEAR 207 (231)		YEAR 208 (232)		YEAR 209 (233)		YEAR 210 (234)		YEAR 211 (235)		YEAR 212 (236)		YEAR 213 (237)		YEAR 214 (238)		YEAR 215 (239)		YEAR 216 (240)		YEAR 217 (241)		YEAR 218 (242)		YEAR 219 (243)		YEAR 220 (244)		YEAR 221 (245)		YEAR 222 (246)		YEAR 223 (247)		YEAR 224 (248)		YEAR 225 (249)		YEAR 226 (250)		YEAR 227 (251)		YEAR 228 (252)		YEAR 229 (253)		YEAR 230 (254)		YEAR 231 (255)		YEAR 232 (256)		YEAR 233 (257)		YEAR 234 (258)		YEAR 235 (259)		YEAR 236 (260)		YEAR 237 (261)		YEAR 238 (262)		YEAR 239 (263)		YEAR 240 (264)		YEAR 241 (265)		YEAR 242 (266)		YEAR 243 (267)		YEAR 244 (268)		YEAR 245 (269)		YEAR 246 (270)		YEAR 247 (271)		YEAR 248 (272)		YEAR 249 (273)		YEAR 250 (274)		YEAR 251 (275)		YEAR 252 (276)		YEAR 253 (277)		YEAR 254 (278)		YEAR 255 (279)		YEAR 256 (280)		YEAR 257 (281)		YEAR 258 (282)		YEAR 259 (283)		YEAR 260 (284)		YEAR 261 (285)		YEAR 262 (286)		YEAR 263 (287)		YEAR 264 (288)		YEAR 265 (289)		YEAR 266 (290)		YEAR 267 (291)		YEAR 268 (292)		YEAR 269 (293)		YEAR 270 (294)		YEAR 271 (295)		YEAR 272 (296)		YEAR 273 (297)		YEAR 274 (298)		YEAR 275 (299)		YEAR 276 (300)		YEAR 277 (301)		YEAR 278 (302)		YEAR 279 (303)		YEAR 280 (304)		YEAR 281 (305)		YEAR 282 (306)		YEAR 283 (307)		YEAR 284 (308)		YEAR 285 (309)		YEAR 286 (310)		YEAR 287 (311)		YEAR 288 (312)		YEAR 289 (313)		YEAR 290 (314)		YEAR 291 (315)		YEAR 292 (316)		YEAR 293 (317)		YEAR 294 (318)		YEAR 295 (319)		YEAR 296 (320)		YEAR 297 (321)		YEAR 298 (322)		YEAR 299 (323)		YEAR 300 (324)		YEAR 301 (325)		YEAR 302 (326)		YEAR 303 (327)		YEAR 304 (328)		YEAR 305 (329)		YEAR 306 (330)		YEAR 307 (331)		YEAR 308 (332)		YEAR 309 (333)		YEAR 310 (334)		YEAR 311 (335)		YEAR 312 (336)		YEAR 313 (337)		YEAR 314 (338)		YEAR 315 (339)		YEAR 316 (340)		YEAR 317 (341)		YEAR 318 (342)		YEAR 319 (343)		YEAR 320 (344)		YEAR 321 (345)		YEAR 322 (346)		YEAR 323 (347)		YEAR 324 (348)		YEAR 325 (349)		YEAR 326 (350)		YEAR 327 (351)		YEAR 328 (352)		YEAR 329 (353)		YEAR 330 (354)		YEAR 331 (355)		YEAR 332 (356)		YEAR 333 (357)		YEAR 334 (358)		YEAR 335 (359)		YEAR 336 (360)		YEAR 337 (361)		YEAR 338 (362)		YEAR 339 (363)		YEAR 340 (364)		YEAR 341 (365)		YEAR 342 (366)		YEAR 343 (367)		YEAR 344 (368)		YEAR 345 (369)		YEAR 346 (370)		YEAR 347 (371)		YEAR 348 (372)		YEAR 349 (373)		YEAR 350 (374)		YEAR 351 (375)		YEAR 352 (376)		YEAR 353 (377)		YEAR 354 (378)		YEAR 355 (379)		YEAR 356 (380)		YEAR 357 (381)		YEAR 358 (382)		YEAR 359 (383)		YEAR 360 (384)		YEAR 361 (385)		YEAR 362 (386)		YEAR 363 (387)		YEAR 364 (388)		YEAR 365 (389)		YEAR 366 (390)		YEAR 367 (391)		YEAR 368 (392)		YEAR 369 (393)		YEAR 370 (394)		YEAR 371 (395)		YEAR 372 (396)		YEAR 373 (397)		YEAR 374 (398)		YEAR 375 (399)		YEAR 376 (400)		YEAR 377 (401)		YEAR 378 (402)		YEAR 379 (403)		YEAR 380 (404)		YEAR 381 (405)		YEAR 382 (406)		YEAR 383 (407)		YEAR 384 (408)		YEAR 385 (409)		YEAR 386 (410)		YEAR 387 (411)		YEAR 388 (412)		YEAR 389 (413)		YEAR 390 (414)		YEAR 391 (415)		YEAR 392 (416)		YEAR 393 (417)		YEAR 394 (418)		YEAR 395 (419)		YEAR 396 (420)		YEAR 397 (421)		YEAR 398 (422)		YEAR 399 (423)		YEAR 400 (424)		YEAR 401 (425)		YEAR 402 (426)		YEAR 403 (427)		YEAR 404 (428)		YEAR 405 (429)		YEAR 406 (430)		YEAR 407 (431)		YEAR 408 (432)		YEAR 409 (433)		YEAR 410 (434)		YEAR 411 (435)		YEAR 412 (436)		YEAR 413 (437)		YEAR 414 (438)		YEAR 415 (439)		YEAR 416 (440)		YEAR 417 (441)		YEAR 418 (442)		YEAR 419 (443)		YEAR 420 (444)		YEAR 421 (445)		YEAR 422 (446)		YEAR 423 (447)		YEAR 424 (448)		YEAR 425 (449)		YEAR 426 (450)		YEAR 427 (451)		YEAR 428 (452)		YEAR 429 (453)		YEAR 430 (454)		YEAR 431 (455)		YEAR 432 (456)		YEAR 433 (457)		YEAR 434 (458)		YEAR 435 (459)		YEAR 436 (460)		YEAR 437 (461)		YEAR 438 (462)		YEAR 439 (463)		YEAR 440 (464)		YEAR 441 (465)		YEAR 442 (466)		YEAR 443 (467)		YEAR 444 (468)		YEAR 445 (469)		YEAR 446 (470)		YEAR 447 (471)		YEAR 448 (472)		YEAR 449 (473)		YEAR 450 (474)		YEAR 451 (475)		YEAR 452 (476)		YEAR 453 (477)		YEAR 454 (478)		YEAR 455 (479)		YEAR 456 (480)		YEAR 457 (481)		YEAR 458 (482)		YEAR 459 (483)		YEAR 460 (484)		YEAR 461 (485)		YEAR 462 (486)		YEAR 463 (487)		YEAR 464 (488)		YEAR 465 (489)		YEAR 466 (490)		YEAR 467 (491)		YEAR 468 (492)		YEAR 469 (493)		YEAR 470 (494)		YEAR 471 (495)		YEAR 472 (496)		YEAR 473 (497)		YEAR 474 (498)		YEAR 475 (499)		YEAR 476 (500)		YEAR 477 (501)		YEAR 478 (502)		YEAR 479 (503)		YEAR 480 (504)		YEAR 481 (505)		YEAR 482 (506)		YEAR 483 (507)		YEAR 484 (508)		YEAR 485 (509)		YEAR 486 (510)		YEAR 487 (511)		YEAR 488 (512)		YEAR 489 (513)		YEAR 490 (514)		YEAR 491 (515)		YEAR 492 (516)		YEAR 493 (517)		YEAR 494 (518)		YEAR 495 (519)		YEAR 496 (520)		YEAR 497 (521)		YEAR 498 (522)		YEAR 499 (523)		YEAR 500 (524)		YEAR 501 (525)		YEAR 502 (526)		YEAR 503 (527)		YEAR 504 (528)		YEAR 505 (529)		YEAR 506 (530)		YEAR 507 (531)		YEAR 508 (532)		YEAR 509 (533)		YEAR 510 (534)		YEAR 511 (535)		YEAR 512 (536)		YEAR 513 (537)		YEAR 514 (538)		YEAR 515 (539)		YEAR 516 (540)		YEAR 517 (541)		YEAR 518 (542)		YEAR 519 (543)		YEAR 520 (544)		YEAR 521 (545)		YEAR 522 (546)		YEAR 523 (547)		YEAR 524 (548)		YEAR 525 (549)		YEAR 526 (550)		YEAR 527 (551)		YEAR 528 (552)		YEAR 529 (553)		YEAR 530 (554)		YEAR 531 (555)		YEAR 532 (556)		YEAR 533 (557)		YEAR 534 (558)		YEAR 535 (559)		YEAR 536 (560)		YEAR 537 (561)		YEAR 538 (562)		YEAR 539 (563)		YEAR 540 (564)		YEAR 541 (565)		YEAR 542 (566)		YEAR 543 (567)		YEAR 544 (568)		YEAR 545 (569)		YEAR 546 (570)		YEAR 547 (571)		YEAR 548 (572)		YEAR 549 (573)		YEAR 550 (574)		YEAR 551 (575)		YEAR 552 (576)		YEAR 553 (577)		YEAR 554 (578)		YEAR 555 (579)		YEAR 556 (580)		YEAR 557 (581)		YEAR 558 (582)		YEAR 559 (583)		YEAR 560 (584)		YEAR 561 (585)		YEAR 562 (586)		YEAR 563 (587)		YEAR 564 (588)		YEAR 565 (589)		YEAR 566 (590)		YEAR 567 (591)		YEAR 568 (592)		YEAR 569 (593)		YEAR 570 (594)		YEAR 571 (595)		YEAR 572 (596)		YEAR 573 (597)		YEAR 574 (598)		YEAR 575 (599)		YEAR 576 (600)		YEAR 577 (601)		YEAR 578 (602)		YEAR 579 (603)		YEAR 580 (604)		YEAR 581 (605)		YEAR 582 (606)		YEAR 583 (607)		YEAR 584 (608)		YEAR 585 (609)		YEAR 586 (610)		YEAR 587 (611)		YEAR 588 (612)		YEAR 589 (613)		YEAR 590 (614)		YEAR 591 (615)		YEAR 592 (616)		YEAR 593 (617)		YEAR 594 (618)		YEAR 595 (619)		YEAR 596 (620)		YEAR 597 (621)		YEAR 598 (622)		YEAR 599 (623)		YEAR 600 (624)		YEAR 601 (625)		YEAR 602 (626)		YEAR 603 (627)		YEAR 604 (628)		YEAR 605 (629)		YEAR 606 (6

KENTUCKY POWER COMPANY DERIVATION FOR 3 YEAR DSM EXPERIMENT CALCULATION OF EFFICIENCY INCENTIVE											
											Exhibit C PAGE 19C of 22
PROGRAM DESCRIPTIONS	YEAR 13 (67)	YEAR 14 (68)	YEAR 15 (69)	YEAR 16 (70)	YEAR 17 (71)	YEAR 18 (72)	YEAR 19 (73)	YEAR 20 (74)	YEAR 21 (75)	YEAR 22 (76)	YEAR 23 (77)
	(61X133)	(61X134)	(61X135)	(71X136)	(71X137)	(81X138)	(81X139)	(91X140)	(91X141)	(101X142)	(101X143)
	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half
RESIDENTIAL PROGRAMS											
Energy Fitness	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Targeted Energy Efficiency											
- All Electric	\$0	\$9,189	\$9,073	\$9,189	\$10,811	\$13,436	\$13,282	\$16,253	\$20,033	\$19,221	\$7,102
- Non-All Electric	\$997	\$3,454	\$1,234	\$1,357	\$3,762	\$1,912	\$1,419	(\$224)	(\$857)	(\$825)	(\$391)
Compact Fluorescent Bulb	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
High - Efficiency Heat Pump											
- Resistance Heat	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
- Non Resistance Heat	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
High - Efficiency Heat Pump											
- Mobile Home	\$3,564	\$8,539	\$10,359	\$8,539	\$13,659	\$13,579	\$19,039	\$27,615	\$33,491	\$28,043	\$11,354
Mobile Home New Construction ***											
- Heat Pump	\$10,120	\$10,597	\$12,047	\$9,816	\$11,490	\$4,462	\$13,274	\$9,393	\$8,649	\$8,554	\$4,729
- Air Conditioner	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Modified Energy Fitness	\$20,409	\$27,671	\$21,899	\$21,152	\$18,664	\$24,935	\$34,769	\$9,456	\$8,151	\$4,115	\$2,038
High Efficiency Heat Pump											
- Resistance Heat Replacement				\$13,387	\$30,120	\$48,376	\$74,108	\$12,030	\$9,453	\$3,458	\$1,572
- Heat Pump Replacement				\$0	\$0	\$0	\$0	\$25,033	\$22,698	\$18,218	\$12,664
Energy Education for Student Program (NEED)				\$0	\$5,627	\$2,430	\$5,274	\$1,613	\$1,648	\$1,694	\$1,268
Community Outreach Program (CFL)				\$4,621	\$14,062	\$13,194	\$10,813	\$9,871	\$9,386	\$11,138	\$7,871
Residential Efficient Products											
- Compact Fluorescent Lamp (CFL)							\$0	\$24,107	\$17,338	\$43,759	\$35,160
- Specialty Bulbs							\$0	\$0	\$0	\$0	\$5
- LED Lights							\$0	\$0	\$0	\$0	(\$177)
HVAC Diagnostic & Tune-Up											
- Air Conditioner							\$0	\$84	\$220	(\$788)	(\$418)
- Heat Pump							\$319	\$3,300	\$5,007	(\$253)	(\$137)
Residential Load Management											
- Air Conditioner								\$0	\$0	\$0	\$0
- Water Heating								\$0	\$0	\$0	\$0
TOTAL RESIDENTIAL PROGRAMS	\$41,050	\$59,650	\$52,412	\$68,091	\$108,395	\$120,324	\$172,315	\$135,031	\$136,237	\$129,304	\$82,920
*** Participants since 09/01/08											
COMMERCIAL PROGRAMS											
Smart Audit - Class 1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
- Class 2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Smart Financing - Existing Building	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Smart Financing - New Building	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Commercial A/C & Heat Pump Program											
- Air Conditioner Replacement							\$0	\$1	\$2	(\$29)	(\$465)
- Heat Pump Replacement							\$0	\$872	\$349	(\$92)	(\$147)
HVAC Diagnostic & Tune-Up											
- Air Conditioner							\$0	\$7	\$326	(\$163)	(\$176)
- Heat Pump							\$30	\$532	\$2,601	(\$20)	(\$16)
Commercial Incentive							\$0	\$0	\$42,852	(\$5,810)	(\$12,831)
Commercial Load Management											
- Air Conditioner								\$0	\$0	\$0	\$0
- Water Heating								\$0	\$0	\$0	\$0
TOTAL COMMERCIAL PROGRAMS	\$0	\$0	\$0	\$0	\$0	\$0	\$30	\$1,412	\$46,130	(\$6,114)	(\$13,635)
INDUSTRIAL PROGRAMS - (w/Est. Out-Ofs Removed)											
Smart Audit - Class 1	\$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
Smart Financing - General	\$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
TOTAL INDUSTRIAL PROGRAMS	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
ANNUAL SHARED SAVINGS (\$)	\$41,050	\$59,650	\$52,412	\$68,091	\$108,395	\$120,324	\$172,345	\$136,943	\$162,367	\$123,190	\$69,285

KENTUCKY POWER COMPANY		Exhibit C		
FORECAST OF 2012 KENTUCKY RETAIL ENERGY SALES IN KWH		PAGE 22 of	22	
FOR RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTORS				
PROGRAM YR 17 - 2012				
LINE NO.	YEAR	RESIDENTIAL SECTOR	COMMERCIAL SECTOR	INDUSTRIAL SECTOR
1	TOTAL ULTIMATE SALES (KWH) *	1,175,000,000	729,000,000	1,623,600,000
2	LESS NON-METERED **	7,050,000	4,374,000	9,741,600
3	TOTAL ESTIMATED RETAIL KWH SALES	1,167,950,000	724,626,000	1,613,858,400
4	LESS OPT - OUT CUSTOMERS KWH	0	0	0
5	KWH BEFORE LOST REVENUE IMPACTS	1,167,950,000	724,626,000	1,613,858,400
6	LESS LOST REVENUE IMPACTS ***	11,574,691	375,357	0
7	ADJUSTED KWH BY SECTOR	1,156,375,309	724,250,643	1,613,858,400
8	LINE 7/LINE 1	98.4%	99.3%	99.4%
LINE NO.	PROGRAM YR 17 (3rd QTR)	RESIDENTIAL SECTOR	COMMERCIAL SECTOR	INDUSTRIAL SECTOR
9	TOTAL ULTIMATE SALES (KWH) *	544,500,000	370,600,000	781,600,000
10	LINE 8	98.4%	99.3%	99.4%
11	ADJUSTED KWH BY SECTOR	535,788,000	368,005,800	776,910,400
LINE NO.	PROGRAM YR 17 (4th QTR)	RESIDENTIAL SECTOR	COMMERCIAL SECTOR	INDUSTRIAL SECTOR
12	TOTAL ULTIMATE SALES (KWH) *	630,500,000	358,400,000	842,000,000
13	LINE 8	98.4%	99.3%	99.4%
14	ADJUSTED KWH BY SECTOR	620,412,000	355,891,200	836,948,000
*	SOURCE: 2012 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 2009.			
***	LOST REVENUE IMPACTS			
	Page 18A of 20, Column 6 - TOTAL RESIDENTIAL PROGRAMS	5,327,487	62,826	-
	Page 18B of 20, Column 6 - TOTAL RESIDENTIAL PROGRAMS	2,888,920	117,609	-
	Page 18C of 20, Column 6 - TOTAL RESIDENTIAL PROGRAMS	3,358,284	194,922	-
	TOTAL	11,574,691	375,357	-