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May 15, 2013

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RE: *In the Matter of the Annual Portfolio Status Report Under Rule 4901:1-39-05(C), Ohio Administrative Code, by Ohio Power Company,* Case No. 13-1182-EL-EEC.

Dear Ms. McNeal:

Ohio Power Company ("OPCo," "the Company" or "AEP Ohio") submits the enclosed 2012 Portfolio Status Report, pursuant to Rule 4901:1-39-05(C), Ohio Administrative Code (OAC).

In Case Nos. 11-5568-EL-POR, et al., the Commission approved the Stipulation and Recommendation on March 21, 2012, and granted the requested waiver of Rule 4901:1-39-05(C), OAC, such that AEP Ohio may file its annual portfolio status report on May 15 instead of March 15 during each year of the EE/PDR Action Plan in order to provide sufficient time for adequate evaluation, measurement and verification of plan results.

Please note that the Report is broken into three volumes, due to the size of the supporting documentation. Volume I contains the narrative body of the Report; the supporting affidavit of Jon Williams (the compliance affidavit required by Rule 4901:1-39-05(C)(1)(c), OAC); and Report Appendices A through E. Volume II contains Report Appendices F through J and Volume III contains the remaining Report Appendices K through O.

Thank you for your attention to this matter.

Respectfully Submitted,

/s/ Steven T. Nourse
Steven T. Nourse

2012 PORTFOLIO STATUS REPORT OF THE ENERGY EFFICIENCY AND PEAK DEMAND RESPONSE PROGRAMS

VOLUME I

2012 PORTFOLIO STATUS REPORT

JON WILLIAMS' AFFIDAVIT

APPENDICES A – E

A unit of American Electric Power

AEP Ohio
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Gahanna, Ohio 43230
May 15, 2013

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INTRODUCTION

In Case No. 08-888-EL-ORD, the Public Utilities Commission of Ohio ("the Commission") approved Rules for Energy Efficiency and Peak Demand Reduction Programs of electric utilities ("the Rules"). These Rules first became effective December 10, 2009. In connection with Ohio Senate Bill 221 (S.B. 221), the Rules require that each electric utility in the Commission's jurisdiction implement energy efficiency and peak demand reduction programs and file an annual Portfolio Status Report, originally due March 15 of each year but extended to May 15 in the March 21, 2012 order in Case Nos. 11-5568-EL-POR and 11-5569-EL-POR.

Per Ohio Administrative Code (OAC) 4901:1-39-05(C), these Status Reports are required to address all approved energy efficiency and peak demand reduction (EE/PDR) programs' performance over the prior calendar year. AEP Ohio ("the Company") filed a Program Portfolio Plan for 2012-2014 under Case Nos. 11-5568-EL-POR and 11-5569-EL-POR, which the Commission approved March 21, 2012.

AEP Ohio submits this 2012 Portfolio Status Report in compliance with the above-cited Rules. In accordance with OAC 4901:1-39-05(C)(2)(b), AEP Ohio has contracted with Navigant Consulting, Inc. ("Navigant") to review the Company's programs; perform the impact and process evaluations; and provide evaluation, measurement, and verification reports.

This report is divided into three major sections: The first section covers how the Company has met all the requirements in the Rules in 2012 and achieved its S.B. 221 benchmark requirements. The second section reviews each of AEP Ohio's EE/PDR programs and how they have performed this past year. The third and final section contains the Company's recommendations going forward for each of the programs.

Attached with this report are 15 appendices: Appendix A lists individual measures installed, at a detailed level, under each of the Company's EE/PDR programs. Appendices B through O contain evaluation reports from Navigant covering each EE/PDR program, the Company's large business solution providers, and transmission and distribution projects related to EE/PDR.

Demonstration of Compliance

Benchmark Updates

AEP Ohio filed its Initial Benchmark Report on February 8, 2010[1] and has made regular updates in its intervening Portfolio Status Reports for both energy usage and peak demand. The Company has adjusted both its gross energy sales and peak demand to include the impacts of mercantile[2] customers' energy efficiency resource commitments. These adjusted figures are shown in the tables below.

The annual benchmark target is calculated as the average of the prior three years' load, multiplied by yearly statutory benchmark requirements from S.B. 221: 0.8 percent incremental energy reduction and 3.25 percent cumulative demand reduction in 2012.

AEP Ohio made adjustments for Economic Growth as noted in the Company's ESP I filing (Case Nos. 08-917-EL-SSO and 08-918-EL-SSO) in the section titled "Baselines and Benchmarks." In its prior filings in Case Nos. 10-318-EL-EEC and 10-321-EL-EEC; Case Nos. 11-1299-EL-EEC and 11-1300-EL-EEC; and Case No. 12-1537-EL-EEC, the adjustments for Economic Growth applied towards the 2009, 2010, and 2011 Benchmarks were based on the load associated with 1) the special electric service agreement with Ormet Primary Aluminum Corporation, and 2) a group of customers who were recipients of the Rate Stabilization Plan economic development grants. When calculating the baseline adjustment in those prior filings, AEP Ohio unintentionally did not include the load associated with the Reasonable Arrangements with Timken, Eramet, and Globe Metallurgical that make up the Economic Development Rider. For purposes of this compliance filing for the 2012 Benchmark adjustments for Economic Growth (and the Company's intention going forward), the Company has only included the associated kWh captured in the Economic Development Rider. Although the kWh of the recipients of the Rate Stabilization Plan grants are permissible, the Company is excluding them because they are 1) administratively burdensome to compile for inclusion, 2) the incremental economic development load associated with those grant recipients is only a small portion of the total applicable kWh and in turn represents a minimal change in the Benchmarks, and 3) AEP Ohio doubts that the Commission's original ruling intended for the baseline exclusion to have an infinite applicable life.

Figure 1 below shows the calculation of the adjusted 2012 benchmark for energy usage savings: 340.7 gigawatt-hours (GWh). Figure 2 shows the calculation for the adjusted 2012 benchmark for peak demand savings: 286.9 megawatts (MW).[3]

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[1] *In the Matter of the Initial Benchmark Report of Columbus Southern Power Company and Ohio Power Company*, Case No. 10-153-EL-EEC, February 8, 2010.

[2] Mercantile customers are defined as customers consuming electricity for non-residential use, who either (1) use more than 700 megawatt-hours per year, or (2) are part of a national account with multiple facilities in one or more states. See Ohio Revised Code § 4928.01(A)(19).

[3] Peak demand is defined as the average of the system's top 100 hours of demand in a calendar year.

FIGURE 1: ADJUSTED ENERGY USAGE BASELINES

Year	Actual Retail Sales	Econ. Devel. Adj.	2009-2011 Merc. Savings	2012 Merc. Savings	Adjusted Retail Sales
2009	45,614.4	(4,104.9)	128.1	21.1	41,658.7
2010	47,439.2	(4,029.9)	178.7	28.3	43,616.4
2011	48,433.3	(6,166.1)	195.5	32.4	42,495.1
				Three-Year Average:	**42,590.0**
				Benchmark Rate:	**0.8%**
				2012 Benchmark Target:	**340.7**

All figures are in gigawatt-hours.

FIGURE 2: ADJUSTED PEAK DEMAND BASELINES

Year	Coincident Peak Demand	Econ. Devel. Adj.	2009-2011 Merc. Savings	2012 Merc. Savings	Adjusted Peak Demand
2009	8,734.1	(378.2)	17.0	2.8	8,375.8
2010	9,258.0	(480.0)	26.9	4.1	8,809.0
2011	9,883.5	(621.8)	30.5	4.9	9,297.0
				Three-Year Average:	**8,827.3**
				Benchmark Rate:	**3.25%**
				2012 Benchmark Target:	**286.9**

All figures are in megawatts.

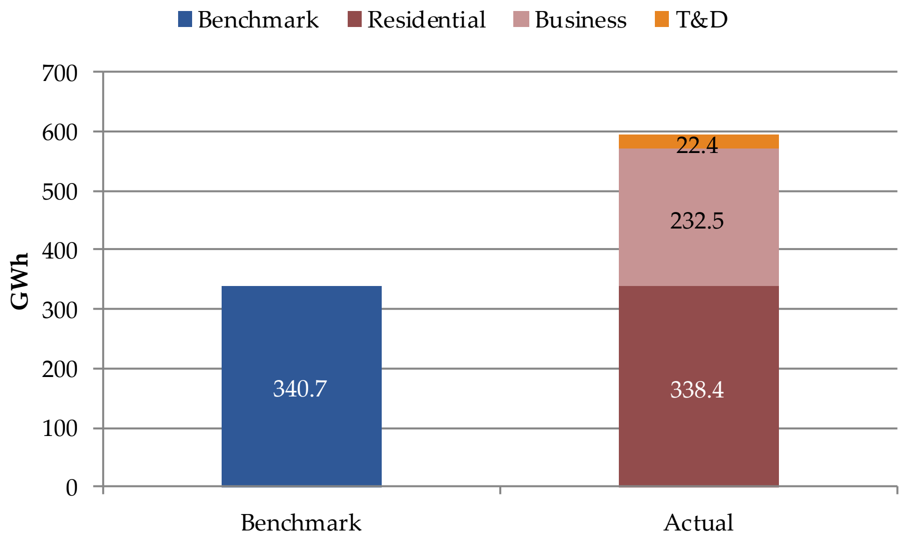
ACHIEVED SAVINGS

The Company has met its EE/PDR benchmarks for both energy and demand savings for 2012, with all of AEP Ohio's EE/PDR programs saving a combined 571.0 GWh of energy.[4]

AEP Ohio is also permitted to add savings resulting from transmission and distribution (T&D) projects. (See page 24.) In 2012, the Company saved 22.4 GWh of energy from T&D projects, yielding a grand total of 593.3 GWh, well above the benchmark target. Figure 3 below illustrates the breakout of these savings between residential programs, business programs, and T&D improvements. The majority of energy savings in 2012 came from residential programs (57.0 percent). Business programs and T&D projects accounted for 39.2 percent and 3.8 percent of the total, respectively.

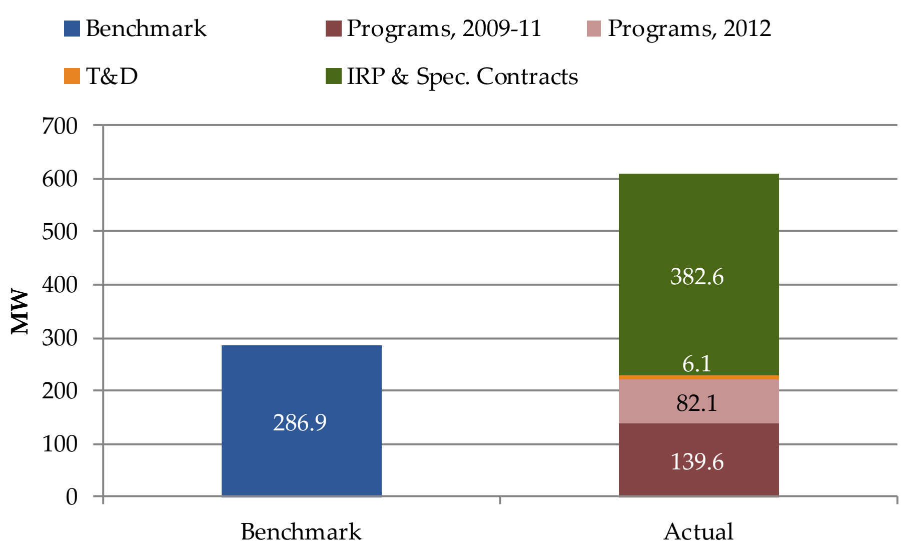
[4] All achieved energy and demand savings figures in this report are *ex-ante*.

FIGURE 3: ACHIEVED ANNUAL ENERGY SAVINGS, BY SEGMENT, 2012



The Company's portfolio yielded 82.1 MW in permanent peak demand reductions. The cumulative permanent peak demand reduction impact of programs from 2009 through 2012 was 221.7 MW. Combined with other sources of demand reduction, including T&D projects (6.1 MW) and interruptible tariffs (IRP) and special contracts (382.6 MW), AEP Ohio reduced peak demand by 610.4 MW in total.

FIGURE 4: ACHIEVED PEAK DEMAND SAVINGS, BY SOURCE, 2012



COST EFFECTIVENESS

In general, the Company's portfolio of EE/PDR programs has been cost-effective. There are four common tests to determine cost effectiveness, differing in which costs and benefits are included and for whom:

- **Total Resource Cost** determines whether a program is beneficial for both the utility and its ratepayers in net. Factors include avoided supply costs (the costs of generating electricity the utility may forego), utility administrative costs, participant costs (out-of-pocket costs customers must cover to participate in the program), and tax credits.
- **Participant Cost** determines whether a program is beneficial for those customers who take advantage. Factors include net reductions in utility bills, incentives paid, participant costs, and tax credits.
- **Ratepayer Impact** measures the effects a program may have in electric rates through changes in revenues and operating costs. Factors include avoided supply costs, payments participants may make to the utility (if any), utility administrative costs, incentives paid to participants, and foregone sales revenues from lower usage.
- **Utility Cost** determines whether a program is beneficial for the utility operating it. Factors include avoided supply costs, payments participants may make to the utility (if any), administrative costs, and incentive costs.

Figure 5 below shows benefit-cost ratios for each of the cost effectiveness tests listed above. These ratios are based on *ex-ante* savings estimates. A ratio higher than one indicates that net benefits are greater than net costs, and the portfolio is beneficial by the test's standards.

FIGURE 5: PORTFOLIO *EX-ANTE* BENEFIT-COST RATIOS, 2012

Test	Benefit-Cost Ratio
Total Resource Cost	1.8
Participant Cost	3.2
Ratepayer Impact	0.6
Utility Cost	3.8

Total resource benefit-cost ratios for each individual program are shown in Figure 6 below. Again, a ratio greater than one indicates that the program is beneficial in net. Note that the ratios presented in this table are based on *ex-ante* savings estimates and may differ from the *ex-post* figures contained in Appendices B through M.

FIGURE 6: TOTAL RESOURCE COST RATIOS, 2012

Program	Benefit-Cost Ratio
Efficient Products	4.9
Appliance Recycling	3.4
e³smart	2.6
In-Home Energy	0.6
Community Assistance	0.8
ENERGY STAR New Homes	0.4
Home Energy Reports	1.9
Prescriptive	1.4
Custom	1.6
Self-Direct	2.1
Business New Construction	1.9
Express	1.8

Banking of Energy Efficiency Achievements

In accordance with the Order and Stipulation in Case Nos. 09-1089-EL-POR and 09-1090-EL-POR, AEP Ohio presents its banking methodology. The Company reserves the right to bank all achievement exceeding the benchmark. At a minimum for 2009-12, the Company is banking all achievement in excess of benchmark, shown in Figure 7 below.

FIGURE 7: BANKING OF ENERGY EFFICIENCY ACHIEVEMENTS

Year	GWh
2009	141.9
2010	103.3
2011	148.7
2012	252.6
Total	**646.6**

Summary

In 2012, AEP Ohio met its benchmark targets for both energy usage and peak demand. The Company's EE/PDR portfolio as a whole was cost effective.

PROGRAM ACTIVITY DESCRIPTIONS

This section of the report discusses program activity from January 1 through December 31, 2012. AEP Ohio operated twelve programs this year, not counting T&D improvements:

Residential Programs

- Efficient Products
- Appliance Recycling
- *e*^{3}*smart*^{SM}
- In-Home Energy
- Community Assistance
- ENERGY STAR® New Homes
- Home Energy Reports

Business Programs

- Prescriptive
- Custom
- Self-Direct
- Business New Construction
- Express

Figure 8 summarizes each program's direct costs to AEP Ohio; the number of participants or units sold; and estimated energy and demand savings. Descriptions of each program follow after.

FIGURE 8: SUMMARY OF DIRECT PROGRAM COSTS AND BENEFITS, 2012

Program	Customer Incentives	Third Party Costs	Utility Admin. Costs*	Total Costs	Number of Participants / Units	Coincident Peak MW Saved	Annual GWh Saved
Efficient Products	$8,046	$1,946	$817	$10,809	4,341,719	20.7	229.9
Appliance Recycling	2,019	607	216	2,842	15,643	3.8	27.3
e[3] *smart*[SM]	572	290	53	915	31,698	0.8	6.1
In-Home Retrofits	1,811	1,268	294	3,374	11,384	1.2	8.3
Community Assistance	5,749	1,030	691	7,470	8,579	1.1	11.6
ENERGY STAR® New Homes	1,396	582	197	2,175	796	0.6	2.2
Home Energy Reports	0	1,111	134	1,245	138,605	6.9	53.2
Prescriptive	11,914	3,854	1,406	17,175	2,643	30.2	142.3
Custom	1,651	922	482	3,055	192	3.4	26.0
Self-Direct	1,658	950	280	2,888	227	5.7	35.9
Business New Construction	1,700	418	302	2,419	94	5.3	19.3
Express	1,413	511	247	2,171	556	2.2	9.0
Demand Response	0	0	5	5			
Retrocommissioning	0	152	48	201			
Continuous Improvement	0	197	38	235			
Data Center	0	0	8	8			
Programs Total	**$37,928**	**$13,838**	**$5,219**	**$56,985**	**4,552,136**	**82.1**	**571.0**

Education and Media	6,837
Pilot Programs	294
Grand Total	**$64,116**

*Programs' utility administrative costs include allocated departmental costs.
All cost figures are in thousands of dollars. Columns may not total due to rounding.

RESIDENTIAL PROGRAMS

EFFICIENT PRODUCTS

This program provides incentives and marketing support through retailers to encourage purchases of ENERGY STAR®-approved lighting and appliances. There are two main facets to the Efficient Products program: The first is customer incentives and rebates at the point of sale. There are over 350 participating retailers in the Company's service territory equipped to offer instant rebates on certain ENERGY STAR®-approved lighting devices. Other retailers without the capability to offer electronic markdowns may also offer retailer-reimbursed rebates on these same approved lighting products. Appliance products include refrigerators, freezers, clothes washers, dehumidifiers, and heat pump water heaters. While not ENERGY STAR®-rated, AEP Ohio also offers rebates for high-efficiency electric water heaters. These rebates and incentives range from an average $1.30 for CFLs to $300 for heat pump water heaters.

As the available technologies and ENERGY STAR® standards continue to evolve over time, AEP Ohio will maintain and regularly update the list of qualifying devices.

In addition, AEP Ohio offers marketing support to retailers. These services include in-store signage to promote efficient devices and training for sales associates to help them understand the benefits of energy-efficient lights and appliances.

Figure 9 below shows the number of products for which AEP Ohio provided incentives or distributed for free in 2012. Please see Appendix A for a detailed measure listing.

FIGURE 9: EFFICIENT PRODUCTS INCENTED OR PROVIDED, 2012

Product	Number	MWh	kW
CFLs	4,283,008	222,366.0	19,630.0
LEDs	27,170	2,014.9	177.9
Appliances	31,541	5,547.9	894.5
Total	**4,341,719**	**229,928.8**	**20,702.5**

A new program component in 2012, retailers now also receive incentives for selling high-efficiency televisions. Televisions that are at least 20 percent more efficient than required in the ENERGY STAR 5.3 standard are eligible for a $25 restocking incentive.

The Company's 2012-2014 EE/PDR Action Plan ("Action Plan") goals for 2012 were 125.5 GWh of savings in energy consumption, and 11.8 MW of savings from peak demand. Figure 10 below shows the Efficient Products program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 10: EFFICIENT PRODUCTS PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	229.9	125.5	183.2%
Demand Savings (MW)	20.7	11.8	174.8%
Program Costs ($M)	10.8	11.9	90.9%
First Year Cost per kWh Saved (¢)	4.7	9.5	

The Efficient Products program greatly exceeded its goals for both energy and demand savings for 2012. The program saved 229.9 GWh of energy, 83 percent more than originally planned. The program also reduced peak demand by 20.7 MW, 75 percent more than planned. The program came in slightly below budget last year at approximately $10.8 million, yielding an average first year cost of 4.7 cents per kWh saved.

Appliance Recycling

This program seeks to remove functioning but inefficient refrigerators and freezers from the power grid. Often, older appliances, especially refrigerators, remain in use as second or "backup" appliances—still plugged in and using an inordinate amount of energy. By removing these high-usage appliances from the grid, the Company reduces unnecessary load and usage. This program's primary focus is on these second refrigerators, but recycling for stand-alone freezers is also available. In return for recycling appliances, AEP Ohio paid the customer an incentive of $50 per unit in 2012.

After a competitive bidding process in 2009, AEP Ohio contracted with JACO Environmental, Inc. (JACO) to administer this program. AEP Ohio extended the contract for the 2012-2014 Plan period. Customers may enroll in the program either through the Company's website or over the phone and schedule an at-home pickup. (As a customer service, the program also allows customers to recycle windowsill room air conditioners if picked up at the same time as a refrigerator or freezer. Savings from air conditioners are not included in program totals.) Figure 11 below shows the number of appliances were recycled through this program in 2012. Please see Appendix A for a detailed measure listing.

FIGURE 11: APPLIANCES RECYCLED, 2012

Appliance	Number	MWh	kW
Refrigerators	12,139	21,139.6	2,983.0
Freezers	3,381	6,114.7	824.4
Total	**15,520**	**27,254.3**	**3,807.4**

Note: This table does not include 123 room air conditioners collected in 2012.

The Company's Action Plan goals for 2012 were 19.0 GWh of savings in energy consumption and 3.7 MW of savings from peak demand. Figure 12 below shows the Appliance Recycling program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 12: APPLIANCE RECYCLING PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	27.3	19.0	143.7%
Demand Savings (MW)	3.8	3.7	103.9%
Program Costs ($M)	2.8	2.8	102.8%
First Year Cost per kWh Saved (¢)	10.4	14.6	

The Appliance Recycling program exceeded energy savings goals for 2012 and met demand savings goals. The program saved 27.3 GWh of energy, 43.7 percent more than originally planned. Demand savings were in line with the goal of 3.7 MW. On average, the program cost 10.4 cents per first year kWh saved.

e³smart

AEP Ohio offers an educational program covering energy efficiency for students in grades 5 through 9 in schools throughout the Company's service territory. It includes a curriculum designed to meet state and national science standards for this age group, teacher training, and supplies for classroom instruction. Students served by the program will learn about different forms of energy, their sources, and how electric power reaches their homes. Students are then given a box of energy-efficient devices—CFLs, LED night lights, low-flow showerheads, faucet aerators, weather-stripping, electric outlet gaskets, and door sweeps—to install at home with their parents' or caretakers' supervision. Kits also include tools students can use to measure energy use and efficiency losses.

In the 2011-2012 school year, 31,698 students participated in *e³smart*. Figure 13 below shows how many of which items were included in their kits. Please see Appendix A for a detailed measure listing.

FIGURE 13: ITEMS INCLUDED IN *E³SMART* KITS, 2012

Item	Number	MWh	kW
CFLs	55,391	3,384.4	298.8
LED Night Lights	14,710	309.9	35.3
Faucet Aerators	14,353	351.6	43.9
Low-Flow Showerheads	5,673	1,158.0	148.1
Door Sweeps	10,668	53.3	99.6
Outlet Gaskets	10,572	52.9	98.7
Weather-Stripping	10,295	51.5	96.1
Hot Water Temp. Setback	5,471	722.2	0.0
Total	**127,133**	**6,083.9**	**820.4**

AEP Ohio's Action Plan goals for 2012 were 7.1 GWh of savings in energy consumption and 1.5 MW of savings from peak demand. Figure 14 below shows the *e³smart* program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 14: *E³SMART* PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	6.1	7.1	86.1%
Demand Savings (MW)	0.8	1.5	56.1%
Program Costs ($M)	0.9	1.1	86.3%
First Year Cost per kWh Saved (¢)	15.0	15.0	

The *e³smart* program did not meet its energy or demand savings goals for 2012. The program saved 6.1 GWh of energy or 86 percent of goal. Peak demand was reduced by 0.8 MW or 56 percent of goal. On average, the program cost 15.0 cents per first year kWh of energy saved.

In-Home Energy

This program takes a long-term approach to energy efficiency by helping residential customers analyze and reduce their energy use from a whole-house perspective, identifying inefficiencies, and offering appropriate remedies.

AEP Ohio offers three levels of service to customers: The least involved, *Online Energy Checkups*, is a free online tool available on AEP Ohio's website customers may use to quickly identify their home energy costs, receive recommendations on how to save, and learn how to qualify for a kit of free energy-saving items. We provided 4,070 kits to Energy Checkup participants in 2012. Another option, *In-Home Energy Assessments*, includes an in-home visit, visual inspection, prioritized suggestions for efficiency improvements, and installation of several energy-saving devices, such as CFLs, programmable thermostats, or low-flow showerheads, all at a subsidized price of $25. In 2012, 3,784 customers had In-Home Assessments. The most thorough service available is the *In-Home Energy Audit*, which provides a more comprehensive house inspection and a blower door test to find air leaks at a subsidized price. In 2012, 559 customers had In-Home Audits. (In 2012, this third option's availability was limited to customers with all-electric homes. See page 26 for a discussion of future expansion plans.)

In the fourth quarter of 2012, AEP Ohio added a multi-family component to the program. Program staff work with property managers in multi-family housing complexes to schedule home assessments and installations with residents. All multi-family housing is eligible to participate. This part of the program receives some marketing assistance from property manager associations around the state. In 2012, 2,971 individual units had measures installed.

Figure 15 below shows how many energy saving measures participants installed in 2012 through do-it-yourself kits provided to customers.

FIGURE 15: IN-HOME ENERGY DIRECT INSTALLATIONS, 2012

Measure	Number	MWh	kW
CFLs	81,759	4,076.0	359.8
Low-Flow Showerheads	3,271	606.4	77.4
Faucet Aerators	5,720	150.5	18.6
Pipe Insulation	2,828	136.5	13.6
LED Night Lights	9,243	201.0	24.7
Programmable Thermostats	439	56.2	0.0
Windows	3,263	66.5	89.8
Outlet Gaskets	31,056	51.8	64.7
Total	**137,579**	**5,344.9**	**648.7**

Under all three options, the Company offers rebates on selected energy efficiency improvements to make them more affordable. (5,875 participants received rebates in 2012.) Figure 16 below shows how many measures carried rebates in 2012.

FIGURE 16: IN-HOME ENERGY REBATES PROVIDED, 2012

Measure	Number	MWh	kW
Air Conditioners	1,804	431.4	257.2
Air Sealing	540	59.4	3.9
Attic Insulation	808	70.4	8.7
Ceiling Fans	23	4.2	0.6
Pin-Based CFLs	16	0.6	0.0
Ductwork	15	19.5	3.5
Energy Commutating Motors	2,612	1,337.6	142.0
Heat Pumps	615	543.2	89.5
A/C Tune-Ups	755	80.7	22.9
Shower Stops	6	1.1	0.1
Programmable Thermostats	591	276.4	0.0
Wall Insulation	303	65.5	36.8
Window Treatments	217	31.5	13.0
Total	**8,305**	**2,921.5**	**578.2**

Please see Appendix A for a detailed measure listing.

AEP Ohio's Action Plan goals for 2012 were 10.9 GWh of savings in energy consumption and 0.7 MW of savings from peak demand. Figure 17 below shows the In-Home Energy program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 17: IN-HOME ENERGY PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	8.3	10.9	75.8%
Demand Savings (MW)	1.2	0.7	174.3%
Program Costs ($M)	3.4	6.9	48.8%
First Year Cost per kWh Saved (¢)	40.8	63.4	

The In-Home Energy program did not meet its energy goals for 2012. The program saved 8.3 GWh of energy, about 76 percent of goal. Peak demand, however, was reduced by 1.2 MW, slightly over 74 percent above goal. On average, the program cost 40.8 cents per first year kWh of energy saved.

Community Assistance

This program offers energy efficiency services to those AEP Ohio customers with limited income to assist them in reducing their electric energy use and making their utility bills more manageable. Residential customers with incomes up to 200 percent of the federal poverty level are eligible to participate.[5] The

[5] In 2012, this came to roughly $46,100 per year for a family of four. See U.S. Department of Health and Human Services, "2012 HHS Poverty Guidelines," February 9, 2012, http://aspe.hhs.gov/poverty/12poverty.shtml.

program offers services similar to those of the In-Home Energy program, such as home assessments, efficient lighting, appliance replacement, health and safety repairs, and weatherization, at no cost to the customer.

In 2012, 8,579 customers participated in the Community Assistance program. Figure 18 below shows which measures were installed. Please see Appendix A for a detailed measure listing.

FIGURE 18: MEASURES INSTALLED IN THE COMMUNITY ASSISTANCE PROGRAM, 2012

Measure Category	Number	MWh	kW
Air Conditioning	260	87.6	22.6
Air Leakage	306	185.2	3.1
Ductwork	45	6.6	6.0
Hot Water	8,866	355.6	87.5
Insulation	525	52.4	77.1
Lighting	124,139	5,607.6	592.1
Window*	1	0.0	0.0
Refrigerators & Freezers	5,240	5,181.2	299.5
Smart Strips	694	77.2	0.0
Sump & Well Pumps	2	0.3	0.0
Total	**140,078**	**11,553.8**	**1,087.9**

Note: This table only includes categories with associated energy or demand savings.
*Window measures saved 4.5 kWh of energy and 4.1 watts of demand.

AEP Ohio's Action Plan goals for 2012 were 12.1 GWh of savings in energy consumption and 1.2 MW of savings from peak demand. Figure 19 below shows the Community Assistance program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 19: COMMUNITY ASSISTANCE PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	11.6	12.1	95.9%
Demand Savings (MW)	1.1	1.2	91.0%
Program Costs ($M)	7.5	9.8	76.5%
First Year Cost per kWh Saved (¢)	64.7	81.0	

The Community Assistance program did not quite meet its energy or demand goals for 2012. The program saved 11.6 GWh of energy, about 96 percent of goal. Peak demand was reduced by 1.1 MW, about 91 percent of goal. On average, the program cost 64.7 cents per first year kWh of energy saved.

ENERGY STAR® New Homes

This program seeks to effect the construction of single-family residences that meet specific ENERGY STAR® standards. Such structures can use up to 35 percent less energy than residences built to the minimum code requirements. AEP Ohio will pay incentives to participating builders of single-family residences to help offset incremental construction costs. In addition, builders receive training, marketing, and financial support, including site signage, consumer brochures, model home displays, advertising, and other consumer education tools. All new residential construction that meets standards is eligible.

AEP Ohio has agreed to share program costs with Columbia Gas in those areas served by both companies.

The Company's Action Plan goals for 2012 were 1.6 GWh of savings in energy consumption and 0.4 MW of savings from peak demand. Figure 20 below shows the Residential New Construction program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 20: RESIDENTIAL NEW CONSTRUCTION PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	2.2	1.6	137.7%
Demand Savings (MW)	0.6	0.4	158.7%
Program Costs ($M)	2.2	1.0	221.7%
First Year Cost per kWh Saved (¢)	99.9	62.1	

The Residential New Construction program exceeded both its energy savings and demand savings goals for 2012. The program saved 2.2 GWh of energy, 38 percent higher than goal. Peak demand was reduced by 0.6 MW, 59 percent higher than goal. Final program costs were more than double the 2012 Plan budget.[6] On average, this program cost almost one dollar per first year kWh of energy saved.

Home Energy Reports

This program originally targeted 125,000 high-usage customers and 25,000 low-income customers in the Company's service territory to receive a comparison mailing of how occupied homes of similar size and heating source use electricity. This is designed to spur these selected customers to save energy and use electricity more efficiently. Customers who wish to opt out of receiving these reports may call a toll-free number to do so. After these cancellations and other sources of attrition, there are currently 138,605 customers receiving reports.

AEP Ohio's Action Plan goals for 2012 were 35.1 GWh of savings in energy consumption and 4.7 MW of savings from peak demand. Figure 21 below shows the Behavioral program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

[6] In addition to the $1 million 2012 Goal, $1.6 million was carried over from the 2009-2011 EE/PDR Plan to pay for 2011 commitments.

FIGURE 21: BEHAVIORAL PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	53.2	35.1	151.5%
Demand Savings (MW)	6.9	4.7	147.7%
Program Costs ($M)	1.2	1.7	71.7%
First Year Cost per kWh Saved (¢)	2.3	4.9	

The Behavioral program exceeded both its energy savings and demand savings goals for 2012. The program saved 53.2 GWh of energy, about 52 percent higher than goal. Peak demand was reduced by 6.9 MW, 48 percent more than goal. On average, this program cost only 2.3 cents per first year kWh of energy saved, making it the least expensive active energy efficiency program that year. However, the program only has a one-year life and savings must be "re-purchased" every year.

Business Programs

Figure 22 below lists the projects completed through all the large business programs—Prescriptive, Custom, Self-Direct, and Business New Construction—in 2012. (Projects completed through the Express program are listed on page 23.) Note that a single project may involve multiple measure types. In total, there were 3,156 large business projects completed. See Appendix A for complete and detailed measure listings for each of these programs.

FIGURE 22: PROJECTS COMPLETED THROUGH LARGE BUSINESS PROGRAMS, 2012

Measure Type	Number	MWh	kW
Lighting	8,055	137,511.2	29,380.6
HVAC	243	18,761.2	7,469.0
Motors	66	5,533.2	726.6
VSDs	384	22,218.3	3,116.8
Refrigeration	350	7,236.1	977.5
Controls	680	11,572.7	585.4
Other	420	20,665.1	2,393.6
Total*	**10,198**	**223,497.8**	**44,649.6**

*Projects may include multiple measure types.

Prescriptive

This program offers fixed incentives for the installation and implementation of certain pre-approved types of energy efficient lighting; heating, ventilation, and air conditioning (HVAC) systems; variable speed drives (VSDs); motors; controls; refrigeration equipment; and compressed air systems, among other commercial- and industrial-grade equipment. Incentive amounts offered to customers range between 20 and 50 percent of the incremental cost to purchase energy-efficient equipment. All non-residential customers in AEP Ohio's service territory are eligible to participate.

The Company's Action Plan goals for 2012 were 204.0 GWh of savings in energy consumption and 34.0 MW of savings from peak demand. Figure 23 below shows the Prescriptive program's energy savings, demand savings, net program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 23: PRESCRIPTIVE PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	142.3	204.0	69.8%
Demand Savings (MW)	30.2	34.0	88.9%
Program Costs ($M)	17.2	18.6	92.3%
First Year Cost per kWh Saved (¢)	12.1	9.1	

The Prescriptive program did not meet either its energy savings or demand savings goals for 2012. The program saved 142.3 GWh of energy, about 70 percent of goal. Peak demand was reduced by 30.2 MW, about 89 percent of goal. On average, this program cost 12.1 cents per first year kWh of energy saved.

Custom

This program is for cost-effective energy efficiency improvements in existing buildings that reduce energy consumption or peak demand and have more complicated measures that are not included in the Prescriptive programs. All non-residential customers in the Company's service territory are eligible to participate. Customers work closely with their AEP Ohio account managers and other staff to determine measure eligibility and verify energy savings. Customers receive an incentive customized to the specific results of the energy savings technologies implemented. Program management will assist commercial and industrial customers with the analysis and selection of high-efficiency equipment or processes.

The Company's Action Plan goals for 2012 were 66.5 GWh of savings in energy consumption and 8.9 MW of savings from peak demand. Figure 24 below shows the Custom program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 24: CUSTOM PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	26.0	66.5	39.1%
Demand Savings (MW)	3.4	8.9	38.1%
Program Costs ($M)	3.1	8.7	35.1%
First Year Cost per kWh Saved (¢)	11.8	13.1	

The Custom program did not meet either its energy savings or demand savings goals for 2012. The program saved 26 GWh of energy, only 39 percent of goal. Peak demand was reduced by 3.4 MW, only 38 percent of goal. On average, this program cost 11.8 cents per first year kWh of energy saved.

SELF-DIRECT

This program is designed for large customers able to internally administer their own energy management initiatives. Participants design their own energy efficiency programs and submit an application documenting their energy savings. Customers may apply for inclusion in the Self-Direct program up to three years *after* implementing their energy efficiency measures. All applications are subject to approval by both AEP Ohio and the Commission. If approved, participants may either receive a one-time payment, up to 75 percent of an equivalent incentive under the Prescriptive or Custom programs, or an EE/PDR rider exemption. (Customers may not participate in any other EE/PDR programs while under such an exemption.)

Participation in this program is limited to mercantile customers. In 2012, the Company submitted 227 Self-Direct applications to the Commission.

AEP Ohio's Action Plan goals for 2012 were 20.0 GWh of savings in energy consumption and 2.5 MW of savings from peak demand. Figure 25 below shows the Self-Direct program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 25: SELF-DIRECT PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	35.9	20.0	179.4%
Demand Savings (MW)	5.7	2.5	233.4%
Program Costs ($M)	2.9	3.0	96.3%
First Year Cost per kWh Saved (¢)	8.0	15.0	

The Self-Direct program exceeded both its energy savings and demand savings goals for 2012. The program saved 35.9 GWh of energy, 79 percent above goal. Peak demand was reduced by 5.7 MW, more than twice the year's goal. On average, the program costs 8.0 cents per first year kWh of energy saved.

BUSINESS NEW CONSTRUCTION

This program targets non-residential customers who are either building new facilities or making major renovations to existing sites, encouraging building owners, designers, and architects to exceed requirements in current construction practices and codes—specifically, measures that exceed the ASHRAE/IESNA 90.1-2004 minimum requirements. The program includes incentives for the installation of high-efficiency lighting, HVAC systems, building envelopes, industrial refrigeration equipment, and other equipment and controls. The New Construction program offers three tracks: prescriptive and custom, similar to what is offered in those respective programs, plus a "whole building" approach based on building simulation modeling. All non-residential customers building new facilities are eligible to participate.

The Company's Action Plan goals for 2012 were 10.0 GWh of savings in energy consumption and 1.2 MW of savings from peak demand. Figure 26 below shows the New Construction program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 26: BUSINESS NEW CONSTRUCTION PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	19.3	10.0	193.0%
Demand Savings (MW)	5.3	1.2	431.4%
Program Costs ($M)	2.4	1.0	241.9%
First Year Cost per kWh Saved (¢)	12.5	10.0	

The Business New Construction program exceeded both its energy savings and demand savings goals for 2012. The program saved 19.3 GWh of energy, nearly twice the goal level. Peak demand was reduced by 5.3 MW, more than four times the goal level. Final program costs were more than double the 2012 Plan budget.[7] On average, this program cost 12.5 cents per first year kWh of energy saved.

EXPRESS

This program provides a streamlined, one-stop, turn-key energy efficiency service through participating local contractors. These contractors can offer a menu of services to business customers to improve their energy efficiency and lower their electric costs, such as HVAC systems, lighting, weatherization, or other business equipment. The Company pays all incentives for Express projects directly to contractors to expedite payment. Incentive levels are generally higher in this program than in the Prescriptive or Custom programs, up to 80 percent of project cost. This program is designed for small, non-mercantile business customers with annual energy consumption levels no greater than 200 MWh.

Figure 27 below shows the number of projects completed through the Express program. While HVAC and commercial refrigeration measures are also available through this program, no such measures were installed in 2012. Again, a single project may involve multiple measure types. In total, there were 556 projects completed. See Appendix A for a complete listing of installed measures.

FIGURE 27: PROJECTS COMPLETED THROUGH EXPRESS PROGRAM, 2012

Measure Type	Number	MWh	kW
CFLs	335	364.2	70.4
Delamping	137	373.0	115.8
T5/T8	3,397	7,566.6	1,962.8
Other Lighting	389	739.0	97.2
Total*	**4,258**	**9,042.8**	**2,246.1**

*Projects may include multiple measure types.

[7] In addition to the $1 million 2012 Goal, actual costs for 2012 were paid with funds transferred to Business New Construction from other business programs.

AEP Ohio's Action Plan goals for 2012 were 9.7 GWh of savings in energy consumption and 1.6 MW of savings from peak demand. Figure 28 below shows the Express program's energy savings, demand savings, program costs, and average cost per first year energy savings during calendar year 2012.

FIGURE 28: EXPRESS PROGRAM SUMMARY, 2012

	Actual	Goal	Percent of Goal
Energy Savings (GWh)	9.0	9.7	92.9%
Demand Savings (MW)	2.2	1.6	138.4%
Program Costs ($M)	2.2	3.4	64.8%
First Year Cost per kWh Saved (¢)	24.0	34.4	

The Express program partially met its energy savings and demand savings goals for 2012. The program saved 9.0 GWh of energy, just shy of its goal. Peak demand was reduced by 2.2 MW, 38 percent above goal. On average, this program cost 24.0 cents per first year kWh of first year energy saved.

Transmission and Distribution Projects

Inherent in the operation of any electric power system is the electrical resistance of its various elements, such as conductors, transformers, or regulators. The greater the distance the power must travel from generation to end use, the greater the amount of power lost in this transfer. The Ohio Revised Code allows a utility to include transmission and distribution infrastructure improvements to reduce line losses to meet benchmarks,[8] and T&D projects are a major part of the Company's plan for compliance. These projects include reconductoring, substation improvements, capacitor bank installation, and voltage regulator replacement.

- **Reconductoring** projects involve the replacement of existing wires with improved wires designed for lower losses at transmission or distribution voltages, lowering the system's resistance and the power lost over transmission to the end-user.
- **Substation improvements** typically include connecting previously unconnected T&D lines and the addition or upgrade of transformers and circuits, or the construction of altogether new substations. Such projects improve efficiency and reduce load losses by adding new transformation points closer to customers' loads. A greater portion of energy is carried in higher-voltage transmission lines than lower-voltage distribution lines.
- **Capacitor banks** reduce losses by improving system power factors closer to 100 percent.
- **Voltage regulators** assist in maintaining delivery voltage within the Commission's guidelines.

AEP Ohio had 28 distribution projects and 24 transmission projects completed in 2012 related to energy efficiency and peak demand reduction. These improvements prevented the loss of 22.4 GWh of energy

[8] Ohio Revised Code § 4928.66(A)(2)(d).

and lowered peak demand by 6.1 MW. The report in Appendix O contains a complete list of the Company's 2012 T&D projects and their estimated impacts.

RECOMMENDATIONS TO THE COMMISSION

RESIDENTIAL PROGRAMS

EFFICIENT PRODUCTS

In 2012, this program has again surpassed the Plan goal of delivered kWh savings. CFLs continue to provide the savings with LEDs beginning to increase in purchase volume. Customers continue to have positive satisfaction with the mark down amounts and knowing AEP Ohio continues to provide these savings through the program. The number of retailer locations has decreased because the goal was to involve the stores that moved product and supported the program. Going forward in 2013, CFL will continue to play a significant role, but with a new strategy regarding EISA standards. More custom CFLs will be promoted and increase shelf presence of LED lighting products. ENERGY STAR® certified appliances such as clothes washers, freezers, refrigerators, high efficiency electric water heaters and electric heat pump water heaters continue to grow. AEP Ohio recommends that the program continue as described in the Plan.

APPLIANCE RECYCLING

The refrigerator/freezer recycling program surpassed the Plan goal and customers continue to be pleased with the program. During the end of the year, we increased the incentive to $60 to insure we surpassed the year-end goal and this strategy proved successful. For 2013, the new baseline kWh will decrease and additional units will be needed to meet goal. To prepare for this increase, JACO and AEP Ohio have strengthened the marketing plan to include several promotional opportunities like "Oldest Refrigerator Pick-up" contest and the "50,000 unit Celebration" later in 2013. AEP Ohio recommends that the program continue as described in the Plan.

IN-HOME ENERGY

Mid-year, the decision was made to change contractors from CleaResult to Ecova. The transition was successful, and there were few issues that needed resolution. The goal is to be fully functional in early 2013 to meet year-end targets. To maximize energy savings, a targeted marketing effort towards high energy intensity households (all electric) will be implemented along with a new in-home audit tracking system the contractors will use. The data will be provided to AEP Ohio on the home characteristics and provide a more consistent customer friendly education component as well. Starting in 2013, the Company is coordinating with Columbia Gas to offer In-Home Audit services to homes with gas heating. AEP Ohio recommends that the program continue as described in the Plan.

COMMUNITY ASSISTANCE

The Community Assistance program entered into a new contract mid-year due to contract negotiations, which impacted the year-end results. Data requirements and necessary corrections along with learning a new tracking system slowed the agencies down slightly in 2012. However, the program still provided measures to over 8,500 households in 2012. Any customers who are enrolled in the Percentage of Income Payment Plan (PIPP), Home Weatherization Assistance Plan (HWAP) or Home Energy Assistance

Program (HEAP) are eligible to participate in the AEP Ohio's Community Assistance Program. AEP Ohio recommends that the program continue as described in the Plan.

ENERGY STAR® NEW HOMES

The program fell short of the targeted energy savings and was higher than planned on the cost per kWh. To correct the situation, new processes are being implemented to reduce the time to process incentives for the builder and record as energy savings at AEP Ohio. Efforts are also underway to increase the program’s cost effectiveness and to adjust for the new codes and standards implemented for the State of Ohio in January 2013. AEP Ohio recommends that the program continue as described in the Plan.

HOME ENERGY REPORTS

In 2012, about 150,000 customers received a report through the mail six times during the year. In addition, customers can access a secure website to track their energy usage and develop a plan to save energy. AEP Ohio recommends that the program continue as described in the Plan.

e³smart

The 2012 *e³smart* program corresponded to the 2011-2012 school year. Successes for 2012 began with excellent participation: 401 teachers from 259 schools engaged 31,698 students achieving 99 percent of the 32,000-student goal. Eighty-four (84) percent of counties served by AEP Ohio had schools that participated in the *e³smart* program. Almost half (46 percent) of the participating teachers worked in schools with 50 percent or greater free and reduced-cost lunch, and 29 percent worked in school districts located in Appalachian Ohio. Successes also included saving families 5,447 MWh of annual energy use. The main challenge for 2012 was that the survey return rates were lower than in previous years: 86 percent of teacher surveys were completed but only 56 percent of home installation surveys were received. Two changes may have contributed: there was a transition between project managers at Ohio Energy Project just after teacher trainings were completed, and a computer-based survey option was introduced. AEP Ohio recommends that the program continue as described in the Plan.

AEP Ohio received the 2012 MEEA Inspiring Energy Efficiency Education Award, and in the 2012-2013 school year, Columbia Gas of Ohio began sharing costs and co-delivering energy efficiency education to schools in overlapping service areas.

BUSINESS PROGRAMS

PRESCRIPTIVE

The Prescriptive program began June 1, 2009, focused in the first year on prescriptive lighting only. In addition and according to the Plan, AEP Ohio expanded the list of prescriptive measures in 2010 under this program beyond lighting, to include HVAC, motors, drives and other cost effective measures to simplify and market this program effectively. Over 200 prescriptive measures are currently offered. AEP Ohio recommends that the program continue as described in the Plan.

CUSTOM

The Custom program began June 1, 2009 and 2010 showed a significant increase in customer participation. No changes are recommended to the Custom program. The Custom program is designed to be a "kitchen sink" program to handle customer energy efficiency projects not addressed through other business programs. Two specific needs were identified in 2009 and developed in 2010 as pilots. One was a direct install program for small business since AEP Ohio was receiving so few applications in this important customer segment. This Pilot program was developed as the Express program. The second need was for a focused program to address agricultural energy efficiency needs. Work continues with the Collaborative and the Ohio Farm Bureau and has produced a concentrated Pilot program effort for this segment that began at the end of 2012. Additional target segments may also be explored to engage more non-participants in AEP Ohio programs. Each Pilot program will be monitored and listed as a subset of the Custom Program to track performance and participation. In 2011 and 2012, measures which show increased usage as technology develops, such as LED lighting, are moved to the Prescriptive Program to remove barriers to participation. AEP Ohio recommends that the program continue as described in the Plan.

DEMAND RESPONSE

The demand response program is used to supplement the peak demand reductions achieved from EE/PDR programs. Prior to 2012 and the merger of CSP and OPCo additional demand response was needed in CSP. Post-merger, additional customer agreements were not needed to gain customer commitments for supplemental peak demand reduction. No changes are recommended to the demand response program.

SELF-DIRECT

The Self Direct program should continue as designed in 2012. This program has achieved significant impacts and participation since 2009. The Self Direct program has also helped drive participation in other programs through its unique allowance of previously completed projects and the option of either the payment of an energy efficiency credit or an exemption from the EE/PDR rider. No changes are recommended to the Self Direct program.

BUSINESS NEW CONSTRUCTION

The New Construction program started in 2011 with strong participation. In 2012, participation continued to increase as customer recognition of the program increased. New Construction continues to increase as the economy stabilizes and energy savings from new construction is a good opportunity for long lived savings. No changes are recommended to the New Construction Program.

EXPRESS PROGRAM

The Express program started as a Pilot under the Custom program in 2010. In 2011, there was strong participation by small business customers that did not have staff or strong understanding of energy efficiency. In 2012, the program again had strong participation. The program changed in 2012 from a program marketed by local contractors, to a program with dedicated program marketing staff that would present signed contracts and materials to local contractors for installation. Results show a higher participation rate with the 2012 change. No changes are recommended to the Express program.

New and Emerging Programs

Retro-Commissioning

The Retro-Commissioning program is a new program launched in early 2013. This program seeks to obtain energy savings through the identification and implementation of low-cost, operational adjustments that improve the efficiency of existing buildings' operating systems by optimizing the systems to meet the building's requirements, with a focus on building controls and HVAC systems. Activity in 2012 was registering and training local retro-commissioning service providers (RSPs). No savings were attained in 2012. Trained RSPs active at the end of 2012 continue to be active at the beginning of 2013. No changes are recommended for the Retro-commissioning program.

Continuous Improvement

The Continuous Improvement program is a new program launched in early 2013. This program seeks to facilitate a comprehensive and enduring strategic approach to energy reduction at key customer facilities. Activity in 2012 was to enlist large industrial customers into the program. Strong enlistment in early 2013 indicates high acceptance of the program. No changes are recommended to the Continuous Improvement program.

Data Center

The Data Center program is a new program launched in early 2013. This program is designed to assist customers in addressing energy efficiency opportunities in both new and existing data centers (facilities used to house computer systems and associated components). Activity in 2012 was the design and launch of the program. Activity with data centers in early 2013 indicates good acceptance of the program. No changes are recommended to the Data Center program.

Energy Efficiency Auction

The Energy Efficiency Auction program is a new program expected to launch in late 2013. This program seeks to introduce a competitive bidding approach to EE/PDR by using elements of competition and timing to fit customers' schedules for capital improvements to enhance business customer interest. AEP Ohio recommends that the program continue as described in the Plan.

SUPPORTING AFFIDAVIT

AFFIDAVIT OF JON F. WILLIAMS

State of Ohio :
: ss
County of Franklin :

Jon F. Williams, being first duly cautioned and sworn, states as follows:

1. I am the Manager of Energy Efficiency and Peak Demand Reduction for AEP Ohio.

2. I am responsible for the design, development and implementation of customer programs relating to Energy Efficiency (EE) and Peak Demand Reduction (PDR) for AEP Ohio, including overseeing compliance with the EE/PDR mandates of Senate Bill 221 (SB 221) and the rules adopted by the Public Utilities Commission of Ohio (Commission) for inclusion in Ohio Administrative Code Chapter 4901:1-39 (Green Rules).

3. Based on my understanding of SB 221 and the Commission's Green Rules, AEP Ohio's energy baseline to be used for the 2012 reporting year is 42,590.0 GWh.

4. Based on my understanding of SB 221 and the Commission's Green Rules, AEP Ohio's 0.80% EE benchmark for the 2012 reporting year is 340.7 GWh.

5. Based on my understanding of SB 221 and the Commission's Green Rules, AEP Ohio complied with the EE benchmark for the 2012 reporting year.

6. Based on my understanding of SB 221 and the Commission's Green Rules, AEP Ohio's demand baseline to be used for the 2012 reporting year is 8,827.3 MW.

7. Based on my understanding of SB 221 and the Commission's Green Rules, AEP Ohio's 3.25% PDR benchmark for the 2012 reporting year is 286.9 MW. On that basis, AEP Ohio could achieve compliance for 2012 by either implementing

programs (including programs offered through a tariff) designed to achieve a peak demand reduction of 286.9 MW in 2012 or if peak demand is less than 8,540.4 MW (*i.e.,* 8,827.3 MW less 286.9 MW).

8. Based on my understanding of SB 221 and the Commission's Green Rules, AEP Ohio complied with the PDR benchmark for the 2012 reporting year.

FURTHER AFFIANT SAYETH NAUGHT.

Jon F. Williams

Sworn to before me and subscribed in my presence this 14 day of May, 2013.

Notary Public

NOTARIAL SEAL
STATE OF OHIO

MICHELLE L KISHA
NOTARY PUBLIC - OHIO
MY COMMISSION EXPIRES 1-21-2018

APPENDIX A

Efficient Products 2012 *Ex Ante* Savings

Program	Measure	Units	*Ex Ante* Per unit kWh impact	*Ex Ante* Per unit kW impact	Gross *Ex Ante* kWh Savings	Gross *Ex Ante* kW Savings	Source Document
Efficient Products	CFL 5W	30	10	0.0009	296	0.0	Standard Engineering Calculation
	CFL 7W	12,233	8	0.0007	96,445	8.5	Standard Engineering Calculation
	CFL 9W	67,524	31	0.0027	2,062,892	182.1	Standard Engineering Calculation
	CFL 10W	114,025	30	0.0026	3,371,149	297.6	Standard Engineering Calculation
	CFL 11W	30,326	48	0.0043	1,464,427	129.3	Standard Engineering Calculation
	CFL 12W	12,162	47	0.0042	575,311	50.8	Standard Engineering Calculation
	CFL 13W	2,411,132	46	0.0041	111,680,017	9,858.7	Standard Engineering Calculation
	CFL 14W	531,186	45	0.0040	24,080,255	2,125.8	Standard Engineering Calculation
	CFL 15W	144,339	59	0.0052	8,534,765	753.4	Standard Engineering Calculation
	CFL 16W	17,819	58	0.0051	1,036,077	91.5	Standard Engineering Calculation
	CFL 17W	142	57	0.0050	8,117	0.7	Standard Engineering Calculation
	CFL 18W	119,769	56	0.0050	6,727,844	593.9	Standard Engineering Calculation
	CFL 19W	43,294	80	0.0070	3,454,290	304.9	Standard Engineering Calculation
	CFL 20W	135,889	79	0.0070	10,707,354	945.2	Standard Engineering Calculation
	CFL 23W	376,257	76	0.0067	28,551,698	2,520.5	Standard Engineering Calculation
	CFL 25W	841	74	0.0065	62,160	5.5	Standard Engineering Calculation
	CFL 26W	248,521	73	0.0064	18,123,891	1,600.0	Standard Engineering Calculation
	CFL 27W	9	72	0.0064	647	0.1	Standard Engineering Calculation
	CFL 28W	910	71	0.0063	64,570	5.7	Standard Engineering Calculation
	CFL 29W	3,361	70	0.0062	235,171	20.8	Standard Engineering Calculation
	CFL 30W	170	69	0.0061	11,727	1.0	Standard Engineering Calculation
	CFL 32W	6,663	87	0.0077	577,842	51.0	Standard Engineering Calculation
	CFL 33W	744	86	0.0076	63,789	5.6	Standard Engineering Calculation
	CFL 40W	431	79	0.0070	33,980	3.0	Standard Engineering Calculation
	CFL 42W	2,656	155	0.0137	412,144	36.4	Standard Engineering Calculation
	CFL 55W	963	143	0.0126	137,610	12.1	Standard Engineering Calculation
	CFL 65W	804	182	0.0161	146,583	12.9	Standard Engineering Calculation
	CFL 68W	808	179	0.0158	144,924	12.8	Standard Engineering Calculation
	LED 7W	82	52	0.0046	4,283	0.4	Standard Engineering Calculation
	LED 8W	823	51	0.0045	42,175	3.7	Standard Engineering Calculation
	LED 9W	996	65	0.0057	64,783	5.7	Standard Engineering Calculation
	LED 10W	5,156	64	0.0057	330,280	29.2	Standard Engineering Calculation
	LED 11W	5,510	63	0.0056	347,527	30.7	Standard Engineering Calculation
	LED 12W	98	87	0.0077	8,499	0.8	Standard Engineering Calculation
	LED 13W	4,846	86	0.0076	415,489	36.7	Standard Engineering Calculation
	LED 14W	2,321	85	0.0075	196,712	17.4	Standard Engineering Calculation
	LED 15W	3,840	84	0.0074	321,667	28.4	Standard Engineering Calculation
	LED 16W	151	83	0.0073	12,500	1.1	Standard Engineering Calculation
	LED 17W	819	82	0.0072	66,991	5.9	Standard Engineering Calculation
	LED 18W	2,399	81	0.0071	193,866	17.1	Standard Engineering Calculation
	LED 20W	129	79	0.0070	10,170	0.9	Standard Engineering Calculation
	TV	3,215	102	0.0281	327,930	90.3	2012 to 2014 Plan - Exhibit B, Page 189
	Clothes Washer	9,439	226	0.0234	2,137,380	220.4	2012 to 2014 Plan - Exhibit B, Page 189
	Dehumidifier	6,167	197	0.0448	1,215,168	276.2	Draft Ohio 2009 TRM - Page 64
	Electric Water Heater	64	183	0.0139	11,706	0.9	2012 to 2014 Plan - Exhibit B, Page 190
	Freezer	1,535	67	0.0076	102,845	11.7	Energy Star website
	Heat Pump	170	2,076	0.2800	352,920	47.6	2012 to 2014 Plan - Exhibit B, Page 190
	Refrigerator	10,951	128	0.0226	1,399,910	247.4	Draft Ohio 2009 TRM - Page 53
	TOTAL				**229,928,778**	**20,702.4**	

2012 *Ex Ante* Savings

Program	Measure	Units	*Ex Ante* Per unit kWh impact	*Ex Ante* Per unit kW impact	Gross Ex Ante kWh Savings	Gross *Ex Ante* kW Savings	Source Document
Appliance Recycling	Room Air Conditioner	123	0	0.0000	0	0.0	
	Freezer	3381	1,809	0.2438	6,114,723	824.4	Underlying TRM Model - Page 23
	Refrigerator	12139	1,741	0.2457	21,139,583	2,983.0	Underlying TRM Model - Page 23
	TOTAL				**27,254,306**	**3,807.4**	
In Home Retrofit	Air Sealing	670	118	0.0089	78954.71	6.0	Draft Ohio 2009 TRM - Page 104
	Attic Insulation	808	87	0.0107	70408.52	8.7	Draft Ohio 2009 TRM - Page 36
	CFL 13W	72742	46	0.0041	3373935.81	297.9	Standard Engineering Calculation
	CFL 20W	5944	79	0.0070	468624.88	41.4	Standard Engineering Calculation
	CFL 23W	3073	76	0.0067	233189.96	20.6	Standard Engineering Calculation
	LED Night Light	9243	22	0.0027	201033.12	24.7	Navigant Evaluation
	Pipe Insulation	2828	48	0.0045	136480.23	13.6	Draft Ohio 2009 TRM - Page 97
	Direct Install Programmable Thermos	439	128	0.0000	56184.31	0.0	Draft Ohio 2009 TRM - Page 126
	Draft Stoppers	31056	2	0.0021	51760.00	64.7	Navigant Evaluation
	Duct Sealing	15	1,302	0.2326	19526.14	3.5	Draft Ohio 2009 TRM - Page 108
	Energy Star AC Replacement	1804	239	0.1426	431417.11	257.2	Draft Ohio 2009 TRM - Page 78
	Energy Star Ceiling Fan	23	184	0.0248	4241.00	0.6	Draft Ohio 2009 TRM - Page 48
	Energy Star Heat Pump	615	883	0.1455	543188.77	89.5	Draft Ohio 2009 TRM - Page 33
	Faucet Aerator	5720	24	0.0030	150536.50	18.6	Draft Ohio 2009 TRM - Page 89
	Furnace with ECM Motor or ECM Motor Replacement	2612	512	0.0544	1337594.30	142.0	2012 to 2014 Plan - Exhibit B, Page 190
	Heat Pump Thermostat	591	468	0.0000	276369.59	0.0	2012 to 2014 Plan - Exhibit B, Page 190
	PIN Based CFL Fixture (Indoor)	5	46	0.0041	231.59	0.0	Standard Engineering Calculation
	Pin Based CFLs	11	51	0.0044	561.80	0.0	Standard Engineering Calculation
	RCA Tune up	755	107	0.0303	80703.09	22.9	Draft Ohio 2009 TRM - Page 18
	Shower Heads	3271	182	0.0232	606447.56	77.4	Draft Ohio 2009 TRM - Page 93
	Shower Stops	6	178	0.0230	1068.00	0.1	2012 to 2014 Plan - Exhibit B, Page 190
	Wall Insulation	303	216	0.1215	65531.19	36.8	Draft Ohio 2009 TRM - Page 100
	Weatherstripping	3131	15	0.0280	46965.00	87.7	Navigant Evaluation
	Window Film	2	15	0.0144	29.08	0.0	2012 to 2014 Plan - Exhibit B, Page 190
	Window Treatments	99	262	0.0847	25957.04	8.4	2012 to 2014 Plan - Exhibit B, Page 190
	Windows	116	47	0.0400	5506.93	4.6	Draft Ohio 2009 TRM - Page 116
	TOTAL				**8,266,446**	**1,226.9**	

2012 *Ex Ante* Savings

Program	Measure	Units	*Ex Ante* Per unit kWh impact	*Ex Ante* Per unit kW impact	Gross *Ex Ante* kWh Savings	Gross *Ex Ante* kW Savings	Source Document
New Construction	Energy Star Home	796	2,735	0.7738	**2,176,914**	**615.9**	2012 to 2014 Plan - Exhibit B, Page 190
E3Smart	HW Heater Temp Setback	5471	132	0.0000	722,172	0.0	2012 to 2014 Plan - Exhibit B, Page 190
	Aerator	14353	25	0.0031	351,649	43.9	Draft Ohio 2009 TRM - Page 89
	Low-Flow Showerhead	5673	204	0.0261	1,158,029	148.1	Draft Ohio 2009 TRM - Page 93
	CFL	55391	61	0.0054	3,384,445	298.8	Standard Engineering Calculation
	LED	14710	21	0.0024	309,940	35.3	2012 to 2014 Plan - Exhibit B, Page 190
	Door Sweep	10668	5	0.0093	53,340	99.6	2012 to 2014 Plan - Exhibit B, Page 190
	Outlet/Switch Gaskets	10572	5	0.0093	52,860	98.7	2012 to 2014 Plan - Exhibit B, Page 190
	Weather Stripping	10295	5	0.0093	51,475	96.1	2012 to 2014 Plan - Exhibit B, Page 190
	TOTAL				**6,083,910**	**820.4**	
Behavioral	Behavioral	177,175	300	0.0390	**53,174,424**	**6,912.7**	Proprietary Regression Model
Low Income	A-R-C INSULATION	498	102	0.1522	50,977	75.8	Draft Ohio 2009 TRM - Page 36
	AIR SEALING	306	605	0.0101	185,164	3.1	Draft Ohio 2009 TRM - Page 104
	CFL - MISC WATTAGE	124,139	45	0.0048	5,607,581	592.1	Standard Engineering Calculation
	DUCT SEALING	45	147	0.1336	6,637	6.0	Draft Ohio 2009 TRM - Page 108
	FAUCET AERATOR	4,732	19	0.0024	90,405	11.3	Draft Ohio 2009 TRM - Page 89
	FREEZER	936	1,045	0.0180	978,203	16.8	Underlying TRM Model - Page 23
	FREEZER RETIRE	2	1,643	0.1990	3,286	0.4	2012 to 2014 Plan - Exhibit B, Page 190
	HEAT PUMP	39	1,788	0.0996	69,730	4	Draft Ohio 2009 TRM - Page 33
	PIPE INSULATION	419	204	0.0229	85,663	9.6	Draft Ohio 2009 TRM - Page 97
	REFRIGERATOR	4,281	976	0.0652	4,179,720	279.1	Underlying TRM Model - Page 23
	REFRIGERATOR RETIRE	21	950	0.1506	19,942	3.2	2012 to 2014 Plan - Exhibit B, Page 190
	SHOWERHEAD	3,255	42	0.0195	136,663	63	Draft Ohio 2009 TRM - Page 93
	WALL INSULATION	27	53	0.0477	1,422	1.3	Draft Ohio 2009 TRM - Page 100
	WH REPLACEMENT	36	351	0.0139	12,619	0.5	2012 to 2014 Plan - Exhibit B, Page 190
	WH WRAP	322	76	0.0087	24,569	3	Draft Ohio 2009 TRM - Page 131
	DHW TEMP SETBACK	102	56	0.0000	5,712	0.0	Draft Ohio 2009 TRM - Page 126
	MOBILE HOME RIGID WINDOW	1	5	0.0041	5	0.0	Draft Ohio 2009 TRM - Page 116
	SMART STRIPS	694	111	0.0000	77,244	0.0	2014 to 2014 Plan - Exhibit B, Page 190
	SUMP PUMP REPLACEMENT	1	157	0.0000	157	0.0	http://hes-documentation.lbl.gov
	REPLACE WELL PUMP	1	157	0.0000	157	0.0	http://hes-documentation.lbl.gov
	WINDOWAC	206	74	0.0839	15,203	17.3	Draft Ohio 2009 TRM - Page 70
	CAC	15	180	0.0975	2,700	1.5	Draft Ohio 2009 TRM - Page 78
	TOTAL				**11,553,759**	**1,087.9**	

2012 Ex Ante Savings

Program	Measure	Units	*Ex Ante* Per unit kWh impact	*Ex Ante* Per unit kW impact	Gross *Ex Ante* kWh Savings	Gross *Ex Ante* kW Savings	Source
Custom	(2) 200 hp compressors feed XLM area & (2) 100 hp compressors feed Radiance Rail area. - All (4) compressors will be piped together so can provide air to plant from either system.	1	219,846	26.2620	219,846	26.3	All Custom Measures are individually calculated using methodology consistent with the Draft Ohio 2009 TRM
	19 year old 1000 cfm heatless desiccant dryer without an energy management controller - Replaced desiccant dryer with a 1200 cfm Cycling refrigerated dryer that is showing cycling Off 95% of time on its controller	1	43,042	6.3190	43,042	6.3	
	200 Horsepower Load/Unload Compressor ingersoll-Rand Model R 160i 200 HP. 150 Horsepower VSD Drive Two Stage Compressor Ingersoll-Rand model R110ne 150 HP	1	122,777	0.0000	122,777	0.0	
	500 CFM Cyclic Air Dryer	1	1,815	0.2620	1,815	0.3	
	Install 1200 cfm cycling dryer large enough to handle both 100 hp compressor running	1	24,894	2.9880	24,894	3.0	
	Air compressor controls upgrade - reducing total number of units and adding a VFD- New control system will be installed	1	1,075,601	140.2320	1,075,601	140.2	
	Air demand reduction project includes converting 22 air vacuums to electric, removing unnecessary air amplifiers; automatic control of anti-static system set to run only when needed.	1	220,095	25.1250	220,095	25.1	
	Atlas Copco ZR3 (200HP), Atlas Copco ZR275 (358HP) and Atlas Copco ZT275 (333HP) oil-free rotary screw compressors running in load/no load control. Atlas Copco ZT275 (333HP) and Atlas Copco ZT315VSD (394HP) units. ZT275 running fully loaded 100% with the VSD trimming. ManagAir controls will be installed as well.	1	254,951	18.0710	254,951	18.1	
	Dryer replacement	1	24,234	3.7460	24,234	3.7	
	Install ManageAir control system to control the 5 existing air compressors	1	114,791	0.0000	114,791	0.0	
	Replace a 1990 vintage oversized compressors with properly sized compressors. Oversized units could not be turned down enough to match the load, requiring wasteful compressed air blow offs. New compressors will eliminate the need for this blow off.	1	1,280,006	134.4880	1,280,006	134.5	
	Replace all compressed air dryers with one large, energy efficient cycling dryer with built-in redundancy; turn heater off above old dryer.	1	178,375	18.9740	178,375	19.0	
	Replace leased compressors with more efficient units. Dryer replacement. Air demand reduction by using new electrical vaccum system.	1	290,088	34.0830	290,088	34.1	
	Replace non cyclic air dryers with cyclic air dryers	2	16,799	1.9890	33,599	4.0	
	Install ManageAir control system to control the 5 existing air compressors	1	1,040,039	224.5310	1,040,039	224.5	
	Replace end of useful life dryer with new refrigerated dryer	1	34,323	3.4900	34,323	3.5	
	Replaced three compressors with combined capacity of 125HP with a single air compressor with 200HP capacity	1	232,150	39.1300	232,150	39.1	
	DDC Controls	1	93,128	0.0000	93,128	0.0	
	Energy management system upgrades and schedule modifcations to HVAC and lighting controls	1	831,899	0.0000	831,899	0.0	
	Majority of pneumaic controls are now digital as well as update and re-program building automation system.	1	3,260	0.0000	3,260	0.0	
	Majority of pneumaic controls are now digital as well as update and re-program building automation system.	1	90,766	0.0000	90,766	0.0	
	A web based DDC building automation system to properly schedule the motors + Motor runtime reduction reduces the amount of outdoor air cfm that need conditioned.	2	460,405	0.0000	920,810	0.0	
	All Air Handling units ran 24/7 dyas a week. Upgrade to DDC sysstem	1	566,280	0.0000	566,280	0.0	
	Central plant upgrade project	1	486,903	42.4440	486,903	42.4	
	Economizer was installed when new 7.5 Ton Carrier HVAC rooftop unit was installed.	1	4,967	0.0000	4,967	0.0	
	HVAC Upgrade	1	2,145	0.0000	2,145	0.0	
	1-1 ton WSHP	1	107	0.1160	107	0.1	
	1.5 ton WSHP	1	2,997	1.1300	2,997	1.1	
	14-4 ton WSHP	1	15,798	6.0900	15,798	6.1	
	3 ton WSHP	1	13,655	4.9700	13,655	5.0	
	3.5 ton WSHP	1	15,270	5.0100	15,270	5.0	
	7-2.5 ton WSHP	1	8,304	2.6040	8,304	2.6	
	7-6 ton WSHP	1	6,567	1.6870	6,567	1.7	
	8-2 ton WSHP	1	5,985	1.9200	5,985	1.9	
	275-ton scroll chiller. It is tied into the building control system and is taking advantage of several energy-friendly operating strategies. The increased efficiency and smaller chiller capacity will lead to reduced electric usage.	1	93,959	57.3280	93,959	57.3	
	New chiller for Process cooling	1	143,894	19.3500	143,894	19.4	
	Retrofit existing AHUs and Exhaust Fans with VFDs in a Data Center	1	343,465	81.4230	343,465	81.4	
	Retrofitting existing system with VAV system	1	97,559	0.0000	97,559	0.0	
	Suite 250 & CA space 1,587 Sq. Ft. HVAC single non-programmable thermostat. Suite 250 & CA space 1,587 Sq. Ft. HVAC programmable communicating thermostat with two additional averaging sensors. Connected to building automation controls.	1	1,187	0.0000	1,187	0.0	

Custom cont.	Upgrading HVAC systems	1	4,815	1.9000	4,815	1.9
	(1) 1000W MH Exterior replaced with (1) FLD-EDG-40-AA-12 LED	1	4,046	0.0000	4,046	0.0
	(13) 2L 8' T12, (5) 2L 4' T8, (5) 2L 8' T8, (7) 175W HPS	1	20,503	2.7190	20,503	2.7
	(14) - 2 LAMP 2X2 6" UBEND 741 - (14) - 3LPFO17-QHE-ISN 2X2 REFLECTOR KIT	1	2,485	0.3120	2,485	0.3
	(16) 1000 watt Metal hallides in the clearstory of the sales area - (16) fixtures being retrofitted with new ballasts and lamp to 875 watt	1	10,775	2.8950	10,775	2.9
	(2) - 2LP/FO32T8 1x4 Fixtures - (5) - 2LPFO28/841/SS/XL- QHEISL LBO	1	627	0.0790	627	0.1
	(2) - 2LP/FO32T8 2X4 FXTURE - 2) - 2LFO28/841/SS/XL	1	971	0.1220	971	0.1
	(21) - 4LP/FO32T8 2X4 FXTURE - (21) - 4LFO28/841/SS/XL-QHEISL LBO	1	6,359	0.7970	6,359	0.8
	(23) - 4LP/FO32T8 2X4 FXTURE - (24) - 4LFO28/841/SS/XL	1	7,894	0.9900	7,894	1.0
	(25) - 4LP/FO32T8 2X4 FIXTURES - (25) - 4LPFO28/835/SS/XL-QHEISL LBO	1	7,309	0.9170	7,309	0.9
	(29) - 4LP/FO32T8 2X4 FIXTURES - (29) - 4LPFO28/841/SS/XL-QHEISL LBO	1	8,479	1.0640	8,479	1.1
	(3) 1000W MH Exterior replaced with (3) 279W LED	1	10,333	0.0000	10,333	0.0
	(34) - 4LP/FO32T8 2X4 FXTURE - (34) - 4LFO28/841/SS/XL-QHEISL LBO and (3) 1L T832W to (3) 1L T8 28W	1	10,296	1.5390	10,296	1.5
	(36) - 4LP/FO32T8 2X4 FXTURE - (36) - 4LFO28/841/SS/XL-QHEISL LBO	1	10,901	1.3670	10,901	1.4
	(51) 216 Watt 2-lamp F96T12/HO/ES Fixtures and (51) 257 watt 2-lamp F96T12HO fixtures with 110 watt lamps re-lamped and re-ballasted with 142 Watt system (2-lamp T8, 86 NW)	1	39,327	9.6390	39,327	9.6
	(6) - 3LP/FO32T8 2X4 FXTURE - (7) - 3LFO28/841/SS/XL	1	2,558	0.3210	2,558	0.3
	(8) 1500W Quartz & (12) 400W MH Replaced with (8) 150W LED	1	50,844	16.2960	50,844	16.3
	(8) 1500W Quartz replace (4) 150W LED	1	41,496	11.4000	41,496	11.4
	1000W MH to LED	1	20,232	0.0000	20,232	0.0
	1000W metal halide 400W Shoebox induction lighting	1	5,869	0.0000	5,869	0.0
	11 ft of Neon lighting recessed in rear of display cross 54 watts - 68 module LED string 8.2 watts	1	401	0.0000	401	0.0
	1L 4' T8 32W standard ballast to 1L 4' T8 25W lamps LP ballast	1	447	0.1220	447	0.1
	20 ea. 1000W MH exterior parking lot to 20 ea. 400W Induction fixtures	1	51,301	0.0000	51,301	0.0
	250W MH to 18W LEDs (22 input watts) Exterior	1	2,348	0.0000	2,348	0.0
	2L 2' T12 to 32W CFL	1	178	0.0480	178	0.0
	2L 32W T8u TO 2L 2' 17W T8	1	84	0.0220	84	0.0
	2L 4' T8 32W standard ballast to 2L 4' T8 25W lamps LP ballast	1	20,520	5.6220	20,520	5.6
	2L 4' T8 to 2L 4' LED tube	1	1,044	0.2860	1,044	0.3
	2L 8' T12 VHO to 2L 26W LED fixture	1	7,392	0.0000	7,392	0.0
	2L T12 F40DL	1	1,034	0.3190	1,034	0.3
	32W T8 w/NBF -to- 28W CEE T8 w/LBF	2	79,809	25.7665	159,617	51.5
	32W T8 w/NBF -to- 28W T8 w/LBF	1	2,154	0.6950	2,154	0.7
	36 each, 1000W MH exterior parking lot lights. 36 each, 400W Induction fixtures, lights & Ballast exterior parking lot lights with daylight sensors	1	92,342	0.0000	92,342	0.0
	3L 4' F40DL TO 3L 4' T5 40DL	1	12,271	2.4510	12,271	2.5
	3L 4' T12 F40DL to 3L T5 F40DL	1	24,309	7.5050	24,309	7.5
	3L T12 F40DL TO 3L T8 F40DL	1	4,642	1.4330	4,642	1.4
	40 ft (5 ea. 96" lamps) of fluorescent sign lighting 600 watts - 33 ft. of LED strip lighting 82 watts total	1	1,907	0.0000	1,907	0.0
	47 Hall St., existing facility. LED lighting upgrades interior lighting	1	41,523	11.9900	41,523	12.0
	49 each, 1000W MH exterior parking lot lights. 49 each, 400W induction fixtures, lights and ballast exterior parking lot lights with daylight sensors.	1	125,837	0.0000	125,837	0.0
	4L 4' T12 to 4L 4' T8	1	37,765	10.7050	37,765	10.7
	4L 4' T8 32W standard ballast to 4L 4' T8 25W lamps LP ballast	1	38,734	10.6120	38,734	10.6
	4L 4' T8 to 2L 4' T8 RW	1	83,899	22.9860	83,899	23.0
	4L 4' T8 to 4L 4' LED tube	1	2,887	0.7910	2,887	0.8
	5 fixtures 4T12 (F34T12) - 5 fixtures, 4"LED 15w linear tubes	1	4,993	0.5700	4,993	0.6
	6 lamp T12 HO sign light - 1,440 watts - 330 module LED string light - 71 watts	1	1,903	0.0000	1,903	0.0
	7 fixtures, 8T12 (F96T12) -7 fixtures 8' LED 35 Watt linear tubes	1	2,883	0.6160	2,883	0.6
	Existing 32W T8 w/ NBF -to- 28W CEE T8 w/ LBF	1	64,014	20.6670	64,014	20.7
	Existing HID Lighting System. LED 202 W Evolve Fixture	1	69,221	0.0000	69,221	0.0
	Exterior Lighting	3	46,253	0.0000	138,758	0.0
	Install occupancy sensors on lighting system	1	18,405	0.0000	18,405	0.0
	Lighting removal, to complete new fixt installation	1	1,907	0.5060	1,907	0.5
	MH to LED	3	29,673	0.0000	89,019	0.0
	North Gate Shopping Center currently operates (16) 1000-watt pole mounted fixtures and (5) 400-watt flood fixtures from dusk until dawn 365 days a year. Our energy efficient control system will be installed enabling the owner to reduce the operating hours of their light system as follow: (8) of the 1000-watt fixtures and (1) of the 400-watt fixtures will turn off at 10:30pm every night. (4) additional 1000-watt fixtures and (2) additional 400-watt fixtures will turn off at 12:30 am and then be turn back on at 5:30am and operate until dawn.	1	38,096	0.0000	38,096	0.0
	Parking lot lighting	1	24,940	0.0000	24,940	0.0
	Replace (31) - 2LP/CF26DT/E/830 with (31) - LED18PAR38/830/NFL25	1	12,948	1.6240	12,948	1.6
	Replace (69) PAR38 150W incandescent lamps with PAR38 LED lamps	1	26,251	8.4070	26,251	8.4
	Replace 1000W Spot Lights W/279W LED's	1	20,666	0.0000	20,666	0.0
	Replace 100w MV with 18w LED	1	276	0.0870	276	0.1
	Replace 4-60w Incandescent lamps with 4-10w LED lamp	1	5,302	0.1930	5,302	0.2
	Replace a variety of T8's, 100W jelly jars and other misc. lighting	45	9,713	1.2853	437,105	57.8

All Custom Measures are individually calculated using methodology consistent with the Draft Ohio 2009 TRM

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Custom cont.	Replace a variety of T8's, 100W jelly jars and other misc. lighting with LED	5	9,982	1.1834	49,911	5.9
	Replace interior 2-6' 85w T12HO with 1-26w LED wall pack	1	1,067	0.3380	1,067	0.3
	Replace lamps and ballasts in (62) existing 4'-4L-T8-32W with R/W Lamps and LBF Ballasts	1	31,501	3.5960	31,501	3.6
	Replacing T12 fixtures with 35W LED tubes	1	16,036	3.7320	16,036	3.7
	Retrofit	1	32,799	5.5790	32,799	5.6
	Retrofit (152) 400-Watt Metal Halide with 330-Watt Ceramic Metal Halide	1	50,888	13.5800	50,888	13.6
	Retrofit (166) 400-Watt metal halide with ceramic metal halide without ballast change.	1	55,575	14.8320	55,575	14.8
	Retrofit (17) 70-Watt Metal Halide with (17) 27-Watt SI CFLs.	1	5,063	0.0000	5,063	0.0
	Retrofit (172) 400-Watt metal halide to 330-Watt metal halide	1	57,583	15.3700	57,583	15.4
	Retrofit (18) 23W CFLs with (18) 16W LEDs	1	751	0.1140	751	0.1
	Retrofit (30) 2-lamp 8-ft fixtures with 2 8-ft HOT8 lamps which use 110 watts per lamp, and (30) 2-lamp F96T12HO/ES Fixtures which use 95 watts per lamp.	1	23,134	5.6700	23,134	5.7
	Retrofit (30) 2L 8Ft T12s with (30) 30W LED tuhe.	1	22,788	4.7200	22,788	4.7
	Retrofit (31) 150-Watt Metal halide with (18) 42-Watt CFLs	1	20,095	0.0000	20,095	0.0
	Retrofit (4) 2L 8Ft T12s with (4) 36W LED tube	1	2,911	0.6030	2,911	0.6
	Retrofit (71) 2-lamp F96T12/HO/ES fixtures that have 95 watt lamps and (71) 2-lamp F96T12 that have 110 watt lamps with new 86 Watt T8 lamps and electronic ballasts.	1	54,750	13.4190	54,750	13.4
	Retrofit (8) 13W CFLs with (8) 7W LEDs	1	286	0.0430	286	0.0
	Retrofit (95) 1000W Metal Halide fixtures with 775W pulse start metal halide fixtures	1	93,623	0.0000	93,623	0.0
	Retrofit 22-4F32T8 EB to 22-4F32T8 LPEB	1	6,662	0.8350	6,662	0.8
	T8 to T8 Retrofit	1	1,081,586	183.9580	1,081,586	184.0
	Upgrade aircraft hanger lighting	2	7,618	1.0395	15,236	2
	West Parking Lot Lighting	1	45,924	0.0000	45,924	0.0
	Eight 3L T12 to 3L T5	1	1,472	0.2930	1,472	0.3
	Halogen to LED	1	11,222	2.5780	11,222	2.6
	Halogen to LED (exterior)	1	9,153	0.0000	9,153	0.0
	Replace lights in parking garage stairways	1	5,850	1.1700	5,850	1.2
	Replace Incandescent And Quartz Lamps With Wallpack LED Fixtures	1	16,674	0.0000	16,674	0.0
	Replace Photocell With Timer For (10) 1,000-Watt Metal Halide	1	7,020	0.0000	7,020	0.0
	Replaced Fluorescent And Incandescent Fixtures With Led Strip Fixtures	1	20,439	2.7110	20,439	2.7
	Replaced fluorescent and incandescent lights in the walk-in cooler and freezer with LED strip fixtures	1	4,912	2.0590	4,912	2.1
	Replacing 51 F34T12 fluorescent tubes with 4' T8 LED's & 10, FU30T12 fluorescent "U" tubes with 2' T8 LED liniar tubes. replacing 51 F34T12 fluorescent tubes with 4' T8 LED's & 10, FU30T12 fluorescent "U" tubes with 2' T8 LED liniar tubes	1	8,837	2.0930	8,837	2.1
	Retrofit (41) 400-Watt Metal Halide With 330-Watt Ceramic Metal Halide	1	13,726	3.6630	13,726	3.7
	Retrofitting 2L T12 Wrap Fixtures In Freezers With T8 Retrofit Kits	1	1,793	0.5870	1,793	0.6
	HIS high-speed 150 horsepower high-speed turbo blower. The blower supplies air to the aeration basins. The HIS blower will be equipped with a VFD	1	256,829	28.9390	256,829	28.9
	750 Ton + 300 Ton chiller	1	696,675	100.8130	696,675	100.8
	Existing Building Time clocks and VAV controls will be replaced with Advanced DDC Controls	4	216,776	0.0000	867,103	0.0
	Hydraulic to Compressed Air Pneumatic paper tray formers	1	202,972	36.8740	202,972	36.9
	Install Laser Weld machine to reduce the number of spot welds needed to assemble each frame	1	402,584	(4.9020)	402,584	(4.9)
	Install iCom System on existing Liebert systems	1	1,349,136	154.0110	1,349,136	154.0
	Replace Blower/Heater combo with mechanical arm rollers that do not use electricity	1	270,758	43.0400	270,758	43.0
	Replace Calrod Heaters with Zonal Heaters	1	131,855	72.8690	131,855	72.9
	Replacing Powerware 9315 UPS. Current load efficency is 81%. Unit runs 7days a week 24Hrs a day	1	47,628	5.6560	47,628	5.7
	Retrofit existing Linde Nitrogen plant with Praxair Nitrogen plant at PPG Industries	1	843,557	83.3690	843,557	83.4
	System currently running at 45% efficientcy due to very light load. - System will be at 71% efficiency after the upgrade.	2	219,570	25.0655	439,139	50.1
	Installing Pressure Sensors	1	283,588	45.2130	283,588	45.2
	Replacing existing flue gas cooling/filtration system for iron smelting plant with new baghouse filtration system	1	316,640	58.2200	316,640	58.2
	Retrofit two air handler systems with VFDs to run at half speed/flow as the existing system is oversized for the load	1	179,022	42.7360	179,022	42.7
	Add doors to coolers in conjunction with prescriptive items	25	47,159	6.9810	1,178,977	174.5
	Install automated floating head pressure controls to the refrigerated system	1	216,614	66.5940	216,614	66.6
	Retrofit existing flourescent lights, open refrigerated cases. - Install new LED lighting and door on existing open refrigerated cases. This must be datalogged pre and post. This part of the custom is for the open refrigeration cases.	1	110,794	8.3970	110,794	8.4
	Upgraded automatic and remote system controls	1	1,213,896	159.9830	1,213,896	160.0
	>= 65,000 Btu/h and < 120,000 Btu/h (5.5-10 tons)	1	342	0.5045	342	0.5
	Exterior HW CFL - 30W or Greater	5	391	0.0000	1,957	0.0
	Exterior LED or Induction replacing 175W or Less HID	55	314	0.0000	17,265	0.0

Custom cont.	Exterior LED or Induction replacing 176W - 250W HID	32	632	0.0000	20,227	0.0
	Exterior LED or Induction replacing 251W - 400W HID	262	761	0.0000	199,408	0.0
	Exterior Pulse Start or Ceramic, 100W or Less	14	318	0.0000	4,455	0.0
	Exterior Pulse Start or Ceramic, 101W - 200W	15	559	0.0000	8,385	0.0
	Exterior Pulse Start or Ceramic, 201W - 350W	56	576	0.0000	32,267	0.0
	Exterior Specialty/High Wattage Screw-in CFLs (>31W)	25	387	0.0000	9,675	0.0
	Garage LED or Induction replacing 175W or Less HID	12	639	0.0730	7,674	0.9
	Garage LED or Induction replacing 176W - 250W HID	14	1,288	0.1470	18,028	2.1
	Garage Specialty/High Wattage Screw-in CFLs (>31W)	11	788	0.0900	8,672	1.0
	Interior 2-ft T12 to T8 or T5	428	62	0.0109	26,606	4.6
	Interior 2-ft T8 Lamp and Ballast w T12 Base	9	34	0.0094	309	0.1
	Interior 3-ft T12 to T8 or T5	15	42	0.0135	634	0.2
	Interior 4-ft U-Tube T12 to T8	32	37	0.0116	1,168	0.4
	Interior Bi-level Stairwell/Hall/Garage Fixture w/ integrated sensors	50	220	0.0441	10,994	2.2
	Interior CFL - Screw-in (15W or less)	29	116	0.0270	3,351	0.8
	Interior CFL - Screw-in (16W to 26W)	116	167	0.0333	19,391	3.9
	Interior CFL - Specialty (Downlight, Dimmable or 3-way)	28	189	0.0427	5,288	1.2
	Interior Cold Cathode	36	73	0.0170	2,611	0.6
	Interior HP T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot HP T8 Lamps and Ballast	108	59	0.0196	6,402	2.1
	Interior HP T8 - 4-ft Lamp and Ballast	1,665	48	0.0135	79,856	22.5
	Interior HP T8 - 4-ft Lamp and Ballast w T12 Base (Including U Tube)	57	39	0.0106	2,209	0.6
	Interior LED Fixture	10	322	0.0605	3,224	0.6
	Interior LED Lamp	501	205	0.0464	102,869	23.2
	Interior LED, T-1, or Electroluminescent Exit Signs	63	301	0.0392	18,960	2.5
	Interior Occupancy Sensor	200,660	1	0.0000	201,126	2.0
	Interior Permanent Lamp Removal - 2-ft Lamp	374	140	0.0238	52,439	8.9
	Interior Permanent Lamp Removal - 4-ft Lamp	804	151	0.0436	121,372	35.1
	Interior Permanent Lamp Removal - 8-ft Lamp	22	224	0.0761	4,922	1.7
	Interior RW T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot RW T8 Lamps and Ballast	32	86	0.0209	2,768	0.7
	Interior RW T8 - 4-ft Lamp and Ballast	2,959	58	0.0150	172,420	44.3
	Interior RW T8 - 4-ft Lamp and Ballast w T12 Base (Including U Tube)	236	61	0.0111	14,394	2.6
	Interior RW T8 - 4-ft Reduced Watt Lamp only	697	15	0.0034	10,238	2.4
	Interior RW T8 - 8-ft Lamp and Ballast	260	132	0.0270	34,198	7.0
	Photocells	17,704	0	0.0000	4,957	0.0
	Time Clocks	3,518	0	0.0000	439	0.0
	Exterior Non-Standard LED or Induction Fixtures	5	667	0.0000	3,333	0.0
	Garage T8/T5 New Fluorescent Fixture w/Electronic Ballast	190	1,137	0.1298	216,013	24.7
	Interior T8/T5 New Fluorescent Fixture w/Electronic Ballast	2,213	791	0.1861	1,750,952	411.9
	Low Pressure Drop Filter	1,479	15	0.0032	22,155	4.7
	No Loss Condensate Drain	**3**	931	0.2033	2,793	0.6
	Plug Load Occ Sensors	3	169	0.0000	507	0.0
	Prescriptive VSD Incentives for Compressors <= 100HP	100	1,435	0.2990	143,500	29.9
	Anti-Sweat Heater Controls	375	294	0.0340	110,250	12.8
	EC Motor for Walk-in	375	864	0.0986	324,000	37.0
	LED Refrigeration Case Lighting	48	464	0.0690	22,272	3.3
	LED Refrigeration Case Lighting in Freezers and Coolers w Doors	875	216	0.0320	188,913	28.0
	VFD Air Compressor Motor	1	143,500	29.9000	143,500	29.9
	VFD Chilled Water Pump	1	4,620	2.4200	4,620	2.4
	VFD Cooling Tower Fan	9	4,266	0.4200	38,398	3.8
	VFD Supply/Return Fan -Default	9	6,194	1.6528	55,750	14.9
	VFD for HVAC Chillers	1	59,650	1.2500	59,650	1.3
	VFD for Process Motor	2	4,165	0.8700	8,330	1.7
	20 HP Motor	2	453	0.0989	906	0.2
	TOTAL				**25,979,343**	**3,373.3**

All Custom Measures are individually calculated using methodology consistent with the Draft Ohio 2009 TRM

2012 Ex Ante Savings

Program	Measure	Units	*Ex Ante* Per unit kWh impact	*Ex Ante* Per unit kW impact	Gross *Ex Ante* kWh Savings	Gross *Ex Ante* kW Savings	Source
New Construction	Custom	10	47507	4.3691	475,067	43.7	All Custom Measures are individually calculated using methodology consistent with the Draft Ohio 2009 TRM
	Combination Oven	2	18,432	3.5350	36,864	7.1	Vendor Internal TRM - Food Service
	Hot Holding Cabinet	1	2,628	0.5040	2,628	0.5	Vendor Internal TRM - Food Service
	150 to 299 tons	1	22,365	17.8190	22,365	17.8	Vendor Internal TRM - Cooling
	151 to 300 tons	2	58,412	37.8938	116,824	75.8	Vendor Internal TRM - Cooling
	< 65,000 Btu/h (5.4 tons) - 14 SEER	2	407	0.3984	814	0.8	Vendor Internal TRM - Cooling
	> =600 tons	2	558,340	362.8326	1,116,681	725.7	Vendor Internal TRM - Cooling
	>= 240,000 Btu/h and < 760,000 Btu/h (21-63 tons)	3	1,248	3.6216	3,745	10.9	Vendor Internal TRM - Cooling
	>= 65,000 Btu/h and < 120,000 Btu/h (5.5-10 tons)	1	981	0.9315	981	0.9	Vendor Internal TRM - Cooling
	Air-Cooled Chillers	8	21,890	24.5262	175,118	196.2	Vendor Internal TRM - Cooling
	Air-Cooled Chillers <150 tons	118	181	0.2929	21,313	34.6	Vendor Internal TRM - Cooling
	Air-Cooled Chillers >=150 tons	1	9,195	18.0158	9,195	18.0	Vendor Internal TRM - Cooling
	PTAC/PTHP	1	107	0.1534	107	0.2	Vendor Internal TRM - Cooling
	Unitary & Split < 65,000 Btu/h (5.4 tons)	20	464	0.4729	9,281	9.5	Vendor Internal TRM - Cooling
	Unitary & Split >= 65,000 Btu/h and < 120,000 Btu/h (5.5-10 tons)	20	594	0.6748	11,880	13.5	Vendor Internal TRM - Cooling
	Unitary & Split >= 760,000 Btu/h (> 63.3 tons)	1	17,810	24.5454	17,810	24.5	Vendor Internal TRM - Cooling
	Unitary & Split >=120,000 Btu/h and < 240,000 Btu/h (10-19.9 tons)	8	1,163	1.2618	9,306	10.1	Vendor Internal TRM - Cooling
	1001-1500 Ice Maker	**1**	5,019	0.5730	5,019	0.6	Vendor Internal TRM - Food Service
	101-400 Ice Maker	4	394	0.0610	1,576	0.2	Vendor Internal TRM - Food Service
	401-1000 Ice Maker	1	785	0.1220	785	0.1	Vendor Internal TRM - Food Service
	e 1000 Ice Maker	1	1,431	0.2220	1,431	0.2	Vendor Internal TRM - Food Service
	Interior Daylight Sensor Controls	13,350	1	0.0003	11,630	4.5	Vendor Internal TRM - Lighting
	Interior Daylight Sensor Controls (NC)	3,126	1	0.0004	3,259	1.3	Vendor Internal TRM - Lighting
	Interior Occupancy Sensor	149,225	1	0.0000	127,334	1.4	Vendor Internal TRM - Lighting
	LPD - Exterior	3	47,839	0.0000	143,516	0.0	Vendor Internal TRM - Lighting
	LPD - Garage	1	93,407	10.6629	93,407	10.7	Vendor Internal TRM - Lighting
	LPD - Interior	55	112,706	22.5389	6,198,850	1,239.6	Vendor Internal TRM - Lighting
	Combination Oven	1	18,432	3.5350	18,432	3.5	Vendor Internal TRM - Refrigeration
	EC Motor for Reach-in Refrigerator cases	2	345	0.0330	690	0.1	Vendor Internal TRM - Refrigeration
	EC Motor for Walk-in Refrigerator	27	864	0.0986	23,328	2.7	Vendor Internal TRM - Refrigeration
	ENERGY STAR Solid Door Freezer	5	1,519	0.1730	7,595	0.9	Vendor Internal TRM - Refrigeration
	ENERGY STAR Solid Door Refrigerator	14	643	0.0735	9,009	1.0	Vendor Internal TRM - Refrigeration
	Hot Holding Cabinet	4	2,628	0.6000	10,512	2.4	Vendor Internal TRM - Refrigeration
	LED Refrigeration Case Lighting in Freezers and Coolers w Doors	244	216	0.0320	52,680	7.8	Vendor Internal TRM - Refrigeration
	LED Refrigeration Case Lighting in Open Display Cases	28	172	0.0260	4,819	0.7	Vendor Internal TRM - Refrigeration
	VFD Chilled Water Pump	9	9,045	2.3192	81,407	20.9	Vendor Internal TRM - Motors and Drives
	VFD Condenser Water Pump	4	13,038	3.2988	52,150	13.2	Vendor Internal TRM - Motors and Drives
	VFD Hot Water Pump	11	34,901	0.0000	383,910	0.0	Vendor Internal TRM - Motors and Drives
	VFD Other HVAC Motor	16	17,879	1.6611	286,062	26.6	Vendor Internal TRM - Motors and Drives
	VFD Supply/Return Fan -Default	40	5,772	0.8137	230,868	32.5	Vendor Internal TRM - Motors and Drives
	VFD for Kitchen Exhaust Fan - New Hood	4	3,454	0.5852	13,817	2.3	Vendor Internal TRM - Motors and Drives
	VFD for Process Motor	1	5,831	1.2180	5,831	1.2	Vendor Internal TRM - Motors and Drives
	Whole Building - >30% (Owner)	11	817,871	227.6736	8,996,578	2,504.4	Individually modeled by Vendor
	Whole Building - e20 and <30% (Owner)	5	100,833	47.3054	504,163	236.5	Individually modeled by Vendor
	Motor	35	171.5317006	0.035103018	6,004	1.2	Vendor Internal TRM - Motors and Drives
	TOTAL				**19,304,636**	**5,306.4**	

2012 Ex Ante Savings

Program	Measure	Units	*Ex Ante* Per unit kWh impact	*Ex Ante* Per unit kW impact	Gross *Ex Ante* kWh Savings	Gross *Ex Ante* kW Savings	Source
Prescriptive	Combination Oven	4	18,432	3.5350	73,728	14.1	Vendor Internal TRM - Food Service
	151 to 300 tons	1	78,935	75.9239	78,935	75.9	Vendor Internal TRM - Cooling
	300-600 tons	5	68,833	75.7268	344,164	378.6	Vendor Internal TRM - Cooling
	< 65,000 Btu/h (5.4 tons) - 14 SEER	3	714	0.5497	2,141	1.6	Vendor Internal TRM - Cooling
	<= 150 tons	1	8,606	9.3888	8,606	9.4	Vendor Internal TRM - Cooling
	> =600 tons	5	159,835	127.4329	799,175	637.2	Vendor Internal TRM - Cooling
	>=120,000 Btu/h and < 240,000 Btu/h (10-20 tons)	2	2,649	2.4350	5,297	4.9	Vendor Internal TRM - Cooling
	Air Side Economizers AHU and RTU	90	662	0.0000	59,603	0.0	Vendor Internal TRM - Cooling
	Air-Cooled Chillers	49	6,382	8.6021	312,719	421.5	Vendor Internal TRM - Cooling
	Air-Cooled Chillers <150 tons	15	7,238	12.8555	108,566	192.8	Vendor Internal TRM - Cooling
	Air-Cooled Chillers >=150 tons	1	11,024	18.2532	11,024	18.3	Vendor Internal TRM - Cooling
	Centralized Energy Management System Controls	225,525	3	0.0000	789,127	0.0	Vendor Internal TRM - Cooling
	Hotel Guest Room Occupancy Sensor (Electric Heat)	300	1,117	0.1590	335,100	47.7	Vendor Internal TRM - Cooling
	PTAC/PTHP	16	239	0.1620	3,816	2.6	Vendor Internal TRM - Cooling
	Toilet Room Exhaust Occupancy Sensor	4	129	0.0386	516	0.2	Vendor Internal TRM - Cooling
	Unitary & Split < 65,000 Btu/h (5.4 tons)	38	502	0.6568	19,058	25.0	Vendor Internal TRM - Cooling
	Unitary & Split >= 240,000 Btu/h and < 760,000 Btu/h (20-63 tons)	17	3,440	4.1910	58,475	71.2	Vendor Internal TRM - Cooling
	Unitary & Split >= 65,000 Btu/h and < 120,000 Btu/h (5.5-10 tons)	4	956	1.5233	3,822	6.1	Vendor Internal TRM - Cooling
	Unitary & Split >=120,000 Btu/h and < 240,000 Btu/h (10-19.9 tons)	16	1,394	1.7768	22,303	28.4	Vendor Internal TRM - Cooling
	VRF >= 65,000 Btu/h and < 120,000 Btu/h (5.5-11.1 tons)	4	9,053	5.8875	36,211	23.5	Vendor Internal TRM - Cooling
	VRF>= 240,000 Btu/h and < 760,000 Btu/h (>=20 tons)	5	16,928	17.1941	84,640	86.0	Vendor Internal TRM - Cooling
	Window Film	23,690	3	0.0012	64,200	28.4	Vendor Internal TRM - Cooling
	101-400 Ice Maker	1	394	0.0610	394	0.1	Vendor Internal TRM - Food Service
	401-1000 Ice Maker	1	785	0.1220	785	0.1	Vendor Internal TRM - Food Service
	401-500 Ice Maker	1	2,004	0.2290	2,004	0.2	Vendor Internal TRM - Food Service
	e 1000 Ice Maker	9	1,431	0.2220	12,875	2.0	Vendor Internal TRM - Food Service
	<= 2 feet Outdoor	20	155	0.0000	3,096	0.0	Vendor Internal TRM - Lighting
	> 2 feet Outdoor	44	370	0.0000	16,271	0.0	Vendor Internal TRM - Lighting
	Exterior <= 2 feet	159	155	0.0000	24,613	0.0	Vendor Internal TRM - Lighting
	Exterior > 2 feet	34	370	0.0000	12,573	0.0	Vendor Internal TRM - Lighting
	Exterior Bi-Level Lighting Controls	106,360	1	0.0000	69,134	0.0	Vendor Internal TRM - Lighting
	Exterior CFL - Screw-in (15W or less)	11	138	0.0000	1,514	0.0	Vendor Internal TRM - Lighting
	Exterior CFL - Screw-in (16W to 26W)	39	258	0.0000	10,062	0.0	Vendor Internal TRM - Lighting
	Exterior CFL - Screw-in (27W or 40W)	13	318	0.0000	4,137	0.0	Vendor Internal TRM - Lighting
	Exterior Ceramic Discharge MH Probe Start Base, 150W -249W CDM	19	194	0.0000	3,677	0.0	Vendor Internal TRM - Lighting
	Exterior Ceramic Discharge MH Probe Start Base, 250W -399W CDM	29	344	0.0000	9,976	0.0	Vendor Internal TRM - Lighting
	Exterior Ceramic Discharge MH Probe Start Base, 400W -849W CDM	2	675	0.0000	1,350	0.0	Vendor Internal TRM - Lighting
	Exterior Ceramic Discharge MH Probe Start Base, < 149W CDM	58	194	0.0000	11,223	0.0	Vendor Internal TRM - Lighting
	Exterior HP T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot HP T8 Lamps and Ballast	248	80	0.0000	19,728	0.0	Vendor Internal TRM - Lighting
	Exterior HW CFL - 29W or Less	16	237	0.0000	3,784	0.0	Vendor Internal TRM - Lighting
	Exterior HW CFL - 30W or Greater	41	391	0.0000	16,043	0.0	Vendor Internal TRM - Lighting
	Exterior HW CFL - 30W to 60W	66	391	0.0000	25,826	0.0	Vendor Internal TRM - Lighting
	Exterior HW CFL - 61W to 120W	40	396	0.0000	15,824	0.0	Vendor Internal TRM - Lighting
	Exterior LED or Induction replacing 175W or Less HID	523	314	0.0000	164,170	0.0	Vendor Internal TRM - Lighting
	Exterior LED or Induction replacing 176W - 250W HID	27	632	0.0000	17,067	0.0	Vendor Internal TRM - Lighting
	Exterior LED or Induction replacing 251W - 400W HID	145	761	0.0000	110,360	0.0	Vendor Internal TRM - Lighting
	Exterior LED, T-1, or Electroluminescent Exit Signs	6	274	0.0313	1,643	0.2	Vendor Internal TRM - Lighting
	Exterior Permanent Lamp Removal - 8-ft T12 Lamp	30	297	0.0000	8,901	0.0	Vendor Internal TRM - Lighting
	Exterior Photocell and Time Clocks	8,065	2	0.0000	14,033	0.0	Vendor Internal TRM - Lighting
	Exterior Photocells	70,024	0	0.0000	32,911	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 100W or Less	62	318	0.0000	19,728	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 101W - 200W	64	559	0.0000	35,776	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 201W - 350W	154	576	0.0000	88,735	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 350W - 400W	50	1,785	0.0000	89,225	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 401W - 1000W	223	1,140	0.0000	254,109	0.0	Vendor Internal TRM - Lighting
	Exterior RW T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot RW T8 Lamps and Ballast	84	99	0.0000	8,308	0.0	Vendor Internal TRM - Lighting
	Exterior RW T8 - 4-ft Lamp and Ballast w T12 Base (Including U Tube)	24	56	0.0000	1,342	0.0	Vendor Internal TRM - Lighting
	Exterior Specialty CFL: PAR, Dimmable, 3-way (<=40W)	30	237	0.0000	7,095	0.0	Vendor Internal TRM - Lighting
	Exterior Specialty/High Wattage Screw-in CFLs (>31W)	2	387	0.0000	774	0.0	Vendor Internal TRM - Lighting
	Exterior Time Clocks	69,423	0	0.0001	29,852	6.9	Vendor Internal TRM - Lighting
	Garage Ceramic Discharge MH Probe Start Base, < 149W CDM	1	394	0.0000	394	0.0	Vendor Internal TRM - Lighting
	Garage HP T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot HP T8 Lamps and Ballast	56	162	0.0185	9,075	1.0	Vendor Internal TRM - Lighting
	Garage HP T8 - 4-ft Lamp and Ballast w T12 Base (Including U Tube)	360	114	0.0130	40,997	4.7	Vendor Internal TRM - Lighting
	Garage LED or Induction replacing 175W or Less HID	100	639	0.0730	63,948	7.3	Vendor Internal TRM - Lighting
	Garage LED or Induction replacing 251W - 400W HID	138	1,551	0.1770	213,972	24.4	Vendor Internal TRM - Lighting
	Garage LED, T-1, or Electroluminescent Exit Signs	31	274	0.0313	8,486	1.0	Vendor Internal TRM - Lighting
	Garage Permanent Lamp Removal - 8-ft T12 Lamp	49	604	0.0690	29,618	3.4	Vendor Internal TRM - Lighting
	Garage T5 - 4ft Lamp and Ballast w T12 Base	98	74	0.0085	7,297	0.8	Vendor Internal TRM - Lighting

Prescriptive Cont.	Green 12 inch	24	520	0.0593	12,476	1.4	Vendor Internal TRM - Lighting
	Green 12 inch ROUND	74	520	0.0593	38,469	4.4	Vendor Internal TRM - Lighting
	Green 8 inch	12	226	0.0258	2,712	0.3	Vendor Internal TRM - Lighting
	Green 8 inch ROUND	58	226	0.0258	13,109	1.5	Vendor Internal TRM - Lighting
	Interior 2-ft T12 to T8 or T5	967	40	0.0116	39,035	11.2	Vendor Internal TRM - Lighting
	Interior 2-ft T8 Lamp and Ballast w T12 Base	6,755	43	0.0106	292,999	71.5	Vendor Internal TRM - Lighting
	Interior 2-ft T8 Lamp and Ballast w T8 Base	154	13	0.0023	2,067	0.4	Vendor Internal TRM - Lighting
	Interior 3-ft T12 to T8 or T5	601	67	0.0134	40,018	8.0	Vendor Internal TRM - Lighting
	Interior 3-ft T8 Lamp and Ballast w T12 Base	944	55	0.0123	52,101	11.6	Vendor Internal TRM - Lighting
	Interior 4-ft U-Tube T12 to T8	1,793	39	0.0110	70,012	19.7	Vendor Internal TRM - Lighting
	Interior Bi-level Stairwell/Hall/Garage Fixture w/ integrated sensors	7	342	0.0390	2,391	0.3	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (15W or less)	6,228	114	0.0252	711,995	156.9	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (15W or less) - Guest Room	965	32	0.0080	31,266	7.7	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (16W to 26W)	2,908	239	0.0467	694,133	135.9	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (27W or 40W)	757	269	0.0541	203,620	40.9	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (27W or greater)	306	235	0.0557	71,842	17.0	Vendor Internal TRM - Lighting
	Interior CFL - Specialty (Downlight, Dimmable or 3-way)	642	196	0.0459	125,575	29.5	Vendor Internal TRM - Lighting
	Interior Ceramic Discharge MH Probe Start Base, 250W -399W CDM	4	375	0.0683	1,501	0.3	Vendor Internal TRM - Lighting
	Interior Cold Cathode	178	78	0.0152	13,845	2.7	Vendor Internal TRM - Lighting
	Interior Daylight Sensor Controls	7,778	1	0.0003	7,533	2.6	Vendor Internal TRM - Lighting
	Interior Daylighting Controls with Occ Sensors	59,615	1	0.0004	69,819	21.3	Vendor Internal TRM - Lighting
	Interior HP T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot HP T8 Lamps and Ballast	56,602	77	0.0185	4,376,325	1,048.1	Vendor Internal TRM - Lighting
	Interior HP T8 - 4-ft Lamp and Ballast	17,338	49	0.0122	855,761	211.0	Vendor Internal TRM - Lighting
	Interior HP T8 - 4-ft Lamp and Ballast w T12 Base (Including U Tube)	112,097	51	0.0122	5,669,672	1,366.4	Vendor Internal TRM - Lighting
	Interior HP T8 - 4-ft Lamp and Ballast w T8 Base (Including U Tube)	271	11	0.0030	3,007	0.8	Vendor Internal TRM - Lighting
	Interior HW CFL - 29W or Less	293	219	0.0386	64,212	11.3	Vendor Internal TRM - Lighting
	Interior HW CFL - 30W or Greater	40	344	0.0731	13,749	2.9	Vendor Internal TRM - Lighting
	Interior HW CFL - 30W to 60W	53	408	0.0809	21,641	4.3	Vendor Internal TRM - Lighting
	Interior Integrated Ballast Ceramic Metal Halide Lamps	12	188	0.0340	2,252	0.4	Vendor Internal TRM - Lighting
	Interior LED Fixture	230	202	0.0495	46,526	11.4	Vendor Internal TRM - Lighting
	Interior LED Lamp	600	238	0.0498	142,722	29.9	Vendor Internal TRM - Lighting
	Interior LED, T-1, or Electroluminescent Exit Signs	4,084	308	0.0416	1,257,997	169.8	Vendor Internal TRM - Lighting
	Interior OH T5 <= 51W w 54W T5 Base	1,090	8	0.0027	9,257	3.0	Vendor Internal TRM - Lighting
	Interior Occupancy Sensor	5,064,517	1	0.0001	6,006,448	444.5	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 2-ft Lamp	62	100	0.0292	6,215	1.8	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 2-ft T12 Lamp	479	80	0.0240	38,172	11.5	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 4-ft Lamp	10,111	166	0.0393	1,675,538	397.4	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 4-ft Lamp T8	604	89	0.0284	53,671	17.2	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 4-ft T12 Lamp	70,343	146	0.0380	10,290,818	2,671.8	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 8-ft Lamp	165	271	0.0769	44,771	12.7	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 8-ft T12 Lamp	7,368	295	0.0695	2,171,825	512.2	Vendor Internal TRM - Lighting
	Interior Pulse Start or Ceramic, 100W or Less	1	347	0.0632	347	0.1	Vendor Internal TRM - Lighting
	Interior Pulse Start or Ceramic, 101W - 200W	18	610	0.1111	10,978	2.0	Vendor Internal TRM - Lighting
	Interior Pulse Start or Ceramic, 201W - 350W	402	482	0.1113	193,822	44.7	Vendor Internal TRM - Lighting
	Interior Pulse Start or Ceramic, 401W - 1000W	129	1,243	0.2264	160,374	29.2	Vendor Internal TRM - Lighting
	Interior RW T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot RW T8 Lamps and Ballast	25,935	96	0.0226	2,486,951	586.2	Vendor Internal TRM - Lighting
	Interior RW T8 - 4-ft Lamp and Ballast	40,996	52	0.0150	2,114,109	614.8	Vendor Internal TRM - Lighting
	Interior RW T8 - 4-ft Lamp and Ballast w T12 Base (Including U Tube)	187,398	45	0.0119	8,391,794	2,236.2	Vendor Internal TRM - Lighting
	Interior RW T8 - 4-ft Lamp and Ballast w T8 Base (Including U Tube)	30,411	5	0.0014	139,750	41.8	Vendor Internal TRM - Lighting
	Interior RW T8 - 4-ft Reduced Watt Lamp only	110,546	17	0.0047	1,881,162	521.7	Vendor Internal TRM - Lighting
	Interior RW T8 - 8-ft Lamp and Ballast	5,482	104	0.0241	567,481	132.1	Vendor Internal TRM - Lighting
	Interior RW T8 - 8-ft Lamp only	744	37	0.0062	27,381	4.6	Vendor Internal TRM - Lighting
	Interior Specialty CFL: PAR, Dimmable, 3-way (<=40W)	1,221	247	0.0488	302,118	59.6	Vendor Internal TRM - Lighting
	Interior Specialty CFL: PAR, Dimmable, 3-way (<=40W) - Guest Room	4	56	0.0141	222	0.1	Vendor Internal TRM - Lighting
	Interior T12 to T5 retrofit - T5 lamps and new ballast	1,153	28	0.0073	32,323	8.4	Vendor Internal TRM - Lighting
	Interior T5 - 4ft Lamp and Ballast w T12 Base	5,041	33	0.0090	167,175	45.5	Vendor Internal TRM - Lighting
	Interior Time Clocks	68,787	0	0.0001	27,517	7.7	Vendor Internal TRM - Lighting
	LPD - Interior	1	117,460	38.1166	117,460	38.1	Vendor Internal TRM - Lighting
	Photocells	60,070	0	0.0000	16,820	0.0	Vendor Internal TRM - Lighting
	Red 12 inch	24	694	0.0792	16,651	1.9	Vendor Internal TRM - Lighting
	Red 12 inch ROUND	74	694	0.0792	51,341	5.9	Vendor Internal TRM - Lighting
	Red 8 inch	12	299	0.0341	3,585	0.4	Vendor Internal TRM - Lighting
	Red 8 inch ROUND	58	299	0.0341	17,326	2.0	Vendor Internal TRM - Lighting
	Walk/Dont Walk - 12 inch	228	946	0.1080	215,706	24.6	Vendor Internal TRM - Lighting
	Exterior ENERGY STAR and DLC LED Lamp and Fixture	1,158	901	0.0000	1,043,606	0.0	Vendor Internal TRM - Lighting
	Exterior Non-Standard LED or Induction Fixtures	2,975	1,189	0.0000	3,538,404	0.0	Vendor Internal TRM - Lighting
	Exterior Non-Standard Lighting	775	717	0.0000	555,758	0.0	Vendor Internal TRM - Lighting
	Exterior T8/T5 New Fluorescent Fixture w/Electronic Ballast	1,137	1,127	0.0000	1,281,864	0.0	Vendor Internal TRM - Lighting
	Garage ENERGY STAR and DLC LED Lamp and Fixture	30	769	0.0878	23,065	2.6	Vendor Internal TRM - Lighting
	Garage Non-Standard LED or Induction Fixtures	186	1,178	0.1345	219,123	25.0	Vendor Internal TRM - Lighting
	Garage T8/T5 New Fluorescent Fixture w/Electronic Ballast	29	2,136	0.2439	61,951	7.1	Vendor Internal TRM - Lighting
	Interior ENERGY STAR and DLC LED Lamp and Fixture	12,995	219	0.0503	2,849,987	653.7	Vendor Internal TRM - Lighting
	Interior Non-Standard LED or Induction Fixtures	13,069	511	0.0983	6,677,190	1,285.0	Vendor Internal TRM - Lighting
	Interior Non-Standard Lighting	6,146	414	0.1045	2,541,752	642.1	Vendor Internal TRM - Lighting
	Interior T8/T5 New Fluorescent Fixture w/Electronic Ballast	63,823	801	0.1776	51,099,982	11,336.8	Vendor Internal TRM - Lighting
	Interior T8/T5 New Fluorescent Fixture w/Electronic Ballast - BONUS	35	1,321	0.2714	46,223	9.5	Vendor Internal TRM - Lighting
	Compressed Air Receiver (Compressor Storage)	1,060	62	0.0090	66,144	9.5	Vendor Internal TRM - Misc.
	Cycling Air Dryer	2,231	20	0.0035	44,739	7.9	Vendor Internal TRM - Misc.
	Low Pressure Drop Filter	75	15	0.0032	1,124	0.2	Vendor Internal TRM - Misc.
	Networked Power Management Software	11,926	115	0.0000	1,371,490	0.0	Vendor Internal TRM - Misc.
	No Loss Condensate Drain	6	931	0.2017	5,586	1.2	Vendor Internal TRM - Misc.
	Prescriptive VSD Incentives for Compressors <= 100HP	1,127	1,435	0.2990	1,617,245	337.0	Vendor Internal TRM - Misc.
	Anti-Sweat Heater Controls	311	294	0.0340	91,434	10.6	Vendor Internal TRM - Refrigeration
	Beverage Machine Controls	58	1,612	0.0000	93,496	0.0	Vendor Internal TRM - Refrigeration
	EC Motor for Reach-in Refrigerator cases	489	345	0.0330	168,705	16.1	Vendor Internal TRM - Refrigeration
	EC Motor for Walk-in	542	864	0.0986	468,288	53.4	Vendor Internal TRM - Refrigeration
	ENERGY STAR Glass Door Freezer	4	2,035	0.2320	8,140	0.9	Vendor Internal TRM - Refrigeration
	ENERGY STAR Solid Door Freezer	3	1,548	0.1763	4,645	0.5	Vendor Internal TRM - Refrigeration
	ENERGY STAR Solid Door Refrigerator	7	643	0.0735	4,504	0.5	Vendor Internal TRM - Refrigeration
	Evaporator Fan Controls - ECM Motor	1	915	0.1045	915	0.1	Vendor Internal TRM - Refrigeration
	LED Refrigeration Case Lighting	106	464	0.0690	49,184	7.3	Vendor Internal TRM - Refrigeration
	LED Refrigeration Case Lighting in Freezers and Coolers w Doors	4,579	216	0.0320	988,606	146.5	Vendor Internal TRM - Refrigeration
	LED Refrigeration Case Lighting in Open Display Cases	2,564	172	0.0260	441,264	66.7	Vendor Internal TRM - Refrigeration
	Lighting Controls for Freezers and Coolers w Doors	571	170	0.0096	97,298	5.5	Vendor Internal TRM - Refrigeration
	Snack Machine Controls	36	387	0.0000	13,932	0.0	Vendor Internal TRM - Refrigeration
	VFD Air Compressor Motor	8	131,908	27.6286	1,055,265	221.0	Vendor Internal TRM - Motors and Drives
	VFD Chilled Water Pump	11	14,063	3.4980	154,693	38.5	Vendor Internal TRM - Motors and Drives
	VFD Condenser Water Pump	65	13,911	3.1220	904,247	202.9	Vendor Internal TRM - Motors and Drives
	VFD Cooling Tower Fan	9	3,746	0.3267	33,713	2.9	Vendor Internal TRM - Motors and Drives
	VFD Hot Water Pump	10	15,851	0.0000	158,508	0.0	Vendor Internal TRM - Motors and Drives
	VFD Other HVAC Motor	18	7,983	1.2933	143,697	23.3	Vendor Internal TRM - Motors and Drives
	VFD Supply/Return Fan -Backward Inclined - Inlet Guide Vanes	1	12,275	3.1500	12,275	3.2	Vendor Internal TRM - Motors and Drives
	VFD Supply/Return Fan -Default	251	7,769	1.2362	1,949,949	310.3	Vendor Internal TRM - Motors and Drives
	VFD for HVAC Chillers	2	276,982	17.9625	553,964	35.9	Vendor Internal TRM - Motors and Drives
	VFD for Kitchen Exhaust Fan - Retrofit Hood	38	9,326	1.5800	354,394	60.0	Vendor Internal TRM - Motors and Drives
	VFD for Other Motor (Non-HVAC)	5	888	0.1845	4,440	0.9	Vendor Internal TRM - Motors and Drives
	VFD for Process Motor	97	47,260	7.1502	4,584,255	693.6	Vendor Internal TRM - Motors and Drives
	50 HP Motor	3	1,261	0.2294	3,782	0.7	Vendor Internal TRM - Motors and Drives
	60 HP Motor	1	2,020	0.2806	2,020	0.3	Vendor Internal TRM - Motors and Drives
	15 HP Motor	2	474	0.1030	948	0.2	Vendor Internal TRM - Motors and Drives
	7.5 HP Motor	12	381	0.0830	4,572	1.0	Vendor Internal TRM - Motors and Drives
	25 HP Motor	2	789	0.1440	1,578	0.3	Vendor Internal TRM - Motors and Drives
	TOTALS				**142,331,358**	**30,227.6**	

2012 Ex Ante Savings

Program	Measure	Units	*Ex Ante* Per unit kWh impact	*Ex Ante* Per unit kW impact	Gross *Ex Ante* kWh Savings	Gross *Ex Ante* kW Savings	Source
Self Direct	Custom	36	450,270	33.3448	16,209,723	1,200.4	All Custom Measures are individually calculated using methodology consistent with the Draft Ohio 2009 TRM
	151 to 300 tons	4	21,005	19.4669	84,021	77.9	Vendor Internal TRM - Cooling
	< 65,000 Btu/h (5.4 tons) - 14 SEER	11	417	0.2457	4,582	2.7	Vendor Internal TRM - Cooling
	<75 tons	2	6,593	8.4886	13,186	17.0	Vendor Internal TRM - Cooling
	> 300 tons	3	107,383	76.7600	322,148	230.3	Vendor Internal TRM - Cooling
	>= 65,000 Btu/h and < 120,000 Btu/h (5.5-10 tons)	2	1,756	0.8145	3,512	1.6	Vendor Internal TRM - Cooling
	Air-Cooled Chillers	23	17,096	27.6327	393,217	635.6	Vendor Internal TRM - Cooling
	Air-Cooled Chillers >=150 tons	1	24,090	18.5130	24,090	18.5	Vendor Internal TRM - Cooling
	Hotel Guest Room Occupancy Sensor (Non-Electric Heat)	126	334	0.1590	42,084	20.0	Vendor Internal TRM - Cooling
	PTAC/PTHP	180	213	0.1920	38,429	34.6	Vendor Internal TRM - Cooling
	Room AC >= 14,000 Btu/h and < 20,000 Btu/h (1.3 - 1.7 tons)	1	171	0.2190	171	0.2	Vendor Internal TRM - Cooling
	Room AC >= 20,000 Btu/h (> 1.7 tons)	6	264	0.3403	1,583	2.0	Vendor Internal TRM - Cooling
	Unitary & Split < 65,000 Btu/h (5.4 tons)	4	421	0.3345	1,683	1.3	Vendor Internal TRM - Cooling
	Unitary & Split >= 240,000 Btu/h and < 760,000 Btu/h (20-63 tons)	3	2,840	2.5472	8,519	7.6	Vendor Internal TRM - Cooling
	Unitary & Split >= 65,000 Btu/h and < 120,000 Btu/h (5.5-10 tons)	3	1,074	1.3341	3,223	4.0	Vendor Internal TRM - Cooling
	Unitary & Split >=120,000 Btu/h and < 240,000 Btu/h (10-19.9 tons)	1	1,189	1.8673	1,189	1.9	Vendor Internal TRM - Cooling
	101-400	1	394	0.0610	394	0.1	Vendor Internal TRM - Cooling
	Exterior HW CFL - 30W or Greater	7	391	0.0000	2,739	0.0	Vendor Internal TRM - Lighting
	Exterior Photocells	572	0	0.0000	269	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 100W or Less	5	318	0.0000	1,591	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 101W - 200W	1	559	0.0000	559	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 201W - 350W	12	576	0.0000	6,914	0.0	Vendor Internal TRM - Lighting
	Exterior Pulse Start or Ceramic, 350W - 400W	14	1,785	0.0000	24,983	0.0	Vendor Internal TRM - Lighting
	Exterior Specialty/High Wattage Screw-in CFLs (>31W)	11	387	0.0000	4,257	0.0	Vendor Internal TRM - Lighting
	Green 8 inch	10	76	0.0109	764	0.1	Vendor Internal TRM - Lighting
	Interior 2-ft T12 to T8 or T5	1,410	34	0.0095	48,008	13.4	Vendor Internal TRM - Lighting
	Interior 2-ft T8 Lamp and Ballast w T12 Base	1,560	43	0.0104	67,349	16.2	Vendor Internal TRM - Lighting
	Interior 3-ft T12 to T8 or T5	34	42	0.0114	1,419	0.4	Vendor Internal TRM - Lighting
	Interior 3-ft T8 Lamp and Ballast w T12 Base	14	53	0.0127	736	0.2	Vendor Internal TRM - Lighting
	Interior 4-ft U-Tube T12 to T8	432	34	0.0109	14,670	4.7	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (15W or less)	3,361	99	0.0239	332,966	80.5	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (16W to 26W)	365	192	0.0432	69,899	15.8	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (27W or 40W)	98	235	0.0500	23,036	4.9	Vendor Internal TRM - Lighting
	Interior CFL - Screw-in (27W or greater)	85	215	0.0619	18,255	5.3	Vendor Internal TRM - Lighting
	Interior CFL - Specialty (Downlight, Dimmable or 3-way)	20	245	0.0421	4,897	0.8	Vendor Internal TRM - Lighting
	Interior Daylight Sensor Controls	128,591	2	0.0003	203,188	39.8	Vendor Internal TRM - Lighting
	Interior Daylighting Controls with Occ Sensors	4,831	1	0.0005	5,042	2.5	Vendor Internal TRM - Lighting
	Interior HP T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot HP T8 Lamps an	80	56	0.0155	4,441	1.2	Vendor Internal TRM - Lighting
	Interior HP T8 - 4-ft Lamp and Ballast	14,837	48	0.0117	706,891	173.2	Vendor Internal TRM - Lighting
	Interior HP T8 - 4-ft Lamp and Ballast w T12 Base (Including U Tube)	723	39	0.0125	28,387	9.0	Vendor Internal TRM - Lighting
	Interior HW CFL - 29W or Less	29	159	0.0465	4,607	1.3	Vendor Internal TRM - Lighting
	Interior HW CFL - 30W or Greater	193	265	0.0776	51,143	15.0	Vendor Internal TRM - Lighting
	Interior HW CFL - 61W to 120W	34	292	0.0621	9,936	2.1	Vendor Internal TRM - Lighting
	Interior LED Fixture	35	176	0.0515	6,167	1.8	Vendor Internal TRM - Lighting
	Interior LED, T-1, or Electroluminescent Exit Signs	357	307	0.0425	109,657	15.2	Vendor Internal TRM - Lighting
	Interior Occupancy Sensor	1,482,569	1	0.0000	1,380,489	48.3	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 4-ft Lamp	1,360	162	0.0354	220,719	48.1	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 4-ft T12 Lamp	2,086	156	0.0363	325,117	75.8	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 8-ft Lamp	9	206	0.0564	1,851	0.5	Vendor Internal TRM - Lighting
	Interior Permanent Lamp Removal - 8-ft T12 Lamp	3	224	0.0761	671	0.2	Vendor Internal TRM - Lighting
	Interior Pulse Start or Ceramic, 100W or Less	353	347	0.0632	122,547	22.3	Vendor Internal TRM - Lighting
	Interior Pulse Start or Ceramic, 350W - 400W	20	1,145	0.3716	22,896	7.4	Vendor Internal TRM - Lighting
	Interior RW T8 - 1-Lamp 8-foot T12 to 2-Lamp 4-foot RW T8 Lamps a	3,928	86	0.0208	339,160	81.7	Vendor Internal TRM - Lighting
	Interior RW T8 - 4-ft Lamp and Ballast	3,653	45	0.0140	164,480	51.2	Vendor Internal TRM - Lighting
	Interior RW T8 - 4-ft Lamp and Ballast w T12 Base (Including U Tube)	5,388	49	0.0125	263,665	67.1	Vendor Internal TRM - Lighting
	Interior RW T8 - 4-ft Reduced Watt Lamp only	12,047	21	0.0053	254,207	63.4	Vendor Internal TRM - Lighting
	Interior RW T8 - 8-ft Lamp and Ballast	300	99	0.0264	29,647	7.9	Vendor Internal TRM - Lighting
	Interior Specialty CFL: PAR, Dimmable, 3-way (<=40W)	2,492	167	0.0408	417,223	101.7	Vendor Internal TRM - Lighting
	Interior T5 - 4ft Lamp and Ballast w T12 Base	260	25	0.0070	6,589	1.8	Vendor Internal TRM - Lighting
	LPD - Garage	1	313,548	35.7931	313,548	35.8	Vendor Internal TRM - Lighting
	LPD - Interior	31	71,554	15.4069	2,218,187	477.6	Vendor Internal TRM - Lighting
	Photocells	14,509	0	0.0000	4,063	0.0	Vendor Internal TRM - Lighting
	Red 8 inch	10	299	0.0341	2,987	0.3	Vendor Internal TRM - Lighting
	Walk/Dont Walk - 12 inch	10	946	0.1080	9,461	1.1	Vendor Internal TRM - Lighting
	Exterior Non-Standard LED or Induction Fixtures	1	370	0.0000	370	0.0	Vendor Internal TRM - Lighting
	Exterior Non-Standard Lighting	22	1,141	0.0000	25,112	0.0	Vendor Internal TRM - Lighting
	Exterior T8/T5 New Fluorescent Fixture w/Electronic Ballast	64	649	0.0000	41,555	0.0	Vendor Internal TRM - Lighting
	Interior ENERGY STAR and DLC LED Lamp and Fixture	160	207	0.0496	33,124	7.9	Vendor Internal TRM - Lighting
	Interior Non-Standard Lighting	6	18,597	4.4495	111,582	26.7	Vendor Internal TRM - Lighting
	Interior T8/T5 New Fluorescent Fixture w/Electronic Ballast	3,955	932	0.1966	3,684,520	777.5	Vendor Internal TRM - Lighting
	Anti-Sweat Heater Controls	2,304	294	0.0340	677,376	78.3	Vendor Internal TRM - Refrigeration
	Beverage Machine Controls	33	1,612	0.0000	53,196	0.0	Vendor Internal TRM - Refrigeration
	EC Motor for Reach-in Refrigerator cases	26	345	0.0330	8,970	0.9	Vendor Internal TRM - Refrigeration
	EC Motor for Walk-in	121	864	0.0986	104,544	11.9	Vendor Internal TRM - Refrigeration
	ENERGY STAR Solid Door Freezer	1	1,695	0.1930	1,695	0.2	Vendor Internal TRM - Refrigeration
	LED Refrigeration Case Lighting in Freezers and Coolers w Doors	940	216	0.0320	202,946	30.1	Vendor Internal TRM - Refrigeration
	LED Refrigeration Case Lighting in Open Display Cases	35	172	0.0260	6,024	0.9	Vendor Internal TRM - Refrigeration
	Lighting Controls for Freezers and Coolers w Doors	521	170	0.0096	88,778	5.0	Vendor Internal TRM - Refrigeration
	Steam Cookers	7	4,419	1.0000	30,933	7.0	Vendor Internal TRM - Refrigeration
	VFD Air Compressor Motor	1	96,145	20.0330	96,145	20.0	Vendor Internal TRM - Motors and Drives
	VFD Chilled Water Pump	21	17,997	3.6876	377,940	77.4	Vendor Internal TRM - Motors and Drives
	VFD Condenser Water Pump	3	7,467	3.0333	22,400	9.1	Vendor Internal TRM - Motors and Drives
	VFD Cooling Tower Fan	10	5,855	0.4320	58,548	4.3	Vendor Internal TRM - Motors and Drives
	VFD Hot Water Pump	19	27,895	0.0000	530,008	0.0	Vendor Internal TRM - Motors and Drives
	VFD Supply/Return Fan -Default	111	15,522	2.9048	1,722,936	322.4	Vendor Internal TRM - Motors and Drives
	VFD for Kitchen Exhaust Fan - New Hood	19	17,944	3.0400	340,936	57.8	Vendor Internal TRM - Motors and Drives

Self Direct cont.	VFD for Other Motor (Non-HVAC)	5	3,552	0.7380	17,760	3.7	Vendor Internal TRM - Motors and Drives
	VFD for Process Motor	90	23,425	4.0606	2,108,276	365.5	Vendor Internal TRM - Motors and Drives
	e20 and <30% (Owner)	1	468,796	172.0000	468,796	172.0	Individually modeled by Vendor
	1 HP Motor	6	48	0.0133	290	0.1	Vendor Internal TRM - Motors and Drives
	1.5 HP Motor	4	79	0.0210	316	0.1	Vendor Internal TRM - Motors and Drives
	10 HP Motor	4	509	0.1110	2,036	0.4	Vendor Internal TRM - Motors and Drives
	100 HP Motor	3	3,002	0.4170	9,006	1.3	Vendor Internal TRM - Motors and Drives
	15 HP Motor	10	657	0.1436	6,573	1.4	Vendor Internal TRM - Motors and Drives
	2 HP Motor	6	106	0.0280	636	0.2	Vendor Internal TRM - Motors and Drives
	20 HP Motor	6	897	0.1960	5,382	1.2	Vendor Internal TRM - Motors and Drives
	3 HP Motor	6	179	0.0480	1,074	0.3	Vendor Internal TRM - Motors and Drives
	30 HP Motor	3	1,335	0.2430	4,005	0.7	Vendor Internal TRM - Motors and Drives
	40 HP Motor	3	1,144	0.2080	3,432	0.6	Vendor Internal TRM - Motors and Drives
	5 HP Motor	17	196	0.0530	3,332	0.9	Vendor Internal TRM - Motors and Drives
	50 HP Motor	9	1,728	0.3143	15,556	2.8	Vendor Internal TRM - Motors and Drives
	60 HP Motor	3	2,817	0.3910	8,451	1.2	Vendor Internal TRM - Motors and Drives
	7.5 HP Motor	3	442	0.0960	1,326	0.3	Vendor Internal TRM - Motors and Drives
	75 HP Motor	2	2,251	0.3130	4,502	0.6	Vendor Internal TRM - Motors and Drives
	Total				**35,882,418**	**5,742.3**	

Program	Measure	Units	*Ex Ante* Per unit kWh impact	*Ex Ante* Per unit kW impact	Gross *Ex Ante* kWh Savings	Gross *Ex Ante* kW Savings	Source
Express	(1) 1-4 32W T8 PLUS 1-2 17W T8	1	256	0.0003	256	0.1	Vendor Internal TRM - Lighting
	(2) LED WALLPACK 45W	10	549	0.0000	5,491	0.0	Vendor Internal TRM - Lighting
	1 - 4' 28/25W-RWT8-EB1	46	48	0.0176	2,230	0.9	Vendor Internal TRM - Lighting
	100W HPS	5	1,705	0.0009	8,523	1.5	Vendor Internal TRM - Lighting
	100W MH	1	281	0.0003	281	0.1	Vendor Internal TRM - Lighting
	100W WALL PACK FLOOD	20	867	0.0020	17,345	1.8	Vendor Internal TRM - Lighting
	10-4 49W T5 EB1	44	1,986	0.0137	87,397	27.2	Vendor Internal TRM - Lighting
	105W CF-SCRW	10	511	0.0032	5,114	1.6	Vendor Internal TRM - Lighting
	10W LED WALLPACK	1	250	0.0000	250	0.0	Vendor Internal TRM - Lighting
	10W LED-HW	10	517	0.0010	5,165	0.5	Vendor Internal TRM - Lighting
	10W PAR20 LED FLOOD	5	110	0.0014	551	0.2	Vendor Internal TRM - Lighting
	11.8W RECESSED LED DOWNLIGHT	19	189	0.0046	3,583	0.9	Vendor Internal TRM - Lighting
	1-2' 17W-T8-EB2	43	23	0.0167	985	0.4	Vendor Internal TRM - Lighting
	12W LED	4	157	0.0015	627	0.2	Vendor Internal TRM - Lighting
	12W LED PAR30	83	216	0.0204	17,887	4.4	Vendor Internal TRM - Lighting
	12W LED T8 TUBE	2	466	0.0002	932	0.1	Vendor Internal TRM - Lighting
	12W LED-RETRO	59	245	0.0127	14,440	3.1	Vendor Internal TRM - Lighting
	12W LED-SCRW	13	119	0.0000	1,541	0.0	Vendor Internal TRM - Lighting
	12W-LED-HW	49	91	0.0125	4,448	1.1	Vendor Internal TRM - Lighting
	1-3' 25W T8 HPEB1	5	248	0.0000	1,240	0.0	Vendor Internal TRM - Lighting
	1-3' 25W-T8-EB1	21	50	0.0047	1,053	0.2	Vendor Internal TRM - Lighting
	1-3' 25W-T8-LPEB1	7	38	0.0030	264	0.1	Vendor Internal TRM - Lighting
	13W CFL	2	211	0.0006	422	0.1	Vendor Internal TRM - Lighting
	13W CF-SCRW	585	124	0.1656	72,511	20.5	Vendor Internal TRM - Lighting
	13W CF-SCRW/R	15	147	0.0037	2,211	0.5	Vendor Internal TRM - Lighting
	13W RAB LED FLOOD	2	710	0.0004	1,420	0.3	Vendor Internal TRM - Lighting
	1-4 15W LED TUBES	3	558	0.0002	1,673	0.1	Vendor Internal TRM - Lighting
	1-4 15W T8 TUBE	2	242	0.0002	485	0.1	Vendor Internal TRM - Lighting
	1-4 17W T8 EB1	5	88	0.0015	440	0.1	Vendor Internal TRM - Lighting
	1-4 25W RWT8 LPEB1 2300 K	6	76	0.0051	457	0.4	Vendor Internal TRM - Lighting
	1-4 25W RWT8 LPEB1	22	126	0.0176	2,773	2.2	Vendor Internal TRM - Lighting
	1-4 25W T8 EB1	1	92	0.0005	92	0.0	Vendor Internal TRM - Lighting
	1-4' 28/25W T8 EB1	2	69	0.0018	138	0.1	Vendor Internal TRM - Lighting
	1-4 28/25W T8 EB2	3	100	0.0007	301	0.1	Vendor Internal TRM - Lighting
	1-4' 28/25W-RWT8-EB1	15	98	0.0042	1,468	0.4	Vendor Internal TRM - Lighting
	1-4' 28/25W-RWT8-LPEB2	36	79	0.0100	2,853	0.8	Vendor Internal TRM - Lighting
	1-4' 28/25W-T8-LPEB1	16	53	0.0060	854	0.3	Vendor Internal TRM - Lighting
	1-4 28W RWT8 EB1	10	48	0.0030	480	0.1	Vendor Internal TRM - Lighting
	1-4 28W T8 EB2	51	93	0.0195	4,751	1.8	Vendor Internal TRM - Lighting
	1-4' 28W T8-HPEB1	1	265	0.0005	265	0.1	Vendor Internal TRM - Lighting
	1-4' 28W-EB1	9	222	0.0027	1,998	0.6	Vendor Internal TRM - Lighting
	1-4' 28W-T5-EB1	3	10	0.0028	30	0.0	Vendor Internal TRM - Lighting
	1-4' 28W-T8-HPEB1-R	2	290	0.0004	580	0.1	Vendor Internal TRM - Lighting
	1-4' 28W-T8-LPEB1	37	57	0.0131	2,126	0.8	Vendor Internal TRM - Lighting
	1-4' 32W HPT8 EB1	21	263	0.0049	5,513	1.3	Vendor Internal TRM - Lighting
	1-4' 32W T8 EB1	244	101	0.0546	24,525	5.5	Vendor Internal TRM - Lighting
	1-4' 32W T8 EB1-R	21	161	0.0063	3,377	1.0	Vendor Internal TRM - Lighting
	1-4' 32W T8 NEW FIXTURE	6	333	0.0018	1,998	0.6	Vendor Internal TRM - Lighting
	1-4' 32W-T8-HPEB1	124	109	0.0381	13,572	4.2	Vendor Internal TRM - Lighting
	1-4' 32W-T8-HPEB1-R	40	140	0.0117	5,598	1.6	Vendor Internal TRM - Lighting
	1-4' 32W-T8-LPEB1	372	150	0.0992	55,660	14.8	Vendor Internal TRM - Lighting
	14W CF-SCRW	9	286	0.0015	2,570	0.4	Vendor Internal TRM - Lighting
	14W LED LAMP	57	189	0.0159	10,794	3.0	Vendor Internal TRM - Lighting
	14W LED PAR30	33	172	0.0084	5,664	1.4	Vendor Internal TRM - Lighting
	1-5 25W LED TUBE	2	707	0.0002	1,415	0.1	Vendor Internal TRM - Lighting
	1-5' 40W-T8-EB1	9	636	0.0011	5,723	0.7	Vendor Internal TRM - Lighting
	150W INDUCTION LIGHTING RETROFIT KIT	10	740	0.0037	7,403	2.8	Vendor Internal TRM - Lighting
	15W CF-DRUM	2	164	0.0004	328	0.1	Vendor Internal TRM - Lighting
	15W CF-HW	15	255	0.0021	3,829	0.5	Vendor Internal TRM - Lighting
	15W CF-SCRW	192	208	0.0364	39,901	7.6	Vendor Internal TRM - Lighting
	15W CF-SCRW/R	61	172	0.0163	10,471	2.8	Vendor Internal TRM - Lighting
	15W LED TUBE	4	320	0.0004	1,278	0.1	Vendor Internal TRM - Lighting
	1-6 30W LED TUBE	13	699	0.0010	9,089	0.7	Vendor Internal TRM - Lighting
	16W CF-SCRW	18	313	0.0030	5,631	0.9	Vendor Internal TRM - Lighting
	17W LED PAR38	4	228	0.0000	911	0.0	Vendor Internal TRM - Lighting

Express cont.	17W LED PAR38 FLOOD	8	181	0.0000	1,448	0.0	Vendor Internal TRM - Lighting
	1-8 35W LED TUBE	4	583	0.0003	2,330	0.2	Vendor Internal TRM - Lighting
	1-8' 54W-T8-EB1	8	69	0.0024	551	0.2	Vendor Internal TRM - Lighting
	1-8' 55W-T8-HPEB1	24	189	0.0109	4,533	2.1	Vendor Internal TRM - Lighting
	1-8' 59W-T8-EB1	1	101	0.0001	101	0.0	Vendor Internal TRM - Lighting
	1-8' 59W-T8-HPEB1	71	276	0.0160	19,561	4.4	Vendor Internal TRM - Lighting
	18W CF-HW	31	73	0.0029	2,267	0.2	Vendor Internal TRM - Lighting
	18W CF-SCRW	55	170	0.0152	9,324	2.6	Vendor Internal TRM - Lighting
	18W CF-SCRW/R	5	171	0.0011	856	0.2	Vendor Internal TRM - Lighting
	1X2 25W T8 U HPEB1 UTUBE	2	64	0.0018	128	0.1	Vendor Internal TRM - Lighting
	1X2-25W-U-T8HPEB1	7	191	0.0021	1,340	0.4	Vendor Internal TRM - Lighting
	1X4 25W LPEB1	2	136	0.0003	271	0.0	Vendor Internal TRM - Lighting
	1X4 25W T8 LPEB1	8	56	0.0036	449	0.2	Vendor Internal TRM - Lighting
	200W INDUCTION LIGHT KIT	21	859	0.0059	18,036	5.1	Vendor Internal TRM - Lighting
	20W CF-SCRW	6	210	0.0017	1,261	0.4	Vendor Internal TRM - Lighting
	20W LED-SCRW	117	260	0.0289	30,390	7.5	Vendor Internal TRM - Lighting
	2-2' 17W T8 EB1	88	89	0.0278	7,858	2.5	Vendor Internal TRM - Lighting
	2-2 17W T8- EB1-R	2	94	0.0006	189	0.1	Vendor Internal TRM - Lighting
	2-2' 17W-T8-EB	1	156	0.0003	156	0.0	Vendor Internal TRM - Lighting
	2-2' 17W-T8-EB1-R	1	110	0.0004	110	0.0	Vendor Internal TRM - Lighting
	2-2' 17W-T8-HPEB1	22	154	0.0042	3,386	0.7	Vendor Internal TRM - Lighting
	2-2' 17W-T8-HPEB1-R	113	97	0.0329	10,940	3.2	Vendor Internal TRM - Lighting
	2-2' 17W-T8-LPEB1	24	48	0.0062	1,162	0.3	Vendor Internal TRM - Lighting
	2-2 31W T8U EB1	1	85	0.0009	85	0.1	Vendor Internal TRM - Lighting
	2-2' 31W-U-T8-EB1	6	16	0.0052	97	0.1	Vendor Internal TRM - Lighting
	2-2' 32W-T8U-EB1	68	59	0.0174	4,031	1.0	Vendor Internal TRM - Lighting
	2-28W-T8-EB1	1	278	0.0000	278	0.0	Vendor Internal TRM - Lighting
	22W 6 FT LED T8 TUBE	8	766	0.0006	6,126	0.5	Vendor Internal TRM - Lighting
	2-3' 25W-T8-EB1	2	19	0.0012	38	0.0	Vendor Internal TRM - Lighting
	2-32W CFL-HW	16	599	0.0013	9,586	0.8	Vendor Internal TRM - Lighting
	23W CF-SCRW	95	332	0.0135	31,540	4.5	Vendor Internal TRM - Lighting
	23W CF-SCRW/R	170	182	0.0363	30,991	6.6	Vendor Internal TRM - Lighting
	2-4 25/28W RWT8 EB1	4	101	0.0004	403	0.0	Vendor Internal TRM - Lighting
	2-4' 25W T8 LPEB1	22	111	0.0066	2,442	0.7	Vendor Internal TRM - Lighting
	2-4 25W T8 EB	1	23	0.0003	23	0.0	Vendor Internal TRM - Lighting
	2-4 25W T8 EB1	20	254	0.0081	5,077	2.1	Vendor Internal TRM - Lighting
	2-4' 25W-T8-HPEB1	1	(202)	0.0001	(202)	(0.0)	Vendor Internal TRM - Lighting
	2-4' 28/25W RWT8-EB1	6	(9)	0.0092	(56)	(0.1)	Vendor Internal TRM - Lighting
	2-4 28/25W T8 LPEB1	61	161	0.0064	9,820	1.0	Vendor Internal TRM - Lighting
	2-4 28/25W T8-EB1-R	72	240	0.0302	17,265	7.2	Vendor Internal TRM - Lighting
	2-4' 28/25W-RWT8-EB1	1,163	193	0.3042	224,615	58.8	Vendor Internal TRM - Lighting
	2-4' 28/25W-RWT8-EB1 TANDEM	11	84	0.0033	926	0.3	Vendor Internal TRM - Lighting
	2-4' 28/25W-RWT8-EB1-R	153	277	0.0587	42,390	16.3	Vendor Internal TRM - Lighting
	2-4' 28/25W-RWT8-HPEB1	13	234	0.0046	3,037	1.1	Vendor Internal TRM - Lighting
	2-4' 28/25W-RWT8-HPEB1-R	33	324	0.0084	10,682	2.7	Vendor Internal TRM - Lighting
	2-4' 28/25W-RWT8-LPEB1	2,555	219	0.5111	559,355	111.9	Vendor Internal TRM - Lighting
	2-4' 28/25W-T8-EB1	9	503	0.0010	4,523	0.5	Vendor Internal TRM - Lighting
	2-4 28W RWT8 EB1	1	171	0.0004	171	0.1	Vendor Internal TRM - Lighting
	2-4 28W RWT8 EB1 NF	2	91	0.0018	181	0.2	Vendor Internal TRM - Lighting
	2-4 28W RWT8 EB1-R	10	400	0.0018	3,995	0.7	Vendor Internal TRM - Lighting
	2-4 28W RWT8 HPEB1	4	272	0.0012	1,087	0.3	Vendor Internal TRM - Lighting
	2-4' 28W T8 EB1	162	258	0.0439	41,737	11.3	Vendor Internal TRM - Lighting
	2-4' 28W T-8 EB1 KITS	38	167	0.0172	6,347	2.9	Vendor Internal TRM - Lighting
	2-4 28W T8 EB1-R	52	316	0.0138	16,408	4.4	Vendor Internal TRM - Lighting
	2-4 28W T8 EB-R	24	419	0.0043	10,053	1.8	Vendor Internal TRM - Lighting
	2-4 28W T8 HPEB1	10	508	0.0015	5,084	0.8	Vendor Internal TRM - Lighting
	2-4 28W T8 HPEB1-R	27	220	0.0065	5,936	1.4	Vendor Internal TRM - Lighting
	2-4' 28W T8-EB1 RETRO FIT KIT	8	217	0.0036	1,735	0.8	Vendor Internal TRM - Lighting
	2-4' 28W/25W T8 EB1	47	295	0.0165	13,861	4.9	Vendor Internal TRM - Lighting
	2-4' 28W-T5-EB1	2	42	0.0005	83	0.0	Vendor Internal TRM - Lighting
	2-4' 28W-T8-EB1 KIT	11	422	0.0050	4,638	2.1	Vendor Internal TRM - Lighting
	2-4 32W HPT8 EB1	4	56	0.0011	223	0.1	Vendor Internal TRM - Lighting
	2-4' 32W HPT8 EB1 NF	16	1,241	0.0000	19,850	0.0	Vendor Internal TRM - Lighting
	2-4 32W HPT8 HPEB1	60	182	0.0223	10,923	4.1	Vendor Internal TRM - Lighting
	2-4 32W RWT8 LPEB1	16	(21)	0.0062	(335)	(0.1)	Vendor Internal TRM - Lighting
	2-4 32W T8 EB1	679	247	0.1785	167,978	44.2	Vendor Internal TRM - Lighting
	2-4 32W T8 EB1 NF	58	430	0.0117	24,927	5.0	Vendor Internal TRM - Lighting
	2-4 32W T8 EB1-R	38	360	0.0114	13,661	4.1	Vendor Internal TRM - Lighting
	2-4' 32W T8-8' NEW FIXTURE	10	234	0.0030	2,335	0.7	Vendor Internal TRM - Lighting
	2-4' 32W T8-EB1	10,209	318	2.5449	3,243,658	808.6	Vendor Internal TRM - Lighting

Express cont.	2-4' 32W T8-EB1-R	1,699	303	0.4799	515,509	145.6	Vendor Internal TRM - Lighting
	2-4' 32W T8-LPEB1	411	86	0.1101	35,297	9.5	Vendor Internal TRM - Lighting
	2-4' 32W-T8-HPEB1	243	279	0.0712	67,716	19.8	Vendor Internal TRM - Lighting
	2-4' 32W-T8-HPEB1-R	652	316	0.1456	205,972	46.0	Vendor Internal TRM - Lighting
	2-4' 54W T5 EB1	26	536	0.0097	13,931	5.2	Vendor Internal TRM - Lighting
	2-42W CFL WALLPACK	4	1,088	0.0016	4,352	1.7	Vendor Internal TRM - Lighting
	24W CF-SCRW DIMMABLE	21	176	0.0034	3,705	0.6	Vendor Internal TRM - Lighting
	250W MH	2	334	0.0000	669	0.0	Vendor Internal TRM - Lighting
	26W CFL	2	67	0.0000	133	0.0	Vendor Internal TRM - Lighting
	26W CF-SCRW	15	289	0.0037	4,331	1.1	Vendor Internal TRM - Lighting
	26W CF-SCRW/R	19	363	0.0029	6,899	1.1	Vendor Internal TRM - Lighting
	26W LED WALLPACK	1	1,479	0.0000	1,479	0.0	Vendor Internal TRM - Lighting
	2-8' 54W-T8-EB1	41	115	0.0124	4,709	1.4	Vendor Internal TRM - Lighting
	2-8' 56W-T8-EB1	1	24	0.0007	24	0.0	Vendor Internal TRM - Lighting
	2-8' 59W-T8 EB	16	456	0.0051	7,288	2.3	Vendor Internal TRM - Lighting
	2-8' 59W-T8-EB1	48	94	0.0121	4,522	1.1	Vendor Internal TRM - Lighting
	2-8' 59W-T8-HPEB1-R	20	216	0.0065	4,313	1.4	Vendor Internal TRM - Lighting
	2-8' 59W-T8-LPEB1	59	129	0.0170	7,584	2.2	Vendor Internal TRM - Lighting
	28W CF-SCRW	64	203	0.0226	12,976	4.6	Vendor Internal TRM - Lighting
	28W CF-SCRW/R	27	263	0.0066	7,108	1.7	Vendor Internal TRM - Lighting
	2X 4' 32W T8-EB1 NF	4	230	0.0012	919	0.3	Vendor Internal TRM - Lighting
	2X2 T8 17W. EB1	1	71	0.0004	71	0.0	Vendor Internal TRM - Lighting
	2X4 25W T8 LPEB1	118	225	0.0295	26,556	6.6	Vendor Internal TRM - Lighting
	320W PS MH	1	343	0.0000	343	0.0	Vendor Internal TRM - Lighting
	32W-CF-HD	4	590	0.0010	2,358	0.6	Vendor Internal TRM - Lighting
	32W-CF-HW	8	328	0.0020	2,627	0.7	Vendor Internal TRM - Lighting
	33W HARDWIRED CFL	10	412	0.0000	4,118	0.0	Vendor Internal TRM - Lighting
	3-4' 28/25W RWT8-EB1	462	264	0.1366	121,920	36.1	Vendor Internal TRM - Lighting
	3-4' 28/25W-RWT8-LPEB1	49	219	0.0142	10,752	3.1	Vendor Internal TRM - Lighting
	3-4 28W T8 EB1	11	118	0.0057	1,302	0.7	Vendor Internal TRM - Lighting
	3-4 32W T8 EB1	181	179	0.0596	32,360	10.7	Vendor Internal TRM - Lighting
	3-4' 54W-T5-EB1	3	1,057	0.0009	3,170	1.0	Vendor Internal TRM - Lighting
	39 WATT RAB LED	4	515	0.0013	2,059	0.7	Vendor Internal TRM - Lighting
	3W LED GLOBE	42	136	0.0118	5,731	1.6	Vendor Internal TRM - Lighting
	400W MH	2	3,335	0.0000	6,670	0.0	Vendor Internal TRM - Lighting
	4-2' 17W-T8-EB1	5	10	0.0029	48	0.0	Vendor Internal TRM - Lighting
	42W CF-HW	2	524	0.0000	1,048	0.0	Vendor Internal TRM - Lighting
	42W CF-SCRW	72	337	0.0000	24,261	0.0	Vendor Internal TRM - Lighting
	42W CF-WALLPACK	12	370	0.0019	4,446	0.7	Vendor Internal TRM - Lighting
	42W FLUORESCENT FLOOD	7	60	0.0000	419	0.0	Vendor Internal TRM - Lighting
	4-4' 25/28W T8 LPEB1	16	301	0.0019	4,820	0.6	Vendor Internal TRM - Lighting
	4-4' 25W-T8-EB1	36	623	0.0064	22,442	4.0	Vendor Internal TRM - Lighting
	4-4' 25W-T8-HPEB1	9	745	0.0011	6,707	0.8	Vendor Internal TRM - Lighting
	4-4' 28/25W-RWT8-EB1	1,137	281	0.3533	319,056	99.1	Vendor Internal TRM - Lighting
	4-4' 28/25W-RWT8-EB1 TANDEM	5	180	0.0015	900	0.3	Vendor Internal TRM - Lighting
	4-4' 28/25W-RWT8-EB2	109	238	0.0276	25,922	6.6	Vendor Internal TRM - Lighting
	4-4' 28/25W-RWT8-LPEB1	278	218	0.0945	60,739	20.7	Vendor Internal TRM - Lighting
	4-4' 28/25W-RWT8-LPEB2	2	182	0.0006	364	0.1	Vendor Internal TRM - Lighting
	4-4 28W RWT8 LPEB1	23	605	0.0055	13,909	3.3	Vendor Internal TRM - Lighting
	4-4 28W T-8	16	171	0.0040	2,738	0.7	Vendor Internal TRM - Lighting
	4-4' 28W T8 EB1	269	264	0.0985	70,981	26.0	Vendor Internal TRM - Lighting
	4-4 28W T8 EB1 (NEW FIXTURE)	2	1,416	0.0006	2,833	0.9	Vendor Internal TRM - Lighting
	4-4 28W T8 EB2	21	694	0.0021	14,574	1.5	Vendor Internal TRM - Lighting
	4-4 28W T8 HPEB1	4	1,696	0.0005	6,783	0.8	Vendor Internal TRM - Lighting
	4-4 28W T8 LPEB	1	218	0.0003	218	0.1	Vendor Internal TRM - Lighting
	4-4 28W T8 LPEB1	15	445	0.0045	6,673	2.0	Vendor Internal TRM - Lighting
	4-4 28W/25W T8 EB1	14	223	0.0000	3,120	0.0	Vendor Internal TRM - Lighting
	4-4' 28W-T5-EB2	1	29	0.0007	29	0.0	Vendor Internal TRM - Lighting
	4-4 32W HPT8 EB1	37	452	0.0067	16,707	3	Vendor Internal TRM - Lighting
	4-4' 32W HPT8 HPEB1	75	479	0.0101	35,929	4.9	Vendor Internal TRM - Lighting
	4-4 32W T8	4	357	0.0010	1,427	0.4	Vendor Internal TRM - Lighting
	4-4' 32W T8 EB1 NF	4	1,175	0.0012	4,701	1.4	Vendor Internal TRM - Lighting
	4-4' 32W T8 EB1-R	98	345	0.0244	33,825	8.4	Vendor Internal TRM - Lighting
	4-4 32W T8 HPEB1 NF	15	392	0.0136	5,876	5.3	Vendor Internal TRM - Lighting
	4-4' 32W-T8 HBEB1-R	35	395	0.0089	13,828	3.5	Vendor Internal TRM - Lighting
	4-4' 32W-T8-EB1	675	220	0.1873	148,692	41.3	Vendor Internal TRM - Lighting
	4-4' 32W-T8-HPEB1	70	(37)	0.0171	(2,564)	(0.6)	Vendor Internal TRM - Lighting
	4-4' 32W-T8-HPEB1-R	101	312	0.0130	31,503	4.1	Vendor Internal TRM - Lighting
	4-4' 32W-T8-LPEB1	86	330	0.0169	28,353	5.6	Vendor Internal TRM - Lighting
	4-4' 49W T5 EB1	188	700	0.0599	131,651	41.9	Vendor Internal TRM - Lighting

Express cont.	4-4' 49W-T5-EB2	15	1,220	0.0070	18,304	8.5	Vendor Internal TRM - Lighting
	4-4' 54W-T5-EB2	19	812	0.0057	15,420	4.7	Vendor Internal TRM - Lighting
	4-4'28W RWT8 LPEB1	30	585	0.0047	17,564	2.7	Vendor Internal TRM - Lighting
	4-4'28W T8 EB1	3	111	0.0014	333	0.2	Vendor Internal TRM - Lighting
	4W LED LAMPS	9	287	0.0007	2,579	0.2	Vendor Internal TRM - Lighting
	5W CF-SCRW	1	23	0.0010	23	0.0	Vendor Internal TRM - Lighting
	6-4' 28/25W T8 EB1	12	916	0.0036	10,987	3.3	Vendor Internal TRM - Lighting
	6-4' 28/25W-RWT8-EB1	158	778	0.0501	122,942	39.0	Vendor Internal TRM - Lighting
	6-4' 28/25W-RWT8-EB2	6	253	0.0018	1,516	0.5	Vendor Internal TRM - Lighting
	6-4 32W T8 EB2 NF	10	(97)	0.0045	(970)	(0.4)	Vendor Internal TRM - Lighting
	6-4' 32W T8 HPEB1-R	74	880	0.0213	65,137	18.8	Vendor Internal TRM - Lighting
	6-4' 32W-T8-EB2	25	179	0.0091	4,476	1.6	Vendor Internal TRM - Lighting
	6-4' 32W-T8-HPEB2	463	803	0.1244	371,766	99.9	Vendor Internal TRM - Lighting
	6-4' 54W-T5-EB3	19	368	0.0059	6,997	2.2	Vendor Internal TRM - Lighting
	64W-CF-CANOPY	1	1,220	0.0000	1,220	0.0	Vendor Internal TRM - Lighting
	65 W CFL AND NEW FIXTURE DD	1	3,198	0.0000	3,198	0.0	Vendor Internal TRM - Lighting
	6-54W T5- EB2	13	499	0.0040	6,491	2.0	Vendor Internal TRM - Lighting
	65W CF-HW DUSK TO DAWN	3	702	0.0000	2,106	0.0	Vendor Internal TRM - Lighting
	B65F	1	1,139	0.0000	1,139	0.0	Vendor Internal TRM - Lighting
	65W CFL LAMP DUSK TO DAWN FIX	2	452	0.0000	905	0.0	Vendor Internal TRM - Lighting
	65W CF-SCRW	32	211	0.0122	6,766	2.6	Vendor Internal TRM - Lighting
	65W DUSK TO DAWN FIXTURE	5	1,423	0.0014	7,114	2.0	Vendor Internal TRM - Lighting
	65W DUSK TO DAWN HW FIXTURE	1	468	0.0000	468	0.0	Vendor Internal TRM - Lighting
	65W DUSK TO DAWN SCRW CFL AND FIXTURE	2	3,825	0.0005	7,650	1.9	Vendor Internal TRM - Lighting
	65W-CFL-HW	1	840	0.0003	840	0.2	Vendor Internal TRM - Lighting
	6W LED	19	413	0.0019	7,851	0.8	Vendor Internal TRM - Lighting
	6W LED LAMP	66	200	0.0176	13,228	3.5	Vendor Internal TRM - Lighting
	6W LED MR16	52	339	0.0079	17,638	2.7	Vendor Internal TRM - Lighting
	70W PSMH	1	374	0.0000	374	0.0	Vendor Internal TRM - Lighting
	7W CF-SCRW	2	123	0.0005	246	0.1	Vendor Internal TRM - Lighting
	7W CF-SCRW/R	3	138	0.0005	415	0.1	Vendor Internal TRM - Lighting
	7W LED TRACK LIGHTS	8	157	0.0017	1,253	0.3	Vendor Internal TRM - Lighting
	8-4' 28/25W-RWT8-EB1	4	(530)	0.0013	(2,122)	(0.7)	Vendor Internal TRM - Lighting
	8-4' 28W EB2	12	1,884	0.0012	22,607	2.2	Vendor Internal TRM - Lighting
	8-4' 28W HPEB2	12	1,531	0.0012	18,373	1.8	Vendor Internal TRM - Lighting
	8-4' 28W T8 HPEB2	10	1,531	0.0010	15,311	1.5	Vendor Internal TRM - Lighting
	8-4' 49W T5 EB1	6	46	0.0010	275	0.0	Vendor Internal TRM - Lighting
	8-4 49W T5 EB2	23	1,010	0.0105	23,232	10.6	Vendor Internal TRM - Lighting
	8-4' 59W T5 EB2	6	46	0.0020	275	0.1	Vendor Internal TRM - Lighting
	8-7 WATT LED TRACK	8	120	0.0017	961	0.2	Vendor Internal TRM - Lighting
	8W LED A19	3	194	0.0008	582	0.1	Vendor Internal TRM - Lighting
	9W CF-SCRW	13	185	0.0015	2,407	0.3	Vendor Internal TRM - Lighting
	DELAMPING	1,043	358	0.3238	373,003	115.8	Vendor Internal TRM - Lighting
	DUSK TO DAWN FIXTURE WITH 65W CFL BULB	8	1,026	0.0000	8,206	0.0	Vendor Internal TRM - Lighting
	ENERGY STAR LED 17 WATTS PAR	4	228	0.0000	911	0.0	Vendor Internal TRM - Lighting
	EXIT SIGN 11W-CF-SCRW	2	106	0.0003	212	0.0	Vendor Internal TRM - Lighting
	EXIT SIGN 9W-CF-HW	2	117	0.0004	233	0.0	Vendor Internal TRM - Lighting
	EXIT SIGN LED-RETROFIT	374	527	0.0443	196,916	23.3	Vendor Internal TRM - Lighting
	FINAL 4X4 32W HPT8 32W EB1	2	448	0.0000	895	0.0	Vendor Internal TRM - Lighting
	LED 15W	12	380	0.0010	4,559	0.4	Vendor Internal TRM - Lighting
	LED 25W	28	414	0.0034	11,600	1.4	Vendor Internal TRM - Lighting
	LED 3 WATT DECORATIVE CANDELABRA	5	138	0.0013	690	0.2	Vendor Internal TRM - Lighting
	LED 30W	24	357	0.0030	8,567	1.1	Vendor Internal TRM - Lighting
	LED 45W WALLPACK	1	616	0.0003	616	0.2	Vendor Internal TRM - Lighting
	LED 6 WATT	82	164	0.0209	13,463	3.4	Vendor Internal TRM - Lighting
	LED A19 9W	30	228	0.0039	6,833	0.9	Vendor Internal TRM - Lighting
	LED A19 LAMP	15	192	0.0042	2,877	0.8	Vendor Internal TRM - Lighting
	LED EXIT SIGN	267	398	0.0298	106,133	11.8	Vendor Internal TRM - Lighting
	LED EXIT SIGN W/ SPOT LIGHTS	171	509	0.0189	86,960	9.6	Vendor Internal TRM - Lighting
	LED PAR 30	14	172	0.0036	2,403	0.6	Vendor Internal TRM - Lighting
	OCCUPANCY SENSOR	53,170	1	0.0000	71,778	0.0	Vendor Internal TRM - Lighting
	OCCUPANCY SENSOR / CEILING MOUNTED	30	102	0.0000	3,056	0.0	Vendor Internal TRM - Lighting
	PHOTOCELLS	33	141	0.0000	4,645	0.0	Vendor Internal TRM - Lighting
	REPLACE WITH NEW FIXTURE AND 65 W CFL	1	452	0.0000	452	0.0	Vendor Internal TRM - Lighting
					9,042,756	**2,246.1**	

APPENDIX B

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EFFICIENT PRODUCTS PROGRAM

Program Year 2012 Evaluation Report

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Executive Summary

This report describes the results of an evaluation of the 2012 AEP Ohio Efficient Products Program. The Executive Summary provides a high-level description of the program summary, key impact findings, key process findings, and recommendations stemming from these findings. Detailed methodology and findings are contained in the body of the report following this Executive Summary.

Program Summary

The objective of the AEP Ohio Efficient Products Program is to produce long-term energy and demand savings in the residential market by increasing the number of energy-efficient lighting products, appliances, and televisions sold through retail sales channels. The program provides financial incentives to encourage customers to purchase and install energy-efficient lighting and energy-efficient appliances in their homes. For televisions, which is a new pilot program component in 2012, the retailer is provided a $25 stocking incentive for each high-efficiency television sold, which is intended to result in purchases of more efficient televisions.

In addition to adding televisions to the program, AEP Ohio expanded the appliance rebate offerings, increased the rebate amounts for refrigerators and dehumidifiers, and engaged in a number of CFL giveaway activities in 2012.

Key Impact Evaluation Findings

Table ES-1 shows the 2012 program goals, ex-ante savings claimed by the program, and the ex-post savings. Ex-post savings are broken down to show (1) savings that include only 2012 activity; and (2) savings that include installations of CFLs that were purchased in prior program years but were not installed until 2012. The ex-post energy and demand savings for 2012 activity were 176,211 MWh and 16.77 MW, respectively. Including installations of CFLs purchased in prior years increases energy savings to 207,998 MWh and demand savings to 19.60 MW.

Table ES-1. Overall Evaluation Results from Program Year 2012

2012 Program Goals		2012 Ex-Ante Claimed Savings		2012 Ex-Post Savings			
				2012 Activity Only		2010, 2011, & 2012 Products Installed in 2012	
MWh	MW	MWh	MW	MWh	MW	MWh	MW
125,497	11.84	229,929	20.70	176,211	16.77	207,998	19.60

Table ES-2 shows the realization rate for 2012 activity only. The primary reason for this result is due to the first-year installation rate, which is assumed to be 1.0 in the ex-ante calculations and is 0.817 in the ex-post calculations.

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Table ES-2. Program Savings and Adjustments – 2012 Activity Only

Ex-Ante Savings (a)	Audited Savings (b)	Engineering Adjustment (c)	Ex-Post Savings (d) = (b) x (c)	Realization Rate RR = (d) / (a)
Energy Savings (MWh)				
229,929	230,431	0.76	176,211	0.77
Demand Savings (MW)				
20.70	20.75	0.81	16.77	0.81

Note. Ex-Ante Savings were taken from the program tracking data, and Audited Savings were calculated using AEP Ohio's impact calculation method.

For purposes of ex-post savings calculations, not all CFLs are assumed to be installed in the first year, but additional installations occur in future program years. Table ES-3 takes these additional installations over time into account. Including CFLs purchased in 2010 and 2011, but installed in 2012, increases the realization rate to 0.90 for energy and 0.95 for demand.

Table ES-3. Program Savings and Adjustments, Including Products Purchased in Prior Years but Installed in 2012

Ex-Ante Savings (a)	Audited Savings (b)	Engineering Adjustment (c)	Ex-Post Savings (d) = (b) x (c)	Realization Rate RR = (d) / (a)
Energy Savings (MWh)				
229,929	230,431	0.90	207,998	0.90
Demand Savings (MW)				
20.70	20.75	0.94	19.60	0.95

Table ES-4 shows the breakdown of energy savings by product type. Lighting made up 96% of energy savings from 2012 activity.

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Table ES-4. Ex-post Energy Savings for the 2012 Efficient Products Program

Product Category	Energy Savings (MWh)	Percent of 2012 Activity Savings	Percent of Total Savings
Lighting Products	168,894	95.85%	81.20%
Appliances	7,086	4.02%	3.40%
Televisions	231	0.13%	0.11%
Total 2012 Activity	176,211	100.00%	84.72%
2010 CFLs	17,179	-	8.26%
2011 CFLs	14,608	-	7.02%
Total Savings Credited	207,998	-	100.00%

Table ES-5 shows demand savings broken down by product type. Almost 90 percent of demand savings from 2012 activity were from lighting products, with nearly all of the remaining 10 percent from rebated appliances.

Table ES-5. Ex-post Demand Savings for the 2012 Efficient Products Program

Product Category	Demand Savings (MW)	Percent of 2012 Activity Savings	Percent of Total Savings
Lighting Products	15.08	89.92%	76.94%
Appliances	1.67	9.96%	8.52%
Televisions	0.02	0.12%	0.10%
Total 2012 Activity	16.77	100.00%	85.56%
2010 CFLs	1.53	-	7.81%
2011 CFLs	1.30	-	6.63%
Total Savings Credited	19.60	-	100.00%

Key Process Evaluation Findings

From the staff, retailer, and customer perspective, both the lighting and appliance rebate components of the program are operating successfully. A few potential challenges were identified:

- While only 8 percent of heat pump water heater survey respondents specifically reported that they were dissatisfied with the performance of the unit, this is important to monitor due to the high energy savings associated with this product.
- While retailers were generally quite satisfied, two of six retailer interview respondents expressed dissatisfaction with a lack of incentives on LEDs in their current agreements.
- Although mystery shopping visits revealed that most sales associates were knowledgeable of the appliance rebates, 20% did not mention the program despite being prompted by mystery shoppers.

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Recommendations

In 2012, the Efficient Products Program witnessed increased energy and demand savings due to greater program activity with both lighting and rebated appliances. Because EISA federal standards will continue to raise the baseline for lighting products, it is important to continue to diversify product offerings outside of CFLs. Following are specific recommendations.

1. **Continue to diversify product offerings.** Appliances were a larger portion of savings in 2012, and the program should continue to expand appliance rebates, in terms of the variety of rebated appliances as well as the rebate period. The program should consider offering appliance rebates year-round to capitalize on savings from these products. Additionally, continuing to offer discounts for LEDs will help offset the lower baseline as a result of EISA.
2. **Adjust the baseline for lighting products that are equivalent to 100-watt and 75-watt incandescent lamps to account for the EISA standards.** For 2013, the evaluation team recommends assuming a continuing decreasing availability of 100-watt incandescent lamps. The availability of 75-watt incandescent lamps will also begin to decrease in 2013, with the new federal standard for these lamps taking effect this year.
3. **Record lumens for incentivized lighting products, when possible.** As the industry moves toward using lumens instead of wattage, tracking information on lumens will better enable AEP Ohio to determine replacement wattage for incented lighting products. The evaluation team recommends that AEP Ohio include the tracking of lumens in contracts when they are updated for the next program cycle, which will begin in 2015.
4. **Monitor customer satisfaction with respect to the new products that are being offered.** While only 8 percent of heat pump water heater survey respondents specifically reported that they were dissatisfied with the performance of the unit, it is important to monitor customer feedback. This is an important technology for the program, due to the high per-unit energy savings.
5. **Assess the program theory for televisions.** The 2012 evaluation did not assess the program theory for televisions. AEP Ohio should consider the evaluability of this portion of the program given its unique program theory

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1 Introduction and Purpose of Study

This section covers evaluation objectives and methods, including a brief summary of data collection activities.

1.1 Evaluation Objectives

This report presents the findings from the impact and process evaluations of the AEP Ohio Efficient Products Program for Program Year 2012. The evaluation focuses on all products covered under the program in 2012, including lighting products, appliances, and televisions. The lighting products covered in 2012 included compact fluorescent lamps (CFLs) and LED lamps. The appliances rebated in 2012 were clothes washers, refrigerators, freezers, dehumidifiers, and two types of hot water heaters, high efficiency electric and electric heat pumps. In 2012, the Efficient Products Program also provided midstream incentives for televisions from July through December.

The objectives of the evaluation were to: (1) quantify energy and peak demand savings impacts in Program Year 2012 for these products, (2) determine key process-related program strengths and weaknesses, and (3) provide recommendations to improve the program. Specific evaluation questions are summarized in Section 3.2.

The pilot television incentive component was a limited roll out which started late in the program cycle (in July) and used a very different program theory than the standard appliance rebates. Because of the limited roll out that resulted in relatively low savings (less than one percent of total program energy savings), the only evaluation activity for 2012 was to calculate savings from television sales using the ENERGY STAR® criteria as a conservative baseline.

1.2 Evaluation Methods

Adjusted (ex-post) energy and demand savings were estimated using key impact parameters for lighting and appliances. These impact parameters were determined by analyzing primary data collected in 2012, applying assumptions from 2011 program evaluation in some cases, and reviewing secondary data sources to determine the best estimates for the key impact parameters.

- For lighting impacts, impact parameters from the 2011 lighting participant survey were used.
- Impacts for refrigerators, clothes washers, and dehumidifiers were calculated using the assumptions from the 2011 program evaluation.
- For freezers, electric water heaters, and heat pump water heaters (all new in 2012), survey data collected in 2012 was used to inform impact calculations.
- For the mid-stream television incentive component, the evaluation team developed an impact calculation approach using ENERGY STAR as the baseline and compared this to the energy usage for each model sold.

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Along with primary data collection efforts, the evaluation team analyzed new program documentation for 2012 (marketing materials and any new implementer contracts for 2012) and the program tracking data, which contains information on all the CFLs and appliances discounted or incented through the Efficient Products Program. The results of this analysis informed both the process and impact analyses conducted.

In addition to the analysis of tracking data and program documentation, impact and process evaluation findings were based on primary data collection activities which are summarized in Table 1-1. Primary data collection efforts included in-depth telephone interviews with program staff at AEP Ohio and the program implementers (Applied Proactive Technologies – APT and Energy Federation, Inc. – EFI). In order to understand the availability of different lighting products to AEP Ohio customers, the evaluation team conducted a lighting shelf survey at both participating and non-participating lighting retailers. To determine whether sales associates at partnering retailers were knowledgeable about the appliance rebate component of the program and promoting the program to customers, the evaluation team conducted a series of mystery shopping visits to participating appliance retailers. Participants who purchased appliances new to the program in 2012 – freezers, high-efficiency electric water heaters, and electric heat pump water heaters) – were also contacted for a telephone survey. In-depth interviews with appliance retailers at the corporate level informed the process evaluation. Additionally, a survey of the general population of AEP Ohio residential customers was conducted to inform CFL saturation and demand for specialty CFLs and LEDs. Impact evaluation findings were based on the assessment of the tracking data, coupled with results from the participant telephone surveys.

Table 1-1. Summary of Data Collection Activities

Data Collection Type	Targeted Population	Supported Evaluation Activities
Tracking Data Review	All program participants	Impact and Process Evaluation
In-depth Telephone Interviews	Program staff	Process Evaluation
	Corporate-level staff at participating retailers	Process Evaluation
Lighting Shelf Surveys	Participating and non-participating lighting retailers	Process Evaluation
Mystery Shopping Visits	Participating appliance rebate retailers	Process Evaluation
Telephone Surveys	Appliance rebate program participants (freezers and water heaters)	Impact and Process Evaluation
General Population Survey Analysis	General population of residential AEP Ohio customers	Impact and Process Evaluation

2 Program Description and Theory

This section provides a description of the Efficient Products Program, including differences between the 2011 and 2012 programs. While there are minor differences between the 2011 and 2012 programs, the core processes and program theory remain unchanged. As a result, the discussion of the program theory is less extensive than in previous evaluation reports and the program logic model has been omitted.

2.1 Program Description

The objective of the AEP Ohio Efficient Products Program is to produce long-term energy and demand savings in the residential market by increasing the number of energy-efficient lighting products, appliances, and televisions sold through retail sales channels. The program provides financial incentives to encourage customers to purchase and install energy-efficient lighting and energy-efficient appliances in their homes. For televisions, providing retailers a $25 stocking incentive for each high-efficiency television sold is intended to result in purchases of more efficient televisions. The television markdown targets a single national retailer while the lighting and appliance components target all residential customers. Retail partners are recruited to promote these products by displaying marketing materials in their stores and retail sales associates are provided training to help promote the program to customers.

The program implementation contractor, APT, provides turnkey implementation services, including recruiting manufacturers and retailers to participate in the program, designing and placing marketing materials in participating store locations, conducting promotional activities, and training participating retail staff at both independent and corporate retailers. APT also conducts regular store visits to confirm that qualifying products are correctly labeled and that marketing materials are displayed. A subcontractor to APT, EFI handles the tracking of participation and sales data, payment of invoices to manufacturers and retailers for the lighting component of the program, payment of rebates to customers for the appliance portion of the program, and incentive payments to the partnering retailer for the television portion of the program.

The Efficient Products Program began providing lighting discounts in 2009. In 2012, the program provided incentives to retailers and manufacturers for ENERGY STAR-qualified lighting, including CFLs, LED lamps, and lighting fixtures. Incentives are passed directly to the customer at participating retail locations, in the form of markdowns or instant coupons used at the point of purchase. The program provides discounts for a variety of CFL manufacturers and ENERGY STAR-qualified lamp types, including standard and specialty CFLs, such as covered A-shape and globe, reflector, 3-way, and dimmable CFLs.

In 2012, the Efficient Products Program added three more lighting activities: 1) the appliance rebate CFL giveaway, 2) food bank distribution, and 3) the Metropolitan Housing Authority (MHA) CFL giveaway. For the appliance rebate CFL giveaway, customers who qualify and participate in the appliance rebate component of the Efficient Products Program can sign up via the program enrollment form to receive three CFLs for free. For the food bank distribution, APT worked with the Mid-Ohio Food Bank to

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distribute 200,000 CFLs to a number of local food banks. For the MHA CFL giveaway, AEP Ohio provided a number of MHA locations in the AEP Ohio service territory with free CFLs. These CFLs were then installed by maintenance staff at various MHA properties.

Rebates for efficient appliances began in 2011 with rebates for clothes washers, refrigerators, dehumidifiers, and room air conditioners (RACs). In 2012, AEP Ohio offered rebates on clothes washers, dehumidifiers, refrigerators, freezers, high efficiency electric water heaters, and electric heat pump water heaters. Appliance rebates were offered from April through December of 2012 in the amounts shown in Table 2-1. This time period is different from the 2011 program, when appliance rebates for individual appliance types were only offered for four-month periods during the year. As Table 2-1 illustrates, compared to 2011, the rebate amount for refrigerators increased by $25, while the dehumidifier rebate amount increased by $10.

Table 2-1: Program Rebate Amounts in 2012, Compared to 2011

Appliance Type	2011 Rebate Amount	2012 Rebate Amount
Clothes Washers	$50	$50
Dehumidifiers	$15	$25
Refrigerators	$25	$50
Freezers	NA	$50
High Efficiency Electric Water Heater	NA	$50
Electric Heat Pump Water Heater	NA	$300
Room Air Conditioners (RACs)	$25	NA

To qualify for a 2012 appliance rebate, customers purchased an appliance between April and the end of 2012, and the rebate application had to be postmarked by January 15th, 2013. To receive a rebate, customers completed a mail-in form, which they then submitted along with their product receipt and a copy of their utility bill to EFI.

APT provided training to in-store retail staff so that they were knowledgeable about the program and equipped to promote the rebates and/or lighting discounts to customers. Lighting discounts were primarily marketed via displays at participating retailer locations. For appliance rebates, APT placed point-of-purchase marketing materials (i.e., “clings” or stickers placed on qualifying appliances) in the retail stores. The appliance rebates were also promoted via the AEP Ohio website, bill inserts, outreach at community events, press releases, newsletters, electronic employee communications, and as an energy-saving tip on information distributed to AEP Ohio customers through the Home Energy Report Program.

In addition to providing instant markdown and coupon discounts on efficient lighting products and mail-in rebates for efficient appliances, the program also worked with a single national retailer to encourage the sales of energy-efficient televisions. AEP Ohio pays the retailer a $25 incentive for every

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television sold that is at least 20 percent more efficient than the ENERGY STAR Version 5.3 Standard. The television component of the program began in July 2012 and ran through December.

In 2012, the program aimed to reduce energy usage by 125,497 MWh and peak demand by 11.84 MW. These goals account for 23 percent of AEP Ohio's 2012 overall portfolio energy goal and 12 percent of the total portfolio demand goal. The vast majority of 2012 savings (96 percent of energy and 90 percent of demand) are from lighting. Of the savings from lighting, 99.3 percent were from CFLs with the remaining 0.7 percent from LED lamps. The CFL markdown delivery mechanism accounted for 93.1 percent of the CFLs in 2012, with the remainder discounted through instant coupons (0.3 percent), or given away through food banks (4.6 percent) or MHA locations (2.0 percent).

2.2 2012 Program Differences Compared to 2011

Although the core program processes and basic program theory of the 2012 program was very similar to 2011, there were a number of minor differences in the components and products offered in 2012, as follows:

Lighting Markdown

- The program worked with the Mid-Ohio Food Bank to distribute 200,000 free CFLs to food bank customers.
- The program provided free CFLs to a number of Metropolitan Housing Authorities (MHAs) which were installed by MHA maintenance staff.
- Participants of the appliance rebate portion of the program could elect to receive three free CFLs as part of the rebate application.

Appliance Rebate

- Appliance rebates were offered simultaneously on all of the program products from April through the end of 2012; in 2011 rebates on different appliance types were offered over different four-month periods during that year.
- Rebate amounts for refrigerators and dehumidifiers were increased as shown in Table 2-1.
- Room air conditioners were removed from the program.
- Freezers were added to the program.
- High-efficiency electric water heaters and electric heat pump water heaters were added to the program.

Television

- Televisions were added as a mid-stream incentive in July 2012.

2.3 Program Theory

The basic program theory for lighting and appliance rebates remained unchanged compared to 2011: providing financial incentives encourages customers to purchase and install energy-efficient lighting and energy-efficient appliances in their homes, resulting in decreased energy usage and peak demand.

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The television component of the 2012 program began midway through 2012 and relies on a very different program theory compared to the standard appliance rebates or lighting markdowns. Because of the limited roll out and the high potential cost of performing a full midstream evaluation for televisions, the 2012 evaluation did not assess the program theory of the television incentive component. If television markdowns continue to be a component of the Efficient Products Program, the evaluation team recommends that the program theory be reviewed in subsequent evaluations.

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3 Methodology

This section describes the methodology used to complete the process and impact evaluations.

3.1 *Overview of Approach*

To meet the objectives of this evaluation, the evaluation team first developed a list of specific research questions to guide the evaluation, which are discussed below.

3.2 *Evaluation Questions*

The evaluation sought to answer the following key research questions:

Impact Questions

1. How many CFLs and LEDs discounted through this program were sold, by category (wattage, size, specialty lamp types, retailer, etc.)? How many appliances were rebated through the program, by type?
2. What is the socket-level CFL saturation in the AEP Ohio service territory? How does this compare to the results of the 2010 baseline study and the 2011 general population survey?
3. What values are appropriate for the key impacts parameters? How are these different from past evaluations?
4. What is the energy (kWh) and summer peak demand (kW) savings per-unit, for each of the program products? How have the per-unit savings changed over time?
5. What are the annual energy (kWh) and summer peak demand (kW) impacts resulting from the program? Did the program meet its energy and demand goals?
6. What were the realization rates for the program? (Defined as evaluation-verified (ex-post) savings divided by program-reported (ex-ante) savings.)
7. What is the cost effectiveness of this program?

Process Questions - Marketing and Program Awareness

1. What proportion of AEP Ohio customers is aware of the various program components (i.e., lighting, clothes washer rebates, etc.)? How do customers become aware of the program? How does 2012 customer awareness for the lighting portion of the program, and CFLs in general, compare to results of the 2010 baseline study and the 2011 general population survey? How does awareness of rebated appliances compare to the 2010 baseline study and the 2011 general population survey?
2. How do participants become aware of the discounts for lighting and appliances?
3. To what extent do in-store marketing materials for appliance rebates increase awareness of the program and encourage participation?
4. Are partnering retail sales associates knowledgeable of the appliance rebates and are they promoting the appliance rebates to customers?

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Program Participation and Barriers

1. What is the customer experience and satisfaction with products covered by the program?
2. What is the customer experience and satisfaction with the appliance rebate process (e.g., customer questions, process of submitting rebate forms, timeliness of incentive payments)?
3. What are participating corporate retailers' (i.e., staff responsible for the negotiation and oversight of utility programs) experience and satisfaction with the program?
4. What are key barriers to the purchase of CFLs and LEDs discounted through the program? What is the extent of consumer misconceptions regarding CFLs and LEDs?
5. What is consumer demand for LEDs and specialty CFLs? Has demand increased or decreased from 2011?

Overall Program Design and Administration

1. What is the availability of 100-watt incandescent lamps and lumen-equivalent—but lower wattage—incandescent lamps at retail stores in the AEP Ohio service territory?
2. What is the availability and pricing of standard and specialty CFLs at retail stores in the AEP Ohio service territory? How does availability/pricing differ for CFLs discounted by AEP Ohio and those that are not discounted by AEP Ohio?
3. Has the program as implemented changed from the original plan? If so, how, why, and was this an advantageous change?
4. What are the current program challenges and how are these being addressed?
5. What are the opportunities for program improvement?

3.3 Tracking Data Review

Because the program tracking data is critical for determining program impacts, the evaluation team completed a thorough review of the tracking data, which included five separate databases. Four databases were for lighting, including one for lighting products discounted through markdowns and another for products discounted through coupons. Two databases contained lighting distributions or "giveaways"—one for distributions to food banks, the other for distributions to the Metropolitan Housing Authority (MHA). The fifth database contained appliances. Televisions sold as part of the mid-stream television incentive were contained in the same database as lighting discounted through markdowns.

The evaluation team ran frequencies on each key variable, and where missing data or inconsistencies were identified, we developed assumptions to correct the data for the determination of the key program impacts. The results of this analysis are reported in the Appendix.

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3.4 Review of New Program Documentation

The evaluation team focused the program documentation review on aspects of the 2012 program that were new, including:

- Appliance rebate forms for clothes washers, refrigerators, freezers, dehumidifiers, high-efficiency electric water heaters, and electric heat pump water heaters.
- Relevant pages of the AEP Ohio Efficient Products Program website.
- The 2012-2014 Energy Efficiency/Peak Demand Reduction Action Plan.

3.5 Secondary Literature Review

The evaluation team reviewed published reports and technical reference manuals regarding calculations of impact savings for efficient products. The review focused on new products for 2012, freezers, high-efficiency electric water heaters, and heat pump water heaters.

3.6 Primary Data Collection

In order to answer the key research questions, the evaluation team conducted a series of primary data collection activities, summarized in Table 3-1.

Additionally, the evaluation team piloted a new method to collect participant lighting data; however, because this method was unsuccessful, results are not described in the body of the report. Details regarding this pilot methodology are described in the Appendix.

The remainder of this section covers the program population, sampling strategy and expected error and precision for each of the primary data collection activities.

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Table 3-1. Primary Data Collection Activities

Data Collection Type	Targeted Population	Sample Frame	Sample Target	Sample Size	Timing
In-depth Telephone Interviews	AEP Ohio Program Staff	Contacts from AEP Ohio	Program Manager Manager of Energy Efficiency and Peak Demand Marketing Manager	3 (Conducted as a joint interview)	November 2012
	APT Program Staff	Contacts from AEP Ohio	Program Manager Senior Manager	2 (Conducted as a joint interview)	November 2012
	EFI Program Staff	Contacts from APT	Program Manager (Appliance Rebates) Program Manager (Lighting and TV Incentives)	2	December 2012
	Corporate-level Utility Liaisons of Participating Retailers	Contacts from AEP Ohio	Those staff most familiar with the Efficient Products Program at the participating retailers' corporate offices	6	December 2012-February 2013
Lighting Shelf Surveys	Participating and Non-Participating Retailers	Participating Retailers Contained in Lighting Sales Data Provided by AEP Ohio; Nonparticipating Lighting Retailers in AEP Ohio Service Territory Identified by the Evaluation Team	Stratified sample of participating and nonparticipating retailers offering lighting products to consumers in the AEP Ohio service territory	69	November and December 2012
Appliance Rebate Mystery Shopping Visits	Participating Appliance Retailers	List of Participating Appliance Retailers Provided by AEP Ohio	Stratified sample of retailers participating in the Appliance Rebate Program	20	December 2012
Telephone Surveys	Program Participants	Tracking Database Provided by AEP Ohio	Stratified sample of program participants for rebated freezers, heat pump water heaters, and high efficiency electric water heaters	138 Total 68 freezers; 21 electric water heaters; 49 heat pump water heaters	January 2013
General Population Survey	AEP Ohio Residential Customers	Sample of 3,500 contacts extracted by AEP Ohio from Billing Data	General population survey of residential customers	385	February 2013

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3.6.1 Appliance Rebate Participant Telephone Survey Sampling Strategy

The 2012 program participant population was stratified by appliance type, including freezers, electric water heaters, and heat pump water heaters. Telephone surveys were conducted with a random sample of the participants. Clothes washers, dehumidifiers, and refrigerators were not included in the 2012 evaluation because these were covered in-depth in the 2011 evaluation.

The sample design for the Appliance Rebate Participant Survey was derived from complete, end-of-year program data. The evaluation team estimated required sample sizes needed to support the analysis and reporting of impact results at a 90 percent level of confidence +/- 10 percent precision (90/10) at the measure level. Based on the program data, a minimum of 150 target completes (68 freezers; 33 electric water heaters; 49 heat pump water heaters) was computed for the participant phone survey. However, due to the relatively small population of electric water heater participants (n = 64), the survey house was only able to complete 21 surveys for this measure type.[1] The targets were attained for both freezers and heat pump water heaters; thus, a total of 138 surveys were completed.

At the 90 percent level of confidence, +/- 9.8 percent precision was attained for freezers, +/-14.8 percent precision for electric water heaters, and +/- 9.9 percent precision for heat pump water heaters. Additional detail summarizing population size and completes is contained in the Appendix.

A sample of 569 participant contacts was provided to the telephone survey house. This included a randomly selected sample of 340 freezer contacts, all 64 electric water heater contacts, and all 165 heat pump water heater contacts.[2] Of the sample of 569 total contacts, 538 program participants were contacted at least once to participate in the survey. The overall completion rate was 25.7 percent. Final dispositions are provided in the Appendix.

3.6.2 General Population Telephone Survey Sampling Strategy

The General Population Survey was conducted with a random sample of the roughly 1.3 million AEP Ohio residential customers. No stratification was used. In order to attain results that are statistically significant at the 95 percent level of confidence with a +/- 5 percent level of precision, the research team conducted 385 total general population surveys.

The evaluation team requested a random sample of 3,500 residential customer accounts from AEP Ohio for the general population sample frame. AEP Ohio extracted this sample frame from the overall population of customer accounts on October 25, 2012. Of these, 3,451 customers were contacted to complete the survey. Ultimately, surveys were completed with 385 AEP Ohio customers, reflecting an overall response rate of 11.2 percent. Additional detail and final dispositions are provided in the Appendix.

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[1] This was after trying to contact each customer at least 6 different times, on different days of the week (including weekdays and weekends), at different times of day. Messages were left on the first and fourth attempts.

[2] Four of the 170 total heat pump water heater participants had no phone number in the population file and were excluded from the sample; one participant had an electric water heater and heat pump water heater rebated and was retained in the electric water heater sample because of the relatively fewer number of available cases for electric water heaters.

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3.6.3 Mystery Shopping Sampling Strategy

The twenty mystery shopping visits were divided equally among the four appliance types offered: clothes washers, refrigerators, freezers, dehumidifiers, and hot water heaters. To select the mystery shopping locations, the evaluation team randomly selected four stores for each appliance type from the list of participating stores provided by AEP Ohio.

3.6.4 Lighting Shelf Survey Sampling Strategy

The evaluation team targeted 70 store visits to allow for a minimum of 90 percent confidence and 10 percent precision at the store level. To construct a sample frame for the lighting shelf surveys, the evaluation team compiled a list of non-participating potential lighting retailers with multiple locations throughout Ohio. Using this list and the list of retailers participating in the lighting markdown program supplied by AEP Ohio, the evaluation team then used a set of geographic criteria to identify participating and non-participating stores in proximity to four metropolitan areas: Columbus, Canton, Chillicothe, and Lima. To determine how many stores would be surveyed in each area, the evaluation team divided the 70 store visits proportionally to the total number of participating and non-participating stores in each geographic area. Finally, stores were selected randomly within each geographic area by participation status stratum. Data were collected for 69 stores, which was sufficient to maintain 90 percent confidence and 10 percent precision.

3.7 *Methods Used to Analyze Impact Data*

Methods used to calculate savings for lighting, appliances, and televisions are discussed below, with an emphasis on methodologies that are new for 2012. Methodologies that are the same as in 2011 are detailed in the Appendix.

3.7.1 Ex-Post Energy and Demand Savings Calculations for Lighting

The methodology and assumptions used in 2011 were used in 2012 to calculate lighting energy and demand savings. Details can be found in the Appendix.

3.7.1.1 Past Program Year Lamps Installed in 2012

While first year installation rates are used to determine the portion of lamps installed for first year savings, most of the remaining lamps not initially installed are installed over time. The evaluation of the 2006-2008 California Residential Upstream Lighting Programs estimated that 99% of program CFLs get installed within three years, including the program year.[3] Since there is not comparable data available for Ohio, based on the California data, the evaluation team credited the 2012 program with additional installations from the past two program years. For Program Year 2011 lamps installed in 2012, the second-year installation rate was computed as ISR_{PY2} = (99% - ISR_{PY1})/2, which is 8.65%. For Program Year 2010 lamps installed in 2012, the second-year installation rate was computed as ISR_{PY3} = 99% - ISR_{PY1} – ISR_{PY2}, which is 11.5%. Savings from these products were calculated using 2012 unit energy savings assumptions. The 2012 In Service Rate (ISR) factor was removed from the calculation of these second-

[3] KEMA. 2010 "Final Evaluation Report: Upstream Lighting Program" CALMAC ID CPU 0015.01. Retrieved from: http://www.calmac.org/publications/FinalUpstreamLightingEvaluationReport%5FVol1%5FCALMAC%5F3%2Epdf

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and third-year unit savings, because the full 8.65% and 11.5% of the Program Year 2011 and 2010 lamps, respectively, were assumed to be installed.

The savings attributable to installations of Program Year 2011 and 2010 lighting are calculated separately from the Program Year 2012 lamps and are presented alongside the lighting impact results in Section 4.2.4.

3.7.2 Ex-Post Energy and Demand Savings Calculations for Appliance Rebates – Clothes Washers

Impact calculations were performed for all clothes washers discounted through the program in 2012. The methodology and assumptions used to calculate savings are the same as in the 2011 evaluation. Details can be found in the Appendix.

3.7.3 Ex-Post Energy and Demand Savings Calculations for Appliance Rebates – Dehumidifiers

Impact calculations were performed for all dehumidifiers discounted through the program in 2012. The methodology and assumptions used to calculate savings are the same as in the 2011 evaluation. Details can be found in the Appendix.

3.7.4 Ex-Post Energy and Demand Savings Calculations for Appliance Rebates – Refrigerators

The methodology and assumptions for calculating energy savings for refrigerators is the same as 2011. Details are contained in the Appendix.

The evaluation team used a different method to calculate demand savings in 2012, compared to the method used for the 2011 evaluation. For 2012, the ex-post adjusted demand savings (UDS) are the difference between unit energy demand consumption (UDC) of a federal standard refrigerator and the more energy-efficient ENERGY STAR or CEE Tier-rated refrigerator discounted through the program. The UDCs for both the federal standard refrigerator and the more energy-efficient unit discounted through the program were calculated using the annual unit energy consumption (UEC) for each unit divided by the number of hours in the year, 8,760. The unit demand savings (UDS) is the difference in the UDC values of the two units, multiplied by a summer use factor (SUF), as show in Equation 3-1. The SUF is equal to 1.0 because 2011 survey data showed that all customers planned to keep the new refrigerator in constant use.

Equation 3-1. Unit Demand Savings for Refrigerators

$$UDC_{std} = \frac{UEC_{std}}{8{,}760}$$
$$UDC_{EE} = \frac{UEC_{EE}}{8{,}760}$$
$$UDS = SUF\ (UDC_{std} - UDC_{EE})$$

Total refrigerator adjusted demand savings are the sum of per-unit savings for all refrigerators listed in the program tracking database.

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3.7.5 Ex-Post Energy and Demand Savings Calculations for Appliance Rebates – Freezers

As with refrigerators, there are no calculated key impact parameters for the freezer impact analysis, with energy consumption values taken directly from model information in the ENERGY STAR qualifying products database.

Impact calculations were performed for all freezers discounted through the program in 2012. For these units, full-year unit energy savings (UES) are a function of the rated annual energy usage of the efficient unit (UEC_{EE}) minus the rated energy usage of a standard unit (UEC_{std}), adjusted by a part-use factor (PUF) as shown in Equation 3-2. Additional detail on the energy savings calculation methodology is contained in the Appendix.

Equation 3-2. Unit Energy Savings for Freezers

$$UES = PUF \times (UEC_{std} - UEC_{EE})$$

The ex-post adjusted demand savings (UDS) are the difference between unit energy demand consumption (UDC) of a federal standard freezer and the more energy-efficient ENERGY STAR or CEE Tier-rated freezer discounted through the program.[4] Freezers are calculated in the same way as for refrigerators. The evaluation team used survey data on the percentage of units in use during the performance period to adjust per-unit savings; the resulting summer use factor (SUF) was 1.0, because all survey respondents indicated their freezers were in constant use.

[4] This is the same method that the evaluation team is using to calculate demand savings for refrigerators and freezers recycled through the Appliance Recycling Program.

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3.7.6 Ex-Post Energy and Demand Savings Calculations for Appliance Rebates – Heat Pump Water Heaters

The sources and definitions of key parameters for the water heater calculations are summarized in Table 3-2.

Table 3-2. Key Impact Parameters for Heat Pump Water Heaters

Definition	Parameter	Mean Value	Source
Consumption Typical Water Heater	kWh_{std}	3,460 kWh	DOE [(a)]
Space heating loss from conversion of heat in home to water heat	kWh_{heat}	346.4 kWh	DOE, Energy Center of Wisconsin, EIA [(b)]
Cooling savings from conversion of heat in home to water heat	kWh_{cool}	180 kWh	DOE and Energy Center of Wisconsin [(c)]
Efficiency – Energy-Efficient Unit	EF_{EE}	2.38	Program tracking data and ENERGY STAR [(d)]
Efficiency – Standard Unit	EF_{std}	0.9	DOE [(e)]
Unit Volume	Vol	50.5 gallons	ENERGY STAR [(d)]
Coincidence Factor	CF	0.275	2012 Participant Survey Data
Heat Pump Factor	HPF	0.67	2012 Participant Survey Data
Annual Load Hours	LH	2,533 hours	Mid-Atlantic TRM[(f)]
Conditioned Space Factor	CSF	0.65	2012 Participant Survey Data

a. Assumption of 3,460 kWh taken from: Residential Water Heaters Technical Support Document for the January 17, 2001, Final Rule Table 9.3.9, p9-34, http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/09.pdf

b. Assumption of 1,577 kWh for electric home heating and 779 kWh for heat pump heating http://www.eia.doe.gov/emeu/recs/recs2005/hc2005_tables/hc6airconditioningchar/pdf/tablehc12.6.pdf); applying the Discretionary Usage Adjustment of 0.75% (Based on Energy Center of Wisconsin, May 2008 metering study; "Central Air Conditioning in Wisconsin, A Compilation of Recent Field Research", p31); adjusted for types of home heating in Ohio (http://www.eia.gov/consumption/residential/data/2009/#undefined)

c. Assumption of 180 kWh determined by calculating the MMBtu removed from the air, as above, applying the REMRate determined percentage (45%) of lighting savings that result in increased heating loads, converting to kWh and dividing by efficiency of heating system (1.0 for electric resistance, 2.0 for heat pump).

d. Energy Star Qualified Heat Pump Water Heaters, http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=WHH.

e. DOE Buildings Energy Data Book Table 7.5.3 Efficiency Standards for Residential Water Heaters

f. The Mid-Atlantic TRM from October 2010 uses this value of 2,533 full load hours for heat pump water heater savings; this value is based on an Efficiency Vermont load curve generated from Itron eShapes; http://neep.org/uploads/EMV%20Forum/EMV%20Products/Mid%20Atlantic%20TRM_V1.1.pdf

The ex-post adjusted energy savings are a function of the baseline or standard annual electric water heater electric consumption, the minimum federal efficiency standard (EF_{std}), and the efficiency of the discounted unit (EF_{EE}) as shown in Equation 3-3. This savings calculation also incorporates the decreased cooling load (kWh_{cool}) and increased heating load (kWh_{heat}) that result from the use of a heat pump (which moves and transfers heat from its surroundings to the water it is heating). These cooling and heating values only affect the heating and cooling load for heat pump water heaters that are in conditioned space within the home; therefore these values of kWh_{cool} and kWh_{heat} are adjusted by a conditioned space factor (CSF) that uses 2012 Participant Survey responses to determine the fraction of

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heat pumps in the program that are located in conditioned spaces. Total heat pump water heater adjusted energy savings are the sum of per-unit energy savings for all heat pump water heaters listed in the program-tracking database.

Equation 3-3. Unit Energy Savings for Heat Pump Water Heaters

$$UES = kWh_{std} \times \left(\frac{EF_{EE} - EF_{std}}{EF_{EE}}\right) + (kWh_{cool} - kWh_{heat}) * CSF$$

Ex-post demand savings are based on the percent of units that are described by survey participants as being kept in heat pump mode and a per-unit demand savings constant. Unit demand savings in heat pump mode during the peak summer hours are assumed to be 0.17 kW.[5] The Heat Pump Factor (HPF) takes into account the portion of participants who stated that their heat pump water heater is in either heat pump or hybrid operating mode, and Units is a count of heat pump water heaters listed in the program-tracking database.

Equation 3-4. Total Demand Savings for Heat Pump Water Heaters

$$TDS = HPF \times Units \times (0.17kW)$$

3.7.7 Ex-Post Energy and Demand Savings Calculations for Appliance Rebates – High Efficiency Electric Water Heaters

The sources and definitions of key parameters for the water heater calculations are summarized in Table 3-3.

Table 3-3. Key Impact Parameters for Electric Water Heaters

Definition	Parameter	Mean Value	Source
Consumption – Typical Water Heater	kWh_{std}	3,460 kWh	DOE [(a)]
Efficiency – Energy-Efficient Unit	EF_{EE}	0.95	Program tracking data, Model specifications [(b)]
Efficiency – Standard Unit	EF_{std}	0.91	DOE [(c)]
Unit Volume	Vol	41.7 gallons	Program tracking data, Model Specifications [(a)]
Coincidence Factor	CF	0.275	2012 Participant Surveys [(d)]

a. Assumption of 3,460 kWh taken from; Residential Water Heaters Technical Support Document for the January 17, 2001, Final Rule Table 9.3.9, pp. 9-34, http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/09.pdf
b. Model specifications are from on-line sources, including vendor and manufacturer sites.
c. DOE Buildings Energy Data Book Table 7.5.3 Efficiency Standards for Residential Water Heaters
d. Methods for determining CF from Participant surveys is discussed in electric water heater savings section of Appendix

[5] Specific peak hours are defined by the PJM, based on weather; the performance period is 2PM to 6PM on non-holiday weekdays between June 1 and August 31. Based on a chart showing summer weekday average electrical demand on page 10 of FEMP Study "Field Testing of Pre-Production Prototype Residential Heat Pump Water Heaters" (http://www1.eere.energy.gov/femp/pdfs/tir_heatpump.pdf). Using data points from the chart, the average delta kW in heat pump mode during the peak hours compared to resistance mode is 0.17kW.

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The ex-post adjusted energy savings are a function of the baseline or standard annual water heater electric consumption, the minimum federal efficiency standard (EF_{std}), and the efficiency of the discounted unit (EF_{EE}) as shown in Equation 3-5. Total electric water heater adjusted energy savings are the sum of per-unit savings for all dehumidifiers listed in the program-tracking database.

Equation 3-5. Unit Energy Savings for Electric Water Heaters

$$UES = kWh_{std} \times \left(\frac{EF_{EE} - EF_{std}}{EF_{EE}}\right)$$

Demand savings are based on the Unit Energy Savings and the percent of average daily load (based on EPRI load curve models for Hot Water Demand) that coincides with peak hours for the AEP Ohio service territory.[6] Equation 3-6 shows how UDS is calculated using the UES values, CF as the fraction of the discounted water heaters that are in use coincident with the AEP Ohio summer peak and PF to represent an adjustment for summer hourly demand. CF was determined from customer responses about hot water usage during peak hours for the AEP Ohio service territory. UES/8,760 represents average hourly hot water heating demand savings for the program water heaters. More details on these parameters can be found in the Appendix. Total demand savings for the electric water heaters purchased through the program was calculated by multiplying the Unit Demand Savings by the number of units.

Equation 3-6. Unit Demand Savings for Efficient Electric Water Heaters

$$UDS = CF \times PF \times \frac{UES}{8{,}760}$$

[6] As defined in Lutz et al.1996. Modeling Patterns of Hot Water Use in Households.(EERE/DOE) Retrieved from: http://efficiency.lbl.gov/drupal.files/ees/Modeling%20Patterns%20of%20Hot%20Water%20use%20in%20Households_LBL-37805_Rev.pdf

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3.7.8 Ex-Post Energy and Demand Savings Calculations for Televisions

For televisions, per-unit impacts were calculated as the difference between the program television model's annual energy use (UEC_{EE}) and the maximum annual energy use allowed under the ENERGY STAR threshold for each model's given screen area (UEC_{std}). The sources and definitions of key parameters for the television savings calculations are summarized in Table 3-4.

Table 3-4. Key Impact Parameters for Televisions

Definition	Parameter	Source
Program Television Annual Energy Use	UEC_{EE}	Matched the model numbers of program units to the ENERGY STAR Qualifying Product List. [(a)]
Maximum ENERGY STAR Television Annual Energy Use	UEC_{std}	Calculated from Program Tracking data and ENERGY STAR Qualifying Product List [(a)]
Program Television On Mode Power Consumption	W_{EE}	Program Tracking data and ENERGY STAR Qualifying Product List [(a)]
Maximum ENERGY STAR Television On Mode Power Consumption	W_{std}	Program Tracking data and ENERGY STAR Qualifying Product List [(a)]
Standby Mode Power Consumption	W_{stb}	Program Tracking data and ENERGY STAR Qualifying Product List [(a)]
On Mode Power Consumption	W_{on}	Program Tracking data and ENERGY STAR Qualifying Product List [(a)]
Peak Demand Coincidence Factor	CF	Adapted the approach used in PG&E's Television Work Paper [(b)] by modifying the peak period from 2pm-5pm to 2pm-6pm to match the PJM Peak Performance EE hours. Additionally, the evaluation team modified the assumed hours of use from 5.15 (PG&E) to 5 (AEP Ohio) to match the assumed hours used in the ENERGY STAR annual energy use calculation.
Hours of Use – "On" Mode	HOU_{on}	ENERGY STAR's annual energy consumption equation for televisions.
Hours of Use – "Standby" Mode	HOU_{stb}	

[a] The evaluation team used the Version 5.3 Qualified Product List for Televisions available at http://www.energystar.gov
[b] PG&E Work Paper PGECOAPP104 Energy Efficient Televisions Revision # 5.
August 24. 2012. This work paper is available at http://www.deeresources.com

The general equation for the adjusted (ex-post) energy savings (UES) is described in Equation 3-7. To determine the maximum annual ENERGY STAR television energy use (UEC_{std}), the evaluation team used the equation shown in Equation 3-8. This equation is the basic equation for calculating annual television energy use (UEC_{TV}) shown in Equation 3-9, modified with ENERGY STAR values for hours of use, standby power consumption, and Maximum On Mode Power (W_{std}).

Equation 3-7. Ex-Post Energy Savings Calculation for Televisions

$$UES = (UEC_{std}) - (UEC_{EE})$$

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Equation 3-8. Maximum Annual ENERGY STAR Television Energy Use

$$UEC_{std} = \frac{365\ Days * \ [(19\ hrs * 1.00\ W) + (5\ hrs * W_{std})]}{1{,}000\ W}$$

Equation 3-9. Annual Television Energy Use

$$UEC_{TV} = \frac{365\ Days * \ [(HOU_{stb} * W_{stb}) + (HOU_{on} * W_{on})]}{1{,}000\ W}$$

The equation for coincident demand impact is shown in Equation 3-10. Per-unit demand savings are a function of the difference between the power consumption in On Mode of program television models (W_{EE}) and the maximum rated power use allowed under the ENERGY STAR threshold for a model's given screen area (W_{std}). To determine the per-unit coincident demand savings (UDS), the difference is multiplied by a coincidence factor (CF) of 0.162. To calculate a peak demand coincidence factor for televisions in the AEP Ohio service territory, the evaluation team adapted an approach documented in a Pacific Gas & Electric (PG&E) work paper regarding television program savings.[7] Additional detail for this approach is contained in the Appendix.

Equation 3-10. Ex-Post Coincident Demand Savings Calculation for Televisions

$$UDS = \left[\frac{(W_{std}) - \ (W_{EE})}{1{,}000}\right] * 0.162$$

3.7.9 Realization Rates Calculation Method

Realization rates (RR) for energy and demand savings for products were determined by dividing the evaluation-determined ex-post program impacts ($Impacts_{Ex\text{-}Post}$) by the impacts reported by AEP Ohio for 2012 ($Impacts_{Ex\text{-}Ante}$), as shown in Equation 3-11.

Equation 3-11. Realization Rate

$$RR = \frac{Impacts_{Ex-Post}}{Impacts_{Ex-Ante}}$$

3.8 Methods Used to Analyze Process Data

The following section describes the qualitative and quantitative analysis the evaluation team performed to inform the process evaluation of the AEP Ohio Efficient Products Program.

3.8.1 Review of Program Documentation

The evaluation team's review of program documentation focused on identifying ways in which the 2012 program had changed compared to 2011, including changed rebate amounts for specific products, new or changed participation channels, and any explicitly changed program goals for 2012 compared to 2011. These included new product rebate forms, the revised AEP Ohio web site, and the 2012-2014 Energy

[7]PG&E Work Paper PGECOAPP104 Energy Efficient Televisions Revision # 5. August 24. 2012.

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Efficiency/Peak Demand Reduction Action Plan. These documents were reviewed to understand the details of the 2012 program and inform in-depth interviews and customer surveys.

3.8.2 In-depth Interviews with Program Staff (n = 7)

Qualitative data from the seven program staff interviewed (some of these interviews were conducted jointly as indicated in Table 3-1) were analyzed with focuses on changes to the program compared to 2011, the effectiveness of the program in 2012, and any potential program challenges identified by program staff. To identify potential program challenges, the evaluation team focused on issues communicated by multiple program staff during the course of the interviews.

3.8.3 In-depth Interviews with Participating Retailer Corporate Contacts (n = 6)

The six interviews with corporate-level utility liaisons were analyzed with an emphasis on key research questions, including their knowledge of the program, their satisfaction with the program, program challenges, and suggestions for improvement. Because all six retailers participate in the lighting discount component, while only one participates in the appliance rebate portion of the program, the analysis focused on the respondents' perspective on the lighting discount in particular. As with the in-depth interviews with program staff, the evaluation team focused on issues and themes that were mentioned by multiple respondents, while also considering each interviewee's particular perspective and relationship to the program.

3.8.4 Participant Telephone Surveys with Appliance Rebate Participants (n = 138)

Quantitative data were first reviewed for missing and erroneous data. Open-ended responses were coded up into new and existing response categories. Using SPSS, frequencies and cross-tabs by appliance type were conducted to determine differences in responses by purchasers of different appliance types. The data were weighted by appliance type so that the survey responses were representative of the appliance rebate participant population for the three appliance types surveyed (freezers, electric water heaters, and heat pump water heaters). The weighted data were used to analyze participant satisfaction and source of awareness. These data were then compared to participant responses from the 2011 survey. Although the 2011 survey was conducted on program participants who had purchased completely different appliances, responses to program-specific questions—such as awareness, satisfaction, and retailer knowledge—were compared using simple frequencies, t-tests, and chi-square statistical tests. Finally, 2012 participant data were compared to the 2012 general population survey in an effort to understand if there are differences in awareness and knowledge between program participants and the general population of AEP Ohio residential customers.

3.8.5 Telephone Surveys with the Residential General Population (n = 385)

As with the participant telephone survey data analysis, steps were undertaken to clean data and code open-ended and "other" responses. Simple frequencies were tabulated to report awareness of the program discounts and rebates, awareness of ENERGY STAR appliances and lighting products, consumer misconceptions regarding CFLs, consumer misconceptions regarding LEDs, and awareness of a number of other AEP Ohio residential energy efficiency programs. Additionally, data were compared to previous iterations of the survey conducted in 2010 and 2011. However, the comparisons to the prior

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year's data should be approached with caution because of differences in sampling methodologies. The 2010 baseline survey was conducted with a simple random sample of AEP Ohio customers and then results were weighted to the residential population by building type. The 2011 general population surveys were conducted with a sample of customers that was proportional to the population in terms of service territory and region within Ohio, but not weighted by building type. The 2012 general population was a simple random sample and representation by building type, service territory, or region was not incorporated.

3.8.6 Mystery Shopping (n = 20)

The analysis of the mystery shopping data centered around answering whether appliance sales associates at participating retailers are aware of and knowledgeable about the appliance rebate component of the program. To answer this research question, the evaluation team analyzed the data captured by 20 mystery shoppers, focusing on themes pertaining to each of the following questions:

- Does the salesperson mention the AEP Ohio appliance rebates or the Efficient Products Program?
- How are the rebates (or the program) described by the salesperson?
- How would you describe the salesperson's knowledge of the AEP Ohio appliance rebates?
- How would you describe the salesperson's overall ability to influence a customer to purchase a high-efficiency or ENERGY STAR appliance over a standard appliance?

3.8.7 Lighting Shelf Surveys (n = 69).

The lighting shelf survey data were first extensively cleaned in order to remove incandescent lamps that are not subject to the EISA (Energy Independence and Security Act of 2007) standards (e.g., rough service lamps) and CFLs that do not have a standard base (e.g., those with a candelabra base). CFL wattages were assigned an "incandescent equivalent wattage" based on lumens, according to ENERGY STAR guidelines[8] (see the Appendix for the guidelines). Note that advertised equivalent wattages on the product package were often higher than the lumen output indicated.

[8] http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_lumens

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4 Detailed Evaluation Findings

4.1 Program Activity

Program data from all lighting and appliances submitted during 2012 were analyzed to summarize program activity. This section is divided into three sub-sections: 1) lighting, 2) appliances, and 3) televisions. The lighting portion of the program is substantially larger in scale and responsible for the vast majority of program savings, so lighting activity is analyzed in more detail than for the rebated appliance or televisions. Table 4-1 summarizes program activity for the two main lighting categories (CFLs and LEDs), each of the six rebated appliances, and televisions.

Table 4-1. Efficient Products Program Year 2012 Activity

Product	Number of Units in 2012
CFLs	4,293,076
LEDs	27,170
Total Lighting Products	4,320,246
Clothes Washers	9,439
Dehumidifiers	6,167
Refrigerators	10,951
Freezers	1,535
Heat Pump Water Heaters	170
Electric Water Heaters	63
Total Appliances	28,325
Televisions	3,218

4.1.1 Lighting Activity

Program data for all of the lighting products invoiced during 2012 were used to characterize this component of the program including lighting products discounted through the markdown and coupon delivery mechanisms, as well as CFL "giveaways" distributed to food banks and Metropolitan Housing Authority locations. The 2012 program tracking data showed a total of 4,320,246 lighting products. CFLs were by far the greatest number of lighting products, accounting for 99.4 percent of all lighting units, as shown in Table 4-2. Of all CFLs in 2012, 93.1% were markdown CFLs.

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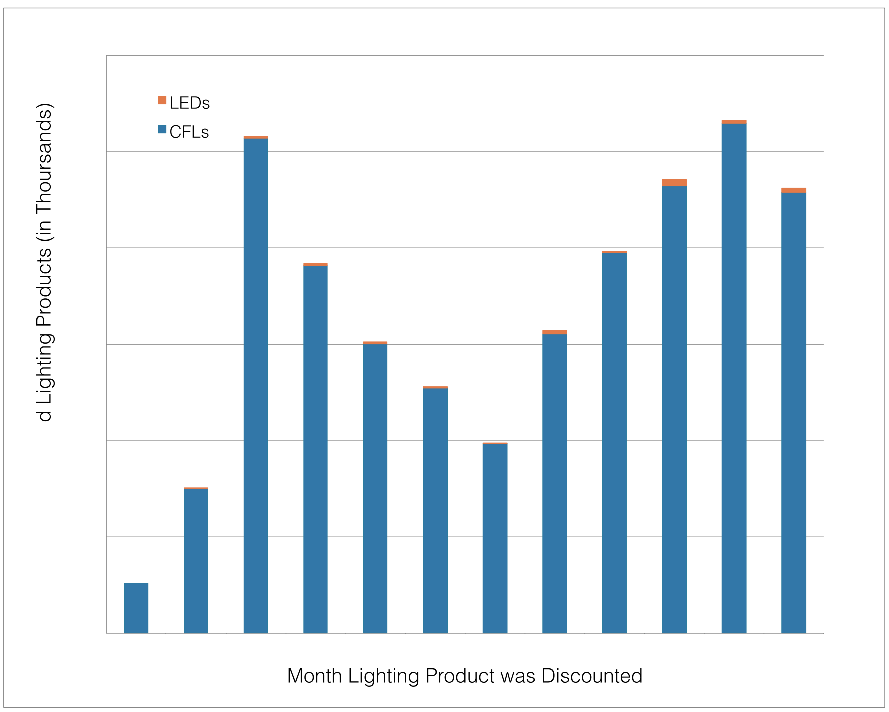
Table 4-2. Lighting Product Program Year 2012 Activity

Lighting Product Type	Markdown Units PY 2012	Coupon Units PY 2012	Food Bank Units PY 2012	MHA Units PY 2012	Total Units PY 2012	Percent
CFLs	3,996,947	13,067	198,320	84,742	4,293,076	99.4%
LEDs	27,170	0	0	0	27,170	0.6%
Total	4,024,117	13,067	198,320	84,742	4,320,246	100.0%

Note. "Food Bank Units" indicates CFLs provided free-of-charge to food banks. "MHA Units" indicates CFLs provided to and installed by Metropolitan Housing Authorities personnel.

Figure 4-1 shows the distribution of 2012 sales for program CFLs and LEDs by month including the markdown and coupon lighting data only, but excludes the food bank or MHA data.

Figure 4-1. Lighting Products Discounted by Month that were Invoiced in Program Year 2012



Among the general population of AEP Ohio residential customers, CFL installations appear to be consistent over time. Indoor CFL socket-saturation was found to be 37.8 percent in the Program Year 2012 evaluation, compared to Program Year 2011 data, which showed a combined saturation of 39.1 percent (31.4 percent for standard CFLs and 7.7 percent for specialty CFLs).[9] The 2010 baseline data also showed a total CFL saturation of 39 percent. In 2012, CFL saturation for outdoor sockets was 26.3 percent.

[9] The 2012 general population survey did not distinguish between standard and specialty CFL saturation.

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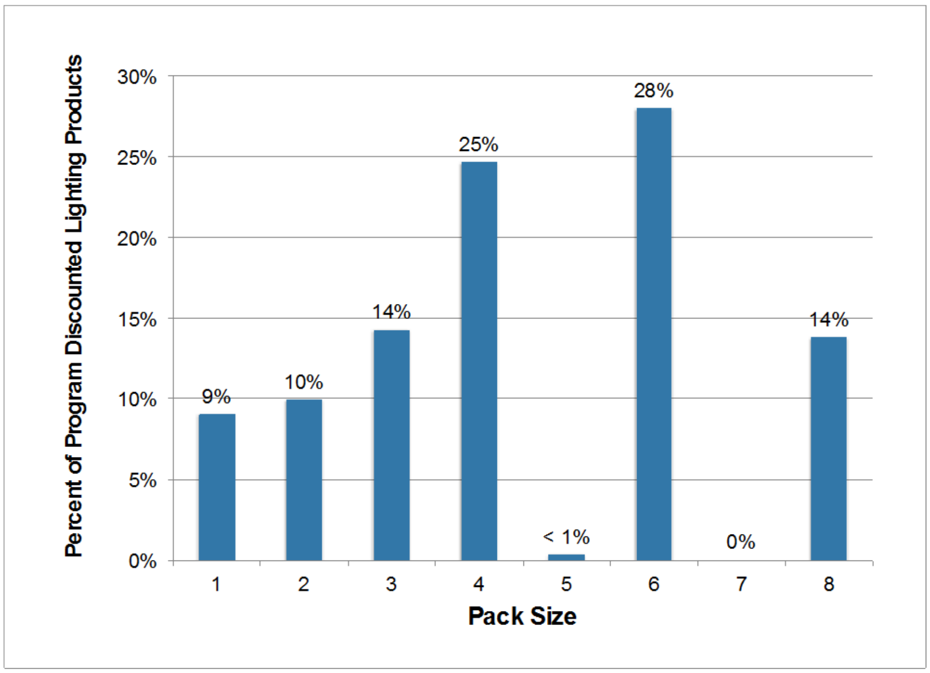
Based on the general population survey, LED saturation among AEP Ohio residential customers is 1 percent, which was similar to 2011. Of all the 385 respondents, 32 had installed at least one LED, with the number installed ranging from 1 to 14. The mean number of LEDs installed was 3.6 (SD = 3.2).
AEP Ohio discounts both individual and multi-pack lamps as part of the program. As shown in Figure 4-2, the majority of program-discounted lighting products (53.0%) were purchased in packs of four or six.

Figure 4-2. Pack Size of Discounted Lighting Products



Out of the 4,293,076 CFLs in the Program Year 2012 lighting program, 431,257 of them (or 10% of total program CFLs) were designated as specialty CFLs in the program tracking data. The 431,257 count only includes CFLs from the markdown tracking data, as the coupon tracking data did not include a field that designated standard from specialty lamps. These specialty lamps included globe, 3-way, A-Shape, twist, spiral, flood, dimmable, and torpedo-shaped CFLs, among others. The markdown tracking data included a general "specialty" designation, but did not specify the type of specialty lamp.

4.1.2 Appliance Rebate Activity

The number of units incented for different appliances varied from a low of 63 units for electric water heaters to 10,951 for refrigerators. The units per month for each appliance type are shown below in Figure 4-3.

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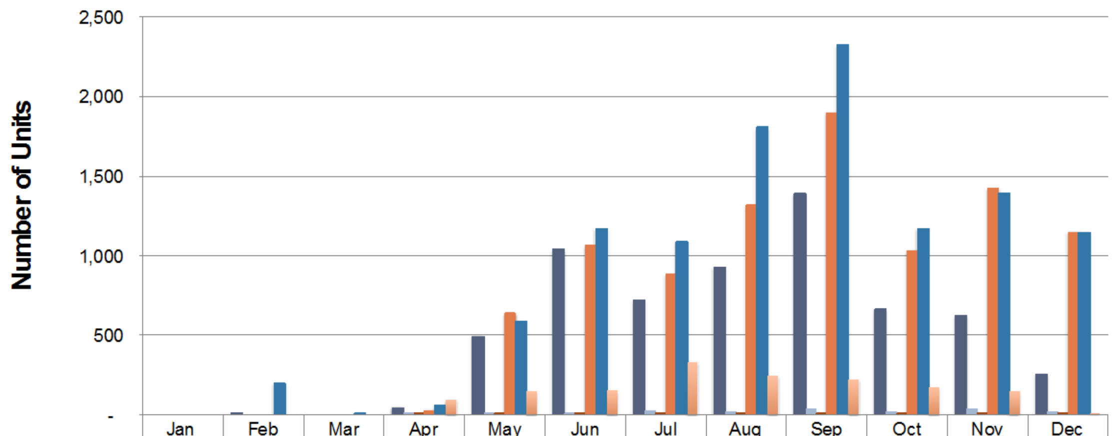
Figure 4-3. Distribution of Efficient Products Appliance Rebates in 2012, by Month



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dehumidifiers	-	1	-	48	497	1,038	722	929	1,389	662	623	258
Heat Pump Water heaters	-	-	-	1	6	8	26	23	34	18	33	21
Electric Water Heaters	-	-	-	1	4	6	5	8	9	8	10	12
Clothes Washers	-	-	-	30	642	1,062	883	1,315	1,900	1,034	1,423	1,150
Refrigerators	-	199	15	59	588	1,169	1,089	1,805	2,321	1,170	1,391	1,145
Freezers	-	-	-	97	149	153	334	247	225	172	148	10

Month

These data show that participation was much higher for some appliances (refrigerators, clothes washers, dehumidifiers) than for others (heat pump water heaters, electric water heaters).

4.2 *Lighting Impact Findings*

This section provides a description of detailed impact findings for 2012 CFLs and LEDs. A list of key impact parameters is provided for each lighting product.

4.2.1 Summary of Lighting Impacts

Ex-post energy savings for the lighting portion of the AEP Ohio Efficient Products Program were 168,894 MWh and ex-post demand savings were 15.08 MW for products purchased in 2012. There were additional savings of 31,787 MWh and 2.83 MW attributed to CFLs purchased in 2010 and 2011 but installed in 2012.

4.2.2 CFL Impacts

The key impact parameters for 2012 CFLs are summarized below, with additional detail provided in the Appendix.

4.2.2.1 *Program Wattage for CFLs*

The evaluation team did not collect participant information for the 2012 evaluation, so this evaluation uses the average program wattage and replaced wattage from 2011. The 2011 program wattage was used in order to maintain consistency in the comparison for replaced wattage, because replaced wattage data

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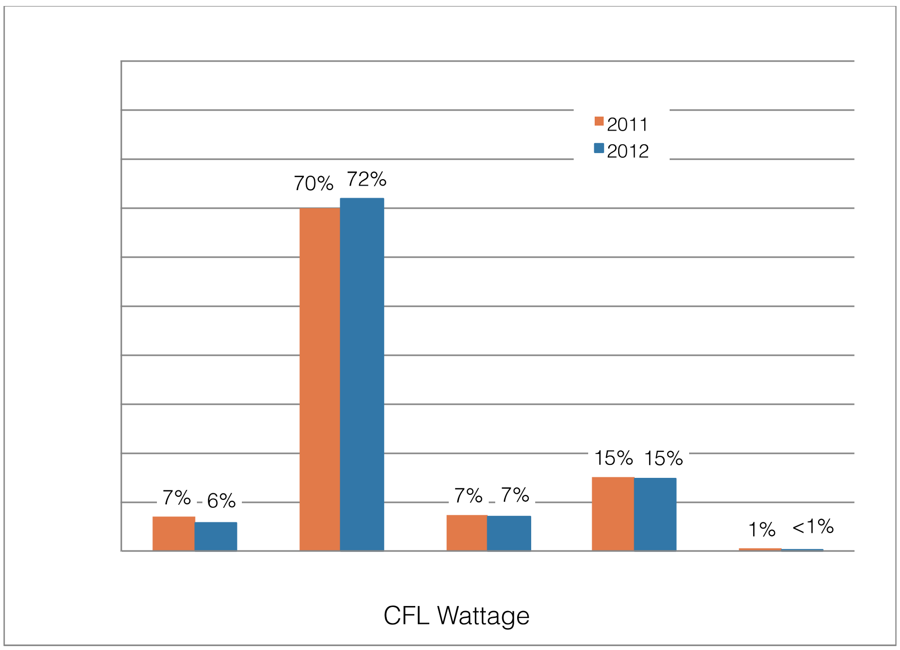
for 2011 were collected through in-store intercepts, which were not performed for PY 2012. Thus, the evaluation team used the mean program wattage ($Watt_{PROG}$) of 14.6 watts determined through the 2011 intercepts.

The program tracking data did provide program lamp wattage data, which was compared to PY 2011 tracking data wattage. The distribution of 2012 CFL wattages is shown in Figure 4-4, alongside 2011 markdown tracking data wattage distribution. Because the distribution for 2011 is very similar to the distribution of wattages in 2012, the evaluation team determined it was appropriate to apply the 2011 program wattage (again, determined through PY 2011 in-store intercepts) to the lighting impact calculations. The most common CFL wattages were between 13 and 17 watts. The mean wattage of program discounted CFLs observed in the program tracking data in 2012 was 15.2 watts.

Figure 4-4. Distribution of Program CFL Wattages



4.2.2.2 *Replaced Wattage for CFLs*

The 2012 replaced wattage was assessed using 2011 participant data and information from the 2012 shelf surveys. The shelf survey data was used to adjust the replaced wattage for the EISA lighting standard that went into effect January 1, 2012, which limits the number of 100-watt incandescent lamps that are available in stores.[10] The evaluation team adjusted the 2011 responses for 100-watt lamps to account for 100-watt availability determined by the shelf surveys conducted in November and December of 2012. Most stores (84.1%) did not stock 100-watt incandescent lamps; however, 15.9% of stores did stock 100-watt incandescent lamps. The evaluation team assumed that customers would adopt 75-watt lamps where 100-watt lamps were not available, and calculated a weighted average to replace previous 100-

[10] http://energy.gov/energysaver/articles/new-lighting-standards-begin-2012

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watt responses.[11] This overall replaced wattage was calculated using a weighted average in order to reflect a declining availability of 100-watt incandescent lamps over the course of the year, in place of 100-watt responses from the 2011 surveys.

Using this approach to account for the decrease in available 100-watt lamps, the evaluation team determined the average replaced wattage, $Watt_{REP}$, to be 63.48 watts. This is similar to the value of 64.6 watts used in the Program Year 2011 evaluation.

4.2.2.3 *Additional Parameters for CFLs*

The in-service rate, hours of use (HOU) and coincidence factor (CF) were all taken from the 2011 evaluation. Additional detail on these parameters is contained in the Appendix.

4.2.2.4 *Energy and Demand Impacts for CFLs*

For CFL impact calculations, the evaluation team assumed that the impact parameters (including program wattage, replaced wattage, HOU, CF and ISR) were the same for all 4,293,076 CFLs sold in 2012. Using the methods from Section 3.7.1, the evaluation team calculated the total ex-post savings for CFLs and then divided by the number of units to determine the per-CFL 2012 energy and demand savings, as shown in Table 4-3.

Table 4-3. Ex-Post Energy and Demand Savings for Program Year 2012 CFLs

	Number of Units	Total Ex-Post Savings	Per-Unit Savings
Energy	4,293,076	167,778 MWh	39.08 kWh
Demand	4,293,076	14.98 MW	0.0035 kW

4.2.3 LED Impacts

The key impact parameters for Program Year 2012 LEDs are summarized below, with additional detail provided in the Appendix. Because LEDs are a very low percentage of discounted lighting products sold (0.2 percent), and primary installation and usage data was not collected for LEDs specifically, the evaluation team assumed all parameters, except for LED wattage, were the same for LEDs as for CFLs.

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[11] A 2012 NMR Group study asked telephone survey respondents what they would use to replace a 100-Wattwatt incandescent in their home. The largest number of respondents (39 percent) stated that they would replace it with a lower wattage incandescent. The next most common response (34 percent) was to replace it with a CFL. Without conducting a similar study in the AEP Ohio service territory, the exact percentages that apply to AEP Ohio customers are unknown. Thus, the evaluation team felt that a conservative approach for 100-watt equivalent program CFLs is to assume that customers who do not have access to 100-watt incandescent lamps are most likely to use the next highest wattage incandescent – a 75-watt lamp. NMR Group. 2012 "Connecticut EISA Lighting Exploration: Stage 2 Results", http://www.ctenergyinfo.com/DRAFT%20CT%20EISA%20Lighting%20Report%20052112.pdf.

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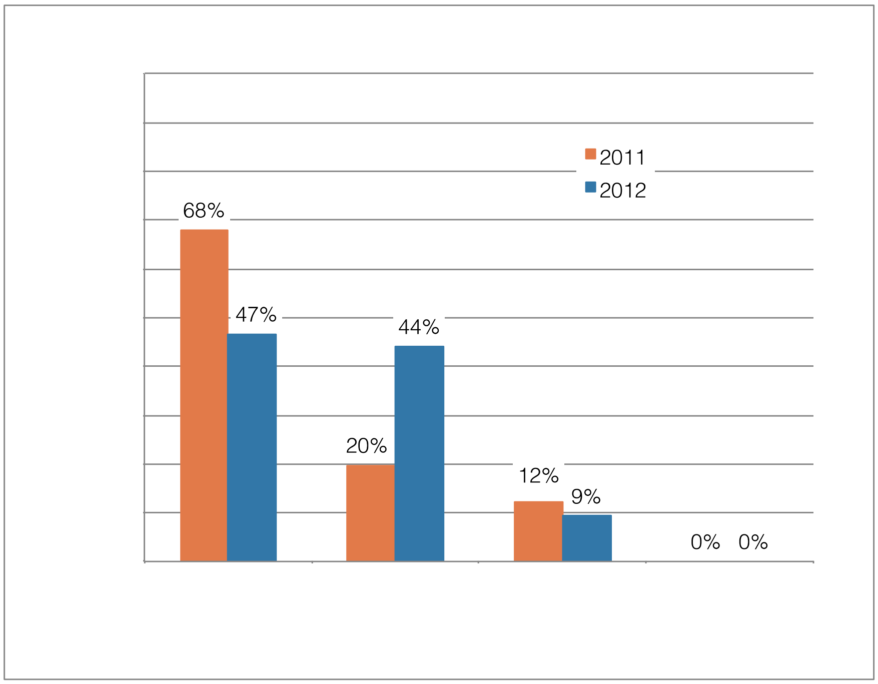
4.2.3.1 Program Wattage for LEDs

The Efficient Products Program discounted 27,170 LEDs in 2012. The mean wattage of program discounted LEDs was 12.1 watts, with a range of 7 to 20 watts; the distribution of discounted LEDs by wattage is shown in Figure 4-5. Because the distribution of 2012 wattages is different from the distribution of 2011 wattages, and in keeping with the method used in 2011, the average program wattage for LEDs was taken from the 2012 tracking data.

Figure 4-5. Distribution of Program LED Wattages



4.2.3.2 Replaced Wattage for LEDs

The evaluation team assumed the same replaced wattage ($Watt_{REP}$) for LEDs as for CFLs. Adjusting to account for the EISA federal standard's effect on 100-watt lamp availability; this replaced wattage was determined to be 63.48 Watts.

4.2.3.3 Additional Parameters for LEDs

The in-service rate, hours of use, and peak demand coincidence factor for LEDs were all taken from the 2011 evaluation.

4.2.3.4 Energy and Demand Impacts for LEDs

For LED impact calculations, the evaluation team assumed that the same impact parameters (program wattage, replaced wattage, HOU, CF, and ISR) applied to all 27,170 LEDs sold in 2012. Using the methods summarized in Section 3.7.1, the evaluation team calculated the ex-post savings for LEDs and

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then divided by the number of units to determine the per-LED 2012 energy and demand savings, as shown in Table 4-4.

Table 4-4. Ex-Post Energy and Demand Savings for Program Year 2012 LEDs

	Number of Units	Total Ex-Post Savings	Per-Unit Savings
Energy	27,170	1,116 MWh	41.07 kWh
Demand	27,170	0.10 MW	0.0037 kW

4.2.4 Total Lighting Impacts and Realization Rates

The ex-post 2012 energy savings for lighting product sales was 168,894 MWh; over 99 percent of those savings were from CFLs, as shown in Table 4-5.

Table 4-5. Total Ex-Post Energy Savings for 2012 Lighting

Lighting Product	Number of Units	Total Ex-Post Energy Savings (MWh)	Average Per-Unit Energy Savings (kWh)	Percent of Savings
CFLs	4,293,076	167,778	39.08	99.34%
LEDs	27,170	1,116	41.07	0.66%
Total	4,320,246	168,894	-	100.00%

The ex-post demand savings for 2012 lighting product sales were 15.08 MW; 99.3% of those savings are from CFLs, as shown in Table 4-6.

Table 4-6. Total Ex-Post Demand Savings for 2012 Lighting

Lighting Product	Number of Units	Total Ex-Post Demand Savings (MW)	Average Per-Unit Demand Savings (kW)	Percent of Savings
CFLs	4,293,076	14.98	0.0035	99.34%
LEDs	27,170	0.10	0.0037	0.66%
Total	4,320,246	15.08	-	100.00%

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Savings from residual 2011 and 2010 lamps are shown in Table 4-7.

Table 4-7. Ex-Post Energy and Demand savings for Residual Program Year 2010 and 2011 CFLs

Lighting Product	Number of Units	Ex-Post Energy Savings (MWh)	Ex-Post Demand Savings (MW)
Program Year 2010	359,121	17,179	1.53
Program Year 2011	305,352	14,608	1.30
Total Residual Lighting	664,473	31,787	2.83

Total credited 2012 energy and demand savings, from 2012 and residual 2011 and 2010 lamps are 200,681 MWh and 17.91 MW, respectively. The combined impacts from 2012, 2011, and 2010 lamps are shown in Table 4-8 and Table 4-9, below.

Table 4-8. Total Combined Ex-Post Energy Savings - Lighting

Lighting Product	Number of Units	Total Ex-Post Energy Savings (MWh)	Percent of PY 2012 Lighting Savings
CFLs	4,293,076	167,778	99.3%
LEDs	27,170	1,116	0.7%
2012 Total	4,320,246	168,894	100.0%
2010	359,121	17,179	N/A
2011	305,352	14,608	N/A
Total	4,984,719	200,681	N/A

Table 4-9. Total Combined Ex-Post Demand Savings - Lighting

Lighting Product	Number of Units	Total Ex-Post Demand Savings (MW)	Percent of Program Year 2012 Lighting Savings
CFLs	4,293,076	14.98	99.3%
LEDs	27,170	0.10	0.7%
2012 Total	4,320,246	15.08	100.0%
2010	359,121	1.53	N/A
2011	305,352	1.30	N/A
Total	4,984,719	17.91	N/A

As shown in Table 4-10, total lighting ex-post savings were 75 percent of ex-ante estimated energy savings and 79 percent of ex-ante estimated demand savings. The largest factor in the difference between

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ex-ante and ex-post savings for 2012 lighting activity is the ISR, which is assumed to be 1.0 in the ex-ante calculations and is 0.817 in the ex-post calculations. Also, the ex-ante savings are estimated based on matching the wattage of the program bulb with the expected wattage of the bulb to be replaced, based on lumen equivalency, where the ex-post savings are estimated based on an average program and replaced bulb wattage. When installation of 2010 and 2011 CFLs is included, realization rates are 0.89 for energy and 0.90 for demand.

Table 4-10. Lighting Realization Rates

	Ex-Ante Claimed Savings		Ex-Post Savings		Realization Rates	
Lighting Product	MWh	MW	MWh	MW	Energy	Demand
2012 Activity Only	224,381	19.81	168,894	15.08	0.75	0.76
Total Including 2010 and 2011 CFL Installations	224,381	19.81	200,681	17.91	0.89	0.90

4.3 *Appliance Impacts*

This section provides a detailed description of impact findings for the 2012 appliance rebates. A list of key impact parameters is provided for each appliance.

4.3.1 Summary of Appliance Impacts

The 2012 appliance rebates resulted in ex-post energy savings of 7,086 MWh and ex-post demand savings of 1.67 MW. The following sections discuss the impacts for each of the rebated appliances:

» Refrigerators
» Freezers
» Clothes Washers
» Dehumidifiers
» Heat Pump Water Heaters
» Electric Water Heaters

4.3.2 Refrigerator Impact Parameters

AEP Ohio customers submitted rebate forms for 10,951 refrigerators during 2012. Refrigerator savings were calculated based on the difference in energy use between the program-rebated refrigerator and the federal standard. This direct assessment is different from the other appliances (except freezers), which depend upon calculated parameters for development of the ex-post savings. All information necessary for savings calculations and characterization of program-rebated refrigerators came from the ENERGY STAR qualified products list by matching the manufacturer and model in the program tracking

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database.[12] All units were assumed to be running all year based on survey findings from 2011; thus both the part-use factor and summer-use factor were 1.0.

The evaluation team looked at the configuration of refrigerators that were rebated as part of the program to determine whether the different configurations should be evaluated separately. The most common units rebated through the program were bottom freezer, top freezer, and side-by-side units, as shown in Table 4-11.

Table 4-11. Configuration of Program-Rebated Refrigerators

Configuration	Units	Percent
Bottom Freezer	4,141	37.8%
Top Freezer	3,260	29.8%
Side-by-Side	3,325	30.4%
Refrigerator Only - Single Door	144	1.3%
Refrigerator/Freezer - Single Door	80	0.7%
Total	10,950	100.0%

[12] ENERGY STAR Qualified Refrigerator List. http://downloads.energystar.gov/bi/qplist/refrigerators.xls?c70e-5197 Version: March 8, 2013. The Feb 2, 2012 version was also used to account for the fact that some models that qualified in 2012 may have been missing from the 2013 database. For six models, the evaluation team could not find a match in the ENERGY STAR lists and identified key characteristics from ENERGY GUIDES or sales data on manufacturer or retail websites. For one model, the evaluation team was unable to find a match through any means; annual energy use and the federal standard were assigned by taking the mean for other units in the same volume category.

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Table 4-12 shows the savings represented by each refrigerator configuration. On average, program-rebated units are 22.5% percent more energy-efficient than the federal standard. Refrigerators configured with a single door had the lowest per-unit savings in kWh per year, but these represent only a small portion of the program (2%), and are similar to other configurations in terms of percent better than standard efficiency. Thus, the evaluation team did not evaluate these units separately.

Table 4-12. Consumption and Average Savings of Program-Rebated Refrigerators

Configuration	Mean Federal Standard (kWh/year)	Mean Energy Use Program Unit (kWh/year)	Mean Savings (kWh/year)	Mean Percent Better than Standard
Bottom Freezer	643.9	496.3	147.5	22.9%
Refrigerator Only - Single Door	367.4	288.6	78.8	21.5%
Refrigerator/Freezer - Single Door	327.1	256.8	70.3	21.5%
Side-by-Side	717.4	557.0	160.4	22.4%
Top Freezer	489.9	382.6	107.3	21.9%
Overall Mean	614.4	476.4	138.0	22.5%

4.3.3 Freezer Impact Parameters

AEP Ohio customers submitted rebate forms for 1,535 freezers during 2012. As with refrigerators, freezer savings were calculated based on the difference in energy use between the program-rebated appliance and the federal standard. All information necessary for savings calculations and characterization of program-rebated refrigerators came from the ENERGY STAR qualified products list by matching the manufacturer and model in the program tracking database.[13] The majority of program freezers are upright freezers, and less than one percent are compact freezers, as shown in Table 4-13.

Table 4-13. Configuration of Program-Rebated Freezers

Configuration	Units	Percent
Compact Chest Freezer	2	0.1%
Compact Upright Freezer	2	0.1%
Chest Freezer	516	33.6%
Upright Freezer	1,015	66.1%
Total	1,535	100.0%

Note. Percentages do not sum exactly to 100% due to rounding.

[13] ENERGY STAR Qualified Freezer List. http://downloads.energystar.gov/bi/qplist/refrigerators.xls?c70e-5197 Version: 03/13/2013. For models that the evaluation team could not find a direct match in this list and identified key characteristics from ENERGY GUIDES or sales data on manufacturer or retail websites.

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Table 4-14 shows the savings represented by each freezer configuration. On average, program-rebated units are 11 percent more energy-efficient than the federal standard. Compact units represent the greatest relative savings, at 20 percent better than the standard.

Table 4-14. Consumption and Average Savings of Program-Rebated Freezers

Configuration	Mean Federal Standard (kWh/year) [(a)]	Mean Energy Use Program Unit (kWh/year) [(a)]	Mean Savings (kWh/year)	Percent Better than Standard
Compact Chest Freezer	242	193	49	20%
Compact Upright Freezer	322	258	64	20%
Chest Freezer	416	373	43	10%
Upright Freezer	702	626	75	11%
Overall Mean	604	540	64	11%

4.3.3.1 Part Use Factor

For the 2012 evaluation, the evaluation team surveyed a representative sample of freezer program participants. All 68 respondents indicated that the program freezer was in use all year, thus, a part-use factor (PUF) of 1.0 was applied for the 2012 evaluation.

4.3.3.2 Summer Use Factor

For the 2012 evaluation, the evaluation team surveyed a representative sample of freezer program participants. All respondents indicated that the program freezer was in use all summer; thus a summer use factor (SUF) of 1.0 was used for 2012 evaluation.

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4.3.4 Clothes Washer Impact Parameters

The values used in the 2012 evaluation for the key impact parameters for clothes washers are summarized below, with additional detail provided in the Appendix. Unit Capacity for Clothes Washers Program-rebated clothes washers had a mean volume of 3.85 cu ft. Almost 80 percent of program-rebated clothes washers had capacity of 3.6 cu ft. or larger, as shown in Table 4-15.

Table 4-15. Capacity of Qualified Program-Rebated Clothes Washers

Capacity	Units	Percent
< 3 cu. ft.	16	0.2%
3 - 3.5 cu. ft.	1,988	21.1%
3.6 - 4 cu. ft.	4,668	49.5%
> 4 cu. ft	2,767	29.3%
Total	9,439	100.0%

Note. Total adds to greater than 100% due to rounding. Modified Energy Factor for Clothes Washers

The federal standard for Modified Energy Factor (MEF) is 1.26 ft^3/kWh/cycle.[14] The mean MEF of qualified program-rebated clothes washers is 2.56 ft^3/kWh/cycle. Table 4-16, shows the CEE Tier of the program-rebated clothes washers.

Table 4-16. Efficiency of Program-Rebated Clothes Washers

CEE Tier	Units	Percent
ENERGY STAR, Tier 1 (MEF>=2.0 & WF<=6.0)	1,577	16.7%
Tier 2 (MEF>=2.2 & WF<=4.5)	284	3.0%
Tier 3 (MEF>=2.4 & WF<=4.0)	7,578	80.3%
Total	9,439	100.0%

4.3.4.1 Additional Parameters for Clothes Washers

Several parameters were determined as part of the 2011 evaluation: (1) yearly washer loads (cycles), (2) percentage of loads that are heated with electric water heat, (3) percentage of loads run in program-rebated washers that are then dried in electric clothes dryers, (4) Fuel Adjustment Factor (FAF), and (5) coincidence factor.

4.3.5 Dehumidifier Impact Parameters

In 2012, AEP Ohio customers submitted rebate forms for 6,167 dehumidifiers. The key parameters for savings from dehumidifiers are summarized below, with additional detail provided in the Appendix.

[14] Department of Energy. 2001. DOE Residential Clothes Washer Final Rule (66 FR 3314)

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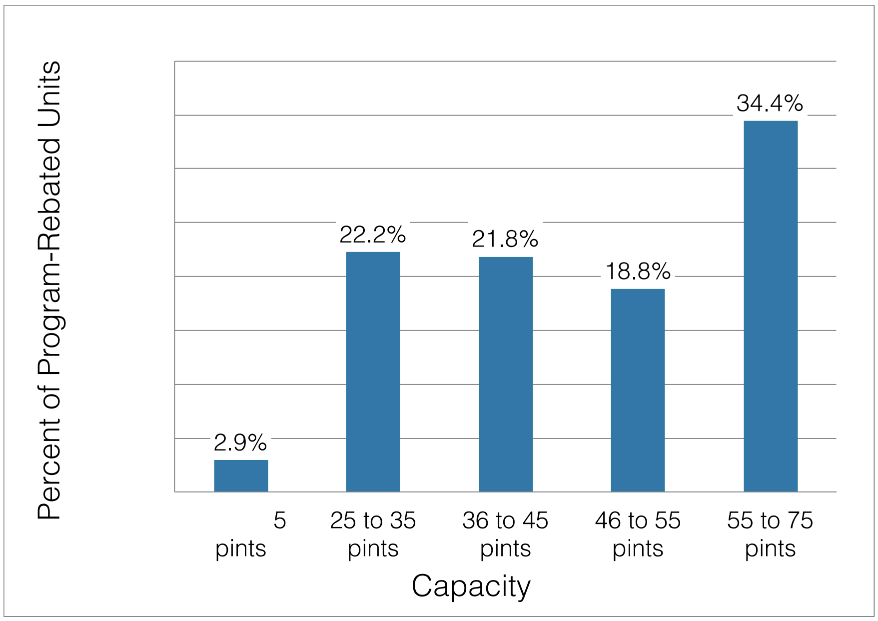
4.3.5.1 *Capacity for Dehumidifiers*

The evaluation team matched the brand and model information to the ENERGY STAR list of qualifying units to determine capacity. The mean capacity for program-rebated dehumidifiers was 50.4 pints, but capacity varied widely among program-rebated dehumidifiers, as shown in Figure 4-6.

Figure 4-6. Capacity of Program-Rebated Dehumidifiers



4.3.5.2 *Hours of Use for Dehumidifiers*

The evaluation team relied on the Department of Energy estimate of 1,095 hours of use for dehumidifiers in 2012.

4.3.5.3 *Coincidence Factor for Dehumidifiers*

The coincidence factor for dehumidifiers is 0.843, based on 2011 participant survey responses.

4.3.5.4 *Efficiency for Dehumidifiers*

The evaluation team matched the brand and model information to the ENERGY STAR list of qualifying units to locate the energy factor for program-rebated dehumidifiers. The mean energy factor for program-rebated dehumidifiers was 1.60 liters per kWh, with a range of 1.20 to 1.81, increasing with capacity. The mean energy factor for the federal standard was 1.34, based on the capacity of program-rebated units. Table 4-17 shows that the program units had energy factors equal to or slightly higher than the ENERGY STAR requirement. The evaluation team notes that new federal standards and ENERGY STAR requirements came into effect in October 2012; under the new ENERGY STAR requirements, only 200 of the program-rebated units would qualify for certification. For 2012, the evaluation team considered all models in the program tracking database in calculating savings.

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Table 4-17. Energy Factors for Dehumidifiers

Size Group	Efficiency Standard	Efficiency ENERGY STAR	Efficiency Program	Number of Units
Up to 25 Pints	1.0	1.20	1.20	177
26 to 35 Pints	1.2	1.40	1.42	1,357
36 to 45 Pints	1.3	1.50	1.50	1,336
46 to 54 Pints	1.3	1.60	1.63	1,153
55 to 75 Pints	1.5	1.80	1.81	2,106

4.3.6 Heat Pump Water Heater Impact Parameters

In 2012, AEP Ohio customers submitted rebate forms for 170 heat pump water heaters. The key parameters for savings from heat pump water heaters are discussed below.

4.3.6.1 Volume for Heat Pump Water Heaters

The evaluation team matched the brand and model information to the ENERGY STAR list of qualifying units to determine capacity. The mean capacity for program-rebated Heat Pump Water Heaters was 50.5 gallons; 97.6% of units (166 out of 170) were 50-gallon units, the remaining units were 60- or 80-gallon units.

4.3.6.2 Water Heating Load for Heat Pump Water Heaters

The evaluation team used a baseline annual water heating load in order to determine savings from using an efficient, program qualified heat pump water heater instead of a federal standard electric water heater. The evaluation team used an annual water-heating load of 3,460 kWh, from DOE estimates.[15]

4.3.6.3 Efficiency for Heat Pump Water Heaters

The average efficiency of the rebated heat pump water heaters was calculated to be 2.38. This compares to an average efficiency of 0.90 for federal standard electric water heaters of the same capacity, as shown in Table 4-18.

[15] Assumption of 3460 kWh taken from; Residential Water Heaters Technical Support Document for the January 17, 2001, Final Rule Table 9.3.9, pp. 9-34, http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/09.pdf

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Table 4-18. Efficiency for Heat Pump Water Heaters

Volume	Standard Efficiency	Program Efficiency	Number of Units
50 Gallons	0.90	2.38	166
60 Gallons	0.89	2.33	2
80 Gallons	0.86	2.33	2
Mean or Total	0.90	2.38	170

4.3.6.4 Heating and Cooling Effects for Heat Pump Water Heaters

Because heat pump water heaters remove heat from the surroundings and transfer this heat to the water being heated, heat pump water heaters have an effect on the surrounding temperature. For heat pump water heaters located in conditioned spaces, this effect may manifest as increased heating loads or decreased cooling loads. The increased heating load (kWh_{heat}) compensates for heat removed from the space and transferred to the water; similarly, the decreased cooling loads (kWh_{cool}) results from heat being removed from the space by the heat pump.

The evaluation team applied an average kWh_{heat} value of 346.4 kWh and a kWh_{cool} value of 180 kWh to the heat pump water heater impact calculations, based on results of a study by the Energy Center of Wisconsin combined with data on home heating types in Ohio.[16]

4.3.6.5 Conditioned Space Factor for Heat Pump Water Heaters

The evaluation team determined the conditioned space factor (CSF) to apply to the heat pump water heater heating and cooling effects based on 2012 participant survey responses regarding the location of rebated heat pump water heaters. The evaluation team used a conditioned space factor of 0.65 for the 2012 impact calculations.

4.3.6.6 Coincidence Factor for Heat Pump Water Heaters

The evaluation team used a coincidence factor for heat pump water heaters of 0.275, based on participant survey responses. Participants were asked if they use any hot water during summer weekdays between 3 pm and 6 pm; 72 percent said they did. These participants were then asked the approximate percentage of the time between 3 pm and 6 pm that they used hot water; they reported that they used hot water for roughly 40 percent of that time period.

4.3.6.7 Heat Pump Factor for Heat Pump Water Heaters

The Heat Pump Factor (HPF) takes into account the portion of participants who stated that their heat pump water heater is in either heat pump or hybrid operating mode The evaluation team calculated the

[16] Energy Information Administration. 2013. Residential Energy Consumption Survey: 2009. Table HC6.9. Space Heating in Midwest Region, Divisions, and States. Available here: http://www.eia.gov/consumption/residential/data/2009/index.cfm?view=characteristics

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HPF based on participant survey responses regarding typical heat pump water heater operating state. Based on these responses, the evaluation team used a value of 0.67 for the impact calculations.

4.3.6.8 Annual Load Hours for Heat Pump Water Heaters

To determine hourly demand savings, the evaluation team divided unit energy savings by the annual load hours for water heaters. The evaluation team used an annual load value of 2,533 hours.[17] This hourly demand savings was also adjusted using the heat pump factor (HPF) and coincidence factor (CF) for heat pump water heaters.

4.3.7 Electric Water Heater Impact Parameters

AEP Ohio customers purchased and submitted rebate forms for 64 electric water heaters in 2012; one of the purchased water heaters was in fact a heat pump water heater model, thus 63 electric water heaters were rebated.[18] The key parameters for savings from electric water heaters are discussed below.

4.3.7.1 Volume of Heat Pump Water Heaters

The evaluation team matched the brand and model information to the ENERGY STAR list of qualifying units to determine capacity. The mean capacity for program-rebated electric water heaters was 41.7 gallons.

4.3.7.2 Water Heating Load for Electric Water Heaters

The evaluation team used an annual water heating load of 3,460 kWh based on DOE estimates, the same as for heat pump water heaters.

4.3.7.3 Coincidence Factor for Electric Water Heaters

The evaluation team used a coincidence factor for electric water heaters of 0.275, the same as for heat pump water heaters. This value was determined from the participant survey responses about hot water use during peak hours in AEP Ohio service territory.

4.3.7.4 Efficiency of Electric Water Heaters

The average efficiency of the rebated electric water heaters was calculated to be 0.95. This compares to an average efficiency of 0.91 for federal standard electric water heaters of the same capacity, as shown in Table 4-19.

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[17] The Mid-Atlantic TRM from October 2010 uses this value of 2,533 full load hours for heat pump water heater savings; this value is based on an Efficiency Vermont load curve generated from Itron eShapes; http://neep.org/uploads/EMV%20Forum/EMV%20Products/Mid%20Atlantic%20TRM_V1.1.pdf

[18] Upon review of the program tracking data, the same unit was found to be entered twice; once as a heat pump water heater and once as an electric water heater. Savings impacts were attributed to the unit as a heat pump water heater.

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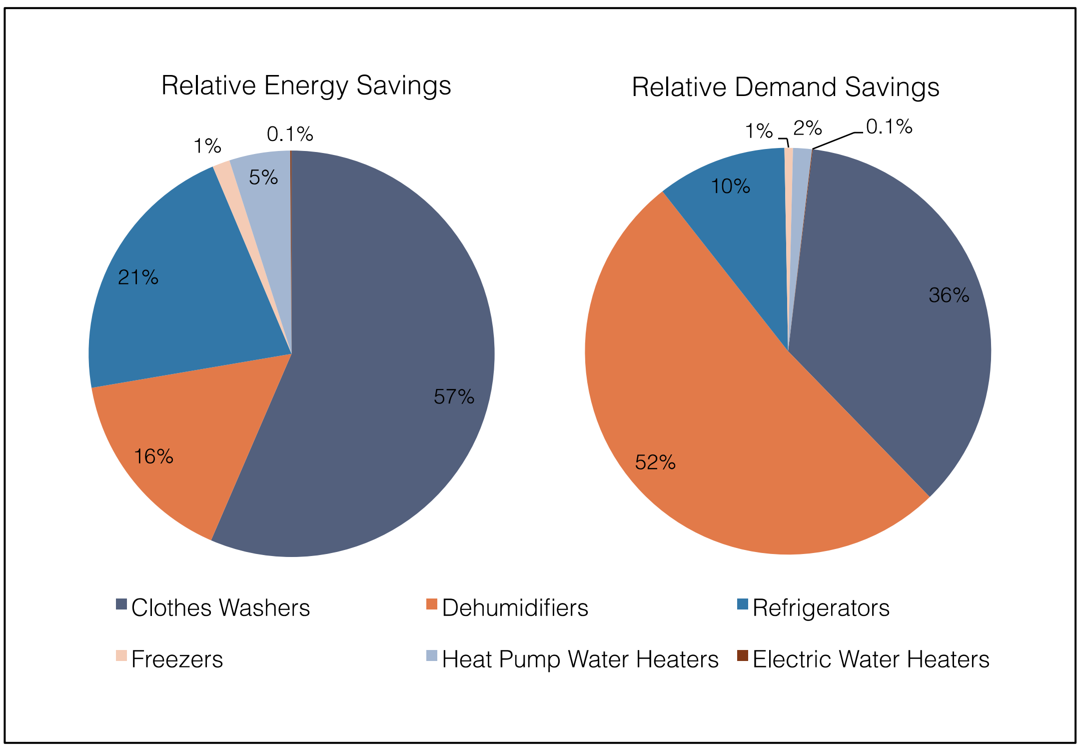
Table 4-19. Efficiency for Electric Water Heaters

Capacity	Efficiency Standard	Efficiency Program	Number of Units
30 gallons	0.93	0.95	1
40 gallons	0.92	0.95	54
50 gallons	0.90	0.94	5
55 gallons	0.90	0.95	2
80 gallons	0.86	0.95	1
Mean or Total	0.91	0.95	63

4.3.8 Total Appliance Impacts

With 28,325 qualifying-rebated appliances, the appliance rebates resulted in 2012 ex-post savings of 7,086 MWh and 1.67 MW. The bulk of the program energy savings came from clothes washers. More than half of the demand energy savings came from dehumidifiers, which have a high coincidence factor. Figure 4-7 shows the relative contribution of each appliance to total appliance savings.

Figure 4-7. Relative Contribution to Appliance Rebate Savings, by Appliance Type



Note. Percentages do not sum to exactly 100% due to rounding.

Table 4-20 shows the total and per-unit ex-post energy savings.

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Table 4-20. Ex-Post Energy Savings for the Appliance Rebates, Program Year 2012

Appliance Type	Number of Qualified Units	Total Ex-Post Energy Savings (MWh)	% of Total Savings	Per-Unit Energy Savings (kWh)
Clothes Washers	9,439	4,003	56.5%	424
Dehumidifiers	6,167	1,121	15.8%	182
Refrigerators	10,951	1,511	21.3%	138
Freezers	1,535	99	1.4%	64
Heat Pump Water Heaters	170	344	4.9%	2,021
Electric Water Heaters	63	8	0.1%	126
Appliances Total	28,325	7,086	100.0%	-

Table 4-21 shows the overall ex-post demand savings and demand savings per unit from the appliance rebates.

Table 4-21. Ex-Post Demand Savings for the Appliance Rebates, Program Year 2012

Appliance Type	Number of Qualified Units	Total Ex-Post Demand Savings (MW)	% of Total Savings	Per-Unit Demand Savings (kW)
Clothes Washers	9,439	0.5977	35.8%	0.063
Dehumidifiers	6,167	0.8634	51.7%	0.140
Refrigerators	10,951	0.1725	10.3%	0.016
Freezers	1,535	0.0113	0.7%	0.007
Heat Pump Water Heaters	170	0.0251	1.5%	0.148
Electric Water Heaters	63	0.0009	0.1%	0.014
Appliances Total	28,325	1.6709	100.0%	-

Note. Percentages do not sum to exactly 100% due to rounding.

The appliance rebate portion of the program overall realized energy savings 136 percent of the ex-ante total and demand savings 208 percent of the ex-ante total (see Table 4-22). Realization rates varied by appliance type. These realization rates reflect different methods used for ex –ante and ex-post calculations. Whereas ex-post savings are calculated based on appliance and survey data, ex-ante savings use deemed values based on appliance characteristics. The greatest differences appear to be with clothes washers and dehumidifiers. For clothes washers, ex-ante values vary by CEE tier level, regardless of capacity, and the rebated units appear to have a larger capacity than those on which the ex-ante estimates are based. For dehumidifiers, ex-ante estimates appear to underestimate savings for about one-third of dehumidifiers, which have a capacity of between 54 and 75 liters per day.

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Table 4-22. Realization Rates for AEP Ohio Efficient Products Appliance Rebates

Appliance	Ex-Ante Claimed Savings MWh	Ex-Ante Claimed Savings MW	Ex-Post Savings MWh	Ex-Post Savings MW	Realization Rates Energy	Realization Rates Demand
Clothes Washers	2,137	0.2204	4,003	0.5977	1.87	2.71
Dehumidifiers	1,215	0.2762	1,121	0.8632	0.92	3.13
Refrigerators	1,400	0.2474	1,511	0.1725	1.08	0.70
Freezers	103	0.0117	99	0.0113	0.96	0.97
Heat Pump Water Heaters	353	0.0476	344	0.0251	0.97	0.53
Electric Water Heaters	12	0.0009	8	0.0009	0.67	1.00
Total or Overall Value	5,220	0.8042	7,086	1.6707	1.36	2.08

4.4 *Television Impacts*

This section provides a description of detailed energy and demand impact findings for the mid-stream television portion of the 2012 Efficient Products Program.

4.4.1 Summary of Television Impacts

The values used in this evaluation for the key impact parameters for televisions are shown in Table 4-23.

Table 4-23. Key Impact Parameters for Televisions

Parameter Description	Parameter	Mean Value
Program Television Annual Energy Use	UEC_{EE}	80.1 kWh
Maximum ENERGY STAR Television Annual Energy Use	UEC_{std}	151.8 kWh
Program Television On Mode Power Consumption	W_{EE}	43.2 W
Maximum ENERGY STAR Television On Mode Power Consumption	W_{std}	79.4 W
Peak Demand Coincidence Factor	CF	0.162

Using the method discussed in Section 3.7.8 and the impact parameters shown in Table 4-23, the evaluation team calculated the ex-post energy and demand savings for program televisions, shown in Table 4-24. AEP Ohio provided incentives to retailers for 3,218 televisions in 2012. This resulted in ex-post energy savings of 231 MWh and ex-post coincident demand savings of 0.019 MW.

Table 4-24. Ex-Post Energy and Demand Savings for PY 2012 Television

	Number of Units	Total Ex-Post Savings	Average Per-Unit Savings
Energy	3,218	231 MWh	71.7 kWh
Demand	3,218	0.019 MW	0.0059 kW

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4.4.1.1 *Television Program Realization Rates*

As shown in Table 4-25 the AEP Ohio mid-stream incentivized televisions had realization rates of 70 percent for energy and 21 percent for demand based on ex-ante estimates and ex-post calculations. While ex-ante savings for televisions were based on the 2012-2014 program plan,[19] and used deemed values, the evaluation team found lower ex-post savings using the calculated approach described in this report.

Table 4-25. 2012 Realization Rates for Televisions

Ex-Ante Claimed Savings		2012 Ex-Post Savings		Realization Rates	
MWh	MW	MWh	MW	Energy	Demand
328	0.09	231	0.019	0.70	0.21

4.5 *Combined Impacts of the Efficient Products Program*

The 2012 AEP Ohio Efficient Products Program had ex-post energy savings of 176,211 MWh, 95.9 percent from lighting products. The program also had 16.77 MW in peak demand savings, 89.9 percent from lighting products. Total savings from the program are summarized in Table 4-26. The additional 2011 and 2010 lighting savings of 31,787 MWh and 2.83 MW included in 2012 bring the overall 2012 total to 207,998 MWh and 19.60 MW of energy and demand savings, respectively.

Table 4-26. Total Efficient Products Savings

Product	Ex-Post Savings			
	MWh	% of 2012 Product Savings	MW	% of 2012 Product Savings
Lighting Products	168,894	95.85%	15.08	89.92%
Appliances	7,086	4.02%	1.67	9.96%
Televisions	231	0.13%	0.02	0.12%
Total – 2012 Products Only	176,211	100.00%	16.77	100.00%
2010 CFLs	17,179	N/A	1.53	N/A
2011 CFLs	14,608	N/A	1.30	N/A
Total – Including Residual Installations of 2010 and 2011 CFLs	207,998	N/A	19.60	N/A

[19] Volume 1: 2012 to 2014 Energy Efficiency/Peak Demand Reduction (EE/PDR) Action Plan. November 29, 2011.

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4.6 Program Realization Rates

As shown in Table 4-27, the AEP Ohio Efficient Products Program in 2012 had realization rates of 77 percent for energy and 81 percent for demand based on ex-ante estimates and ex-post calculations for products purchased in 2012. Including 2010 and 2011 CFLs that were installed in 2012 increases the overall realization rate to 0.90 for energy savings and 0.95 for demand savings.

Table 4-27. Total Realization Rate for Efficient Products

	Ex-Ante Claimed Savings		Ex-Post Savings		Realization Rates	
Product Category	MWh	MW	MWh	MW	Energy	Demand
Lighting Products	224,381	19.81	168,894	15.08	0.75	0.76
Appliances	5,220	0.80	7,086	1.67	1.36	2.08
Televisions	328	0.09	231	0.02	0.70	0.22
Total or Overall Value - 2012 Products Only	229,929	20.70	176,211	16.77	0.77	0.81
2010 CFLs	-	-	17,179	1.53	N/A	N/A
2011 CFLs	-	-	14,608	1.30	N/A	N/A
Total or Overall Value – Including Residual Installations of 2010 and 2011 CFLs	229,929	20.70	207,998	19.60	0.90	0.95

4.7 Process Findings

The process evaluation of the Efficient Products Program focused on assessing the effectiveness of the lighting discounts and appliance rebate components of the program. The process evaluation did not address the television component because it was added midway through the program year and represents a very small portion of total program savings.

Both the lighting and appliance rebate components of the program are operating successfully. From the program staff perspective, interviews with program implementation staff at AEP Ohio, APT, and EFI confirmed that the program is running smoothly and that there were no major program challenges in 2012. Additionally, EFI confirmed that the high percentage of initially incomplete appliance rebate applications experienced by the program in 2011 has decreased substantially due to a process change; extracts from the AEP Ohio customer database are now provided to EFI. This change has allowed EFI staff to confirm the eligibility of a large proportion of rebate applications without having to send incomplete applications back to customers, which has decreased rebate-processing time and decreased the percentage of initially incomplete applications.

From the customer perspective, participant satisfaction with all aspects of the appliance rebate component of the program was high, and participants were generally very satisfied with the energy-efficient appliances purchased. Those participants surveyed by the evaluation team also reported that in-

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store advertising, store employees, and utility mailings and bill inserts were the largest sources of awareness for the program. This is consistent with the experience of the evaluation team's mystery shoppers who conducted mystery shopping visits at 20 different stores participating in the appliance rebate component and found that 16 of the 20 sales associates were at least somewhat familiar with the rebate program. Similarly to rebate participants, the level of satisfaction with the program was generally high among the six corporate-level retailer representatives interviewed by the evaluation team. These retailer representatives generally felt that the program is a win for all those involved, and several offered suggestions for program improvement.

While the process evaluation suggests that the program is operating effectively and achieving its stated goals, the process evaluation also revealed some potential program challenges:

- While only 8 percent of heat pump water heater survey respondents specifically reported that they were dissatisfied with the performance of the unit, this is an important technology for the program, due to the high per-unit energy savings.
- There is a trend of decreasing awareness of energy efficient lighting technologies and appliances among AEP Ohio residential customers; for example, awareness of CFLs decreased from 95 percent in 2010 to 85 percent in 2012.
- The two retailer interview respondents representing franchise-based chains expressed dissatisfaction with a lack of incentives on LEDs in their current agreements.
- Retailer sales staff at some participating retailer locations appeared to be unaware of the appliance rebate offerings.

The remainder of this section presents the findings of the process evaluation in more detail, including:

- Changes in program implementation
- Participant satisfaction
- Marketing and program awareness
- Appliance retailer knowledge and promotion of rebates
- Barriers and misconceptions regarding CFLs and LEDs
- Consumer demand for LEDs and specialty CFLs
- Corporate retailers' experience and satisfaction with the program
- Mystery shopping observations
- Availability of 100-watt incandescent lamps
- Availability and pricing of standard and specialty CFLs

4.7.1 Changes in Program Implementation

In addition to the new products added for 2012, there were also two program implementation changes: changes to the way in which EFI processes appliance rebates and changes to the rebate offer, including timing and incentive amount.

4.7.1.1 Appliance Rebate Processing

In 2012, AEP Ohio provided an extract from the AEP Ohio customer database to EFI. According to EFI, the AEP Ohio database functions as a second level of verification of customer eligibility. EFI can look up

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rebate applicants by account number, name, address, and telephone number to confirm their eligibility. This capability has enabled EFI to reduce the percentage of initially incomplete applications from 30 percent in 2011 to 7 percent in 2012, which has in turn decreased the average rebate processing time. According to EFI staff, the access to the AEP Ohio customer database has been a significant benefit to the effectiveness and efficiency of the program.

4.7.1.2 Rebate Offer

In 2011, the program offered appliance rebates for four-month periods of time, which varied by appliance type. For 2012, the program instead offered rebates for all of the appliances over an eight-month period from April 1 through the end of the year. Additionally, the program no longer offered rebates for room air conditioners and added three additional appliances in 2012: freezers, electric water heaters, and heat pump water heaters. The rebate amount for dehumidifiers was increased to $25, while the rebate amount for refrigerators was increased to $50.

4.7.2 Participant Satisfaction

Because lighting participants were not surveyed in 2012, customer feedback for 2012 is only available for appliance rebate participants, as well as respondents to the residential general population survey. Appliance rebate participants were asked about their satisfaction with the Efficient Products Program. Overall, participants reported being satisfied with all aspects of the program, from the process of applying for a rebate to the energy savings realized as a result of installing the new energy efficient appliances. Table 4-28 details how the survey participants responded to questions regarding program satisfaction on a scale of 1 to 5, with 1 meaning “very dissatisfied” and 5 representing “very satisfied.” Responses are broken down by type of appliance purchased, as well as weighted by each appliance type’s overall proportion of rebates in the program. Appliance rebate customers were most satisfied with the ENERGY STAR appliance itself, and least satisfied with the amount of time it took to receive the rebate. The only rating with a mean less than 4 was among electric water heater rebate participants; however, this result should be interpreted with caution due to the low sample size for this group.

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Table 4-28. Participant Satisfaction with Appliance Rebate Program Components

Component	Freezer (n = 68) Mean	Std. Dev.	Electric Water Heater (n = 21) Mean	Std. Dev.	Heat Pump Water Heater (n = 49) Mean	Std. Dev.	Overall (n = 138) Mean	Std. Dev.
ENERGY STAR appliance	4.87	0.34	4.57	0.87	4.44	1.05	4.82	0.50
Application process	4.67	0.81	4.52	0.93	4.86	0.46	4.68	0.78
Energy savings	4.55	0.68	4.67	0.52	4.71	0.46	4.60	0.61
Efficient Products Program overall	4.55	0.74	4.71	0.46	4.73	0.45	4.57	0.71
Communication with AEP Ohio	4.56	0.53	3.67	1.15	4.80	0.45	4.54	0.57
Rebate amount	4.51	0.79	4.67	0.48	4.76	0.43	4.54	0.75
Time to receive rebate	4.45	0.85	4.56	0.51	4.65	0.63	4.47	0.82

Note: Overall responses are weighted to reflect the program population.

Although the proportion of survey participants who reported dissatisfaction with program elements was very small, it is notable that four of the five participants who reported being unsatisfied with a new appliance they purchased were heat pump water heater purchasers, representing eight percent of respondents from that appliance type category. Reasons for being dissatisfied included slow recovery time, poor heat pump functionality, and inconsistency with water temperature. Additional detail regarding customer satisfaction is provided in the Appendix.

4.7.3 Marketing and Program Awareness

This section summarizes program and product awareness, both within the general population of residential customers and among participating customers.

4.7.3.1 General Population Awareness of Incentivized Products

Table 4-29 highlights the general population's awareness of different energy efficient products in 2012, as compared to general population surveys completed in 2011 and 2010. Overall, respondents were most aware of CFLs (85 percent)[20], ENERGY STAR refrigerators (68 percent), and ENERGY STAR clothes washers (61 percent). In 2012, 77 percent of respondents said that either they or someone in their home had purchased CFLs, compared to 75 percent in 2011; this slight increase is not statistically significant. In 2012, 78 percent of respondents reported having heard of LEDs, compared to 82 percent in 2011. However, respondents were asked a follow-up question to gauge their familiarity with LED technology for general-purpose lighting (excluding night lights, holiday string lights, and exterior lights). Compared to 2011, the percent of respondents who said they were at least "somewhat familiar" with LEDs

[20] Initially, 96 percent reported having heard of CFLs in the past, but only 85 percent reported being either "somewhat familiar" or "very familiar" with CFLs.

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decreased from 53 percent in 2011 to 43 percent in 2012.[21] In 2012, eight percent of respondents had installed LEDs in their home, compared to seven percent in 2011.[22]

As indicated in the following table, there were a number of decreases in awareness of energy efficient technologies from 2010 to 2012. It is not clear what is causing this decrease.

Table 4-29. Residential Customers At Least "Somewhat Familiar" with Energy Efficient Products

Product	Percentage of 2010 Respondents Familiar with Product [a] (n = 386)	Percentage of 2011 Respondents Familiar with Product [b] (n = 384)	Percentage of 2012 Respondents Familiar with Product [c] (n = 385)
Lighting Products			
CFLs (d)	95%	87%	85%
3-Way CFLs (e)	N/A	65%	46%
Floodlight CFLs (f)	N/A	61%	46%
Covered CFLs	N/A	48%	43%
Dimmable CFLs (g)	N/A	57%	42%
LEDs (h)	64%	53%	43%
Appliances			
ENERGY STAR Refrigerators (i)	81%	73%	68%
ENERGY STAR Clothes Washers (j)	80%	68%	61%
High Efficiency Electric Water Heaters (k)	62%	N/A	52%
ENERGY STAR Freezers (l)	63%	N/A	47%
ENERGY STAR Dehumidifiers (m)	47%	39%	33%
Electric Heat Pump Water Heaters (n)	34%	N/A	23%

Note. Percents shown are those customer who stated they were at least "somewhat familiar" with the technology. Respondents who said they were aware but rated their familiarity as "not at all familiar" are not shown. Bold-faced percentages indicate a statistically significant change between years.

[a.] 2010 baseline survey; [b.] 2011 general population survey; [c.] 2012 general population survey;

[d.] X^2 (df = 1) = 19.859, p < 0.001; [e.] X^2 (df = 1) = 30.025, p < 0.001; [f.] X^2 (df = 1) = 18.524, p < 0.001; [g.] X^2 (df = 1) = 17.800, p < 0.001;

[h.] X^2 (df = 1) = 8.123, p < 0.01; [i.] X^2 (df = 1) = 18.558, p < 0.001; [j.] X^2 (df = 1) = 33.373, p < 0.001;

[k.] Fuel type was not specified in the 2010 baseline service; this product was simply referred to as "High Efficiency Water Heater." X^2 (df = 1) = 8.659, p < 0.01;

[l.] X^2 (df = 1) = 19.159, p < 0.001; [m.] X^2 (df = 1) = 16.714, p < 0.001;

[n.] Fuel type was not specified in the 2010 baseline service; this product was simply referred to as "Heat Pump Water Heater." X^2 (df = 1) = 12.753, p < 0.001

[21] X^2 $(df = 1) = 8.123$, $p < 0.01$

[22] This represents a statistically nonsignificant change (X^2 $(df = 1) = 0.655$, $p = 0.418$).

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4.7.3.2 *General Population Awareness of Program Incentives*

Respondents to the residential general population survey were asked to report their awareness of Efficient Products Program incentives available to AEP Ohio customers. Results are shown in Table 4-30. Overall, respondents were most aware of the rebates for refrigerators (37 percent) and least aware of rebates for dehumidifiers (6 percent) and heat pump water heaters (7 percent). Even though the lighting portion of the program represents the largest proportion of program savings, only 14 percent of respondents were aware of discounts on energy efficient lamps. Although awareness for rebates appears to have changed from 2011 to 2012, none of the differences are statistically significant.

Table 4-30. Residential Customers At Least "Somewhat Aware" of Program Rebates and Discounts

Incentivized Product	Percent Aware 2011	Percent Aware 2012 [a]
Refrigerator rebates	30.9%	37.2%
Clothes washer rebates	20.9%	17.2%
Lighting discounts	16.7%	14.0%
High efficiency electric water heater rebates	N/A	13.6%
Freezer rebates	N/A	13.4%
Heat pump water heater rebates	N/A	6.5%
Dehumidifier rebates	7.9%	6.1%

[a] By survey design, other than for lighting discounts (n = 385), not every respondent was asked about each program component. Instead, each respondent was asked about six of the eleven programs at random. Therefore, the number of respondents who were asked about each incentivized product varied as follows: refrigerator rebates (n = 207), clothes washer rebates (n = 209), dehumidifier rebates (n = 213), freezer rebates (n = 216), electric water heater rebates (n = 206), and heat pump water heater rebates (n = 214).

While only 14 percent (54 out of 385) had heard of the AEP Ohio lighting discounts, about a quarter (23.4%) of those respondents who had heard of the discount had purchased CFLs since January 2012. Respondents to the survey of the AEP Ohio general population who reported that they were aware of a program component were asked how they first heard of that component. Table 4-31 lists the different sources of awareness by product. Overall, the most commonly reported channels were bill inserts, in-store sources such as sales associates or signage, friends and family, and television; however, television was rarely reported as a source of awareness for the lighting discounts. Of those aware of lighting discounts, 15 percent stated that they had learned of the discounts through the AEP Ohio website.

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Table 4-31. Sources of Program Awareness Among General Population

Sources of Awareness	Lighting (n = 55)		Refrigerator (n = 77)		Dehumidifier (n = 13)	Freezer (n = 29)		Clothes Washer (n = 36)		Electric Water Heater (n = 28)		Heat Pump Water Heater (n = 14)
	Count	%	Count	%	Count	Count	%	Count	%	Count	%	Count
Bill insert	7	12.7%	26	33.8%	5	8	27.6%	11	30.6%	5	17.9%	5
In-store [a]	13	23.6%	10	13.0%	2	3	10.3%	7	19.4%	3	10.7%	-
Friends or family	8	14.5%	7	9.1%	1	6	20.7%	7	19.4%	5	17.9%	-
Television	2	3.6%	14	18.2%	-	4	13.8%	3	8.3%	4	14.3%	-
Other advertisement	4	7.2%	8	10.4%	-	2	6.9%	1	2.8%	3	10.7%	2
AEP Ohio website	8	14.5%	2	2.6%	-	1	3.4%	2	5.6%	-	-	2
Community Event	-	-	1	1.3%	-	1	3.4%	2	5.6%	2	7.1%	2
Other [b]	6	10.9%	5	6.5%	4	2	6.9%	3	8.3%	5	17.9%	3
Don't know	7	12.7%	4	5.2%	1	2	6.9%	-	-	1	3.6%	-

Note. Only counts are shown for Dehumidifiers and Electric Water Heaters due to the low (i.e., fewer than 20) sample size.
[a] Includes responses from those respondents who first became aware from sales associate, in-store signage, or in-store demonstrations.
[b] Includes responses from those respondents who first became aware from newspapers, coworkers, emails from AEP Ohio, or mailings from AEP Ohio, among other sources.

Results regarding customers' awareness of energy efficient products are contained in the Appendix.

4.7.3.3 *Participant Awareness*

Appliance rebate program participants were first asked how they heard about the rebates available in an open-ended question. As a follow-up, respondents were asked whether they had heard of the rebates from a list of sources. Table 4-32 shows both how respondents first heard about the rebates and all of the subsequent ways in which they heard. The largest proportion of respondents heard about the rebates at a retail store, either through in-store advertising (64 percent) or from a store employee (48 percent).

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Table 4-32. Sources of Participant Awareness of Appliance Rebates

Source	First Heard of Program [a] (n = 133)	All Places Where Heard [b] (n = 133)
In-store advertising	36.7%	63.9%
Store employee	22.7%	47.7%
Mailing or bill insert	18.1%	42.7%
AEP Ohio website	7.1%	19.2%
Television	4.2%	18.8%
Newspaper advertising	1.3%	10.3%
All other comments	3.3%	4.4%
Community event	0.0%	4.2%
Plumber/contractor	0.4%	2.9%
Email from AEP Ohio	1.3%	2.6%
Family Member	1.7%	1.6%
Internet/Online search	0.4%	0.4%
Total	100.0%	-

Note. Percentages are weighted to reflect the program population of freezer, heat pump water heater, and electric water heater rebate participants. Participants of the remaining rebated appliances (i.e., clothes washers, refrigerators, and dehumidifiers) were not surveyed in 2012.

[a.] Open-ended question. Those 5 respondents who reported “Don’t know” to this question were removed from this calculation.

[b.] Closed-ended, prompted question. Multiple responses were accepted; thus, responses total to greater than 100%.

4.7.3.4 *Effectiveness of In-Store Marketing Materials*

As indicated above, in-store advertising was the most frequently mentioned source of awareness of the appliance rebates among surveyed program participants. In total, 104 appliance rebate participants (75 percent) reported seeing AEP Ohio energy efficiency promotional materials or informational displays at a retail store that mentioned appliance rebates.[23] Participants were asked a follow-up question to gauge the influence these promotional materials had over their decision to purchase the rebated appliance. Figure 4-8 below shows how participant survey respondents who recalled seeing in-store promotional materials rated the influence of these materials. Participants who purchased water heaters found these materials to be more influential; the mean rating for electric water heaters (3.94) was significantly greater than that for freezers (2.96), but due to the small sample size of participants who purchased rebated electric water heaters, this difference should be interpreted with caution. [24]

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[23] This percentage is different from that in Table 4-32 because this percentage includes responses to a specific prompted question regarding promotional materials or informational displays at the store that mentioned the rebate.

[24] F (2,100) = 3.705, $p < .05$. Post hoc comparisons using the Tukey HSD test indicated that the mean rating among electric water heater rebate survey respondents was greater than that for freezer rebate survey respondents, $p < .05$.

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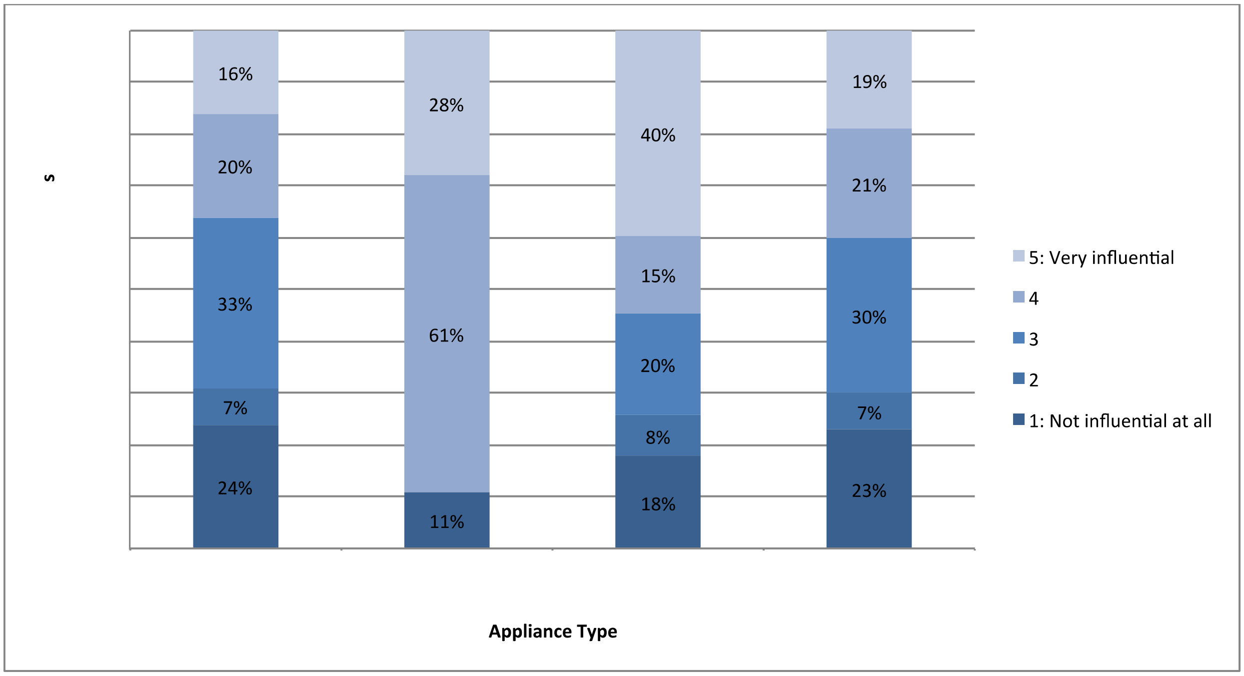
Figure 4-8. Influence of In-Store Materials on Appliance Purchases



Note: Only those who reported seeing AEP Ohio energy efficiency promotional materials (n = 103) were asked this question. Total column is weighted to reflect the program population of freezer, heat pump water heater, and electric water heater rebate participants.

Overall, 40 percent of all participants across all appliance types reported that the in-store promotional materials had at least a moderate influence on their decision to purchase the ENERGY STAR appliance by reporting a rating of 4 or 5.

4.7.4 Appliance Retailer Knowledge and Promotion of Rebates

In total, 72 percent of all appliance rebate survey respondents reported that a store associate spoke with them about the rebate available. Of those, 69 percent reported speaking to the sales associate about the rebates before choosing which appliance to purchase, while 31 percent heard after choosing the appliance. Overall, appliance rebate participants believe appliance retailers are knowledgeable about the appliance rebate portion of the program. In fact, 76 percent of participants ranked the sales associate as either a 4 or 5 on a scale of 1 to 5 (1 meaning “not at all knowledgeable” and 5 meaning “very knowledgeable”).

Participants were also asked to report the level of influence the sales associate had over their purchase of the ENERGY STAR appliance. On a scale of 1 to 5 (1 meaning “not at all influential” and 5 meaning “very influential”), participants reported a mean influence of 2.87. Table 4-33 below highlights the responses of influence of sales associates by appliance type. The sales associates had a wide range of influence on participants’ purchasing decision. Overall, 33 percent of participants rated the sales associate’s influence as a 4 or 5.

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Table 4-33. Influence of Sales Associates on Appliance Purchases

Influence of Sales Associate	Freezer		Electric Water Heater		Heat Pump Water Heater		Total	
	Count	%	Count	%	Count	%	Count	%
5 - Very influential	5	10.2%	3	18.8%	4	11.8%	12	12.1%
4	9	18.4%	4	25.0%	7	20.6%	20	20.2%
3	17	34.7%	5	31.2%	12	35.3%	34	34.3%
2	7	14.3%	0	0.0%	2	5.9%	9	9.1%
1- Not at all Influential	11	22.4%	4	25.0%	9	26.5%	24	24.2%
Total	49	100.0%	16	100.0%	34	100.0%	99	100.0%

Note. The total across appliance types is not weighted due to low cell counts.

Participants (n = 33) who reported that the sales associate was not influential on their decision (i.e., those who gave a rating of less than "3") were asked what additional information they would have liked to have received from the sales associate. Two participants said that they would have liked more details on the program as well as more confidence in the legitimacy of the program from the sales associates; the remaining participants did not offer specific information that would have been useful to the process.

4.7.5 Barriers and Misconceptions Regarding CFLs and LEDs

Survey respondents from the AEP Ohio residential general population were asked what factors were preventing them from installing CFLs and LEDs in their home. Because the respondents represented both purchasers and non-purchasers of each technology, the survey asked those who had already purchased either type what was preventing them from purchasing more CFLs or LEDs, while those who had not purchased CFLs or LEDs were asked what was preventing them from purchasing CFLs or LEDs in the first place. Those respondents who were not aware of the technologies were not asked this question, but their lack of awareness is noted as a barrier in the analysis.

The reported barriers to purchasing CFLs are presented in Table 4-34, in descending frequency for non-purchasers. Among the general population of residential customers, only 9.6 percent of customers (37 out of 385 survey respondents) were not familiar with CFLs. Among non-purchasers, the primary barrier was lack of awareness, indicated by 43 percent of these respondents. The most frequently reported reason among those who had already purchased CFLs was that they were waiting for their currently operating lamps to burn out (n = 67; 28 percent). Of those waiting for lamps to burn out who were asked a follow-up question (n = 64), 77 percent reported that they were waiting for incandescent lamps to burn out, 11 percent said they were waiting for CFLs to burn out, and 9 percent reported they were waiting for both incandescent and CFL lamps to burn out. All respondents who reported already having CFLs installed either inside or outside their home (n = 267) were asked to report on the likelihood that they would replace burned-out lamps with CFLs on a scale of 1 ("not at all likely") to 5 ("very likely"). Overall, 80 percent of respondents reported either a "4" or "5," with only 8 percent reporting a "1" or "2." These responses suggest strong support and likelihood of purchasing CFLs in the future.

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Cost was noted as a barrier to installing CFLs by 19 percent of previous purchasers. Among the 50 non-purchasers who were aware of the technology, 28 percent (or 16 percent of all non-purchasers) reported cost as a barrier. Previous purchasers also noted some additional reasons related to CFL performance, including: insufficient brightness (12 percent), poor fit in existing fixtures (9 percent), poor light quality (4 percent), and being slow to warm up (4 percent). Interestingly, 23 percent (n = 20) of non-purchasers indicated that they are aware of CFLs but there was no particular reason for not purchasing CFLs in their home or that they did not know what was preventing them from installing CFLs; these responses could potentially reflect a lack of engagement in the purchasing decision or a lack of education on the benefits of CFLs.

A few misconceptions regarding CFL technology emerge from these responses, although they do not appear to be commonly held. First, 9 respondents (4 percent of purchasers) said that they were not installing more CFLs in their home because they need lamps with 3-way and dimmable capabilities. However, there are plenty of CFLs on the market today with these functionalities, indicating that the general population might not be fully aware of the selection and variety of CFLs available. Additionally, after the issue of cost, mercury content was mentioned by 6 percent of non-purchasers as a barrier to purchasing CFLs This same reason was not as prevalent in the previous purchaser category (3 percent).

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Table 4-34. Reported Barriers to Purchasing CFLs Among Residential Customers Who Have Already Purchased CFLs and Those Who Have Never Purchased CFLs

	Purchasers (n = 243) [(a)]		Non-Purchasers (n = 87)	
Barriers to Purchasing CFLs Among General Population	Count	Percent	Count	Percent
Not familiar with CFLs [(b)]	-	-	37	43%
Cost	45	19%	14	16%
Nothing in particular	16	7%	14	16%
Mercury content	8	3%	5	6%
Waiting for installed lamps (any type) to burn out	67	28%	5	6%
Poor light quality	10	4%	1	1%
Insufficient brightness	30	12%	-	-
Poor fit	21	9%	-	-
Don't need any more bulbs	13	5%	-	-
Slow to warm up	9	4%	-	-
Short lifespan	6	2%	-	-
Need dimmable bulbs	5	2%	-	-
Need 3-way bulbs	5	2%	-	-
All sockets filled with CFLs	5	2%	-	-
Prefer non-CFL lamps (e.g., incandescent, halogen)	5	2%	-	-
Recycling is difficult	4	2%	-	-
Not enough variety	3	1%	-	-
Don't like the way CFLs look in fixtures	2	1%	-	-
Less availability in stores	2	1%	-	-
Short operating hours of remaining non-CFL sockets	1	< 1%	-	-
Other	14	6%	7	8%
Don't know	14	6%	6	7%

Note: Multiple responses were accepted, so column totals sum to more than the number of respondents for each question.
[a] Although 298 survey respondents reported having CFLs, only 243 were asked about barriers toward installing more CFLs because they also reported that not all of their sockets contained CFLs. Those who said that all the sockets in their home contained CFLs were not asked about barriers to installing more CFLs.
[b] These 37 respondents were not specifically asked to report barriers toward purchasing CFLs because they reported being unaware of the technology. The remaining 50 respondents who were at least somewhat familiar with CFLs were asked to report barriers toward purchasing them.

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As shown in Table 4-35, unlike CFLs, the majority of survey respondents had never purchased LEDs for indoor residential use, so most of the barriers were reported from individuals who had no personal experience with LEDs in their home. The greatest barrier identified was simply lack of knowledge of the technology. Among the general population of residential customers, 57 percent of customers (221 out of all 385 survey respondents) were not familiar with LEDs. Of non-purchasers, 70 percent reported either being unaware of LEDs or stated that their lack of knowledge was a barrier toward purchasing LEDs. Among purchasers, cost was the overwhelming barrier toward the purchase of LEDs, reported by 56 percent of respondents. Among the 132 non-purchasers who were aware of the technology, 29 percent (or 12 percent of all non-purchasers) reported cost as a barrier. Additional barriers for both previous purchasers and non-purchasers include insufficient brightness, poor light quality, poor fit, and aesthetics.

Table 4-35. Reported Barriers to Purchasing LEDs Among Residential Customers Who Have Already Purchased LEDs and Those Who Have Never Purchased LEDs

	Purchasers (n = 32)		Non-Purchasers (n = 353)	
Barriers to Purchasing LEDs Among General Population	Count	Percent	Count	Percent
Not at all familiar with LEDs [(a)]	-	-	221	63%
Cost	18	56%	43	12%
Lack of knowledge of LEDs	2	6%	25	7%
Waiting for installed lamps (any type) to burn out	2	6%	10	3%
Not interested, don't like it (unspecified reason)	2	6%	6	2%
Don't need any more bulbs	2	6%	5	1%
Insufficient brightness	2	6%	5	1%
Poor fit	-	-	5	1%
Less availability in stores	2	6%	4	1%
Poor light quality	2	6%	4	1%
Nothing in particular	2	6%	4	1%
Aesthetics	-	-	2	1%
Need 3-way bulbs	-	-	1	< 1%
All sockets filled with LEDs	2	6%	-	-
Need dimmable bulbs	1	3%	-	-
Other	2	6%	11	3%
Don't know	2	6%	15	4%
Refused	2	6%	6	2%

Note: Multiple responses were accepted, so column totals sum to more than the number of respondents for each question.

[a] These 221 respondents were not specifically asked to report barriers toward purchasing LEDs because they reported being unaware of the technology. The remaining 132 respondents who were aware of LEDs were asked to report barriers toward purchasing them.

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4.7.6 Consumer Demand for LEDs and Specialty CFLs

Those respondents who were at least somewhat familiar with specialty CFLs were asked to rate their interest in installing specialty CFLs in their homes, on a scale of 1 ("not at all interested") to 5 ("very interested"). Table 4-36 presents the responses to this question. Overall, general population residential customers have a wide range of interest in installing specialty CFLs. However, 40 percent of all respondents who were at least somewhat familiar with specialty CFLs expressed moderate to strong interest (by reporting "4" or higher) in installing specialty CFLs in the future; this difference is not statistically different from the proportion of respondents from the 2011 general population survey, in which 43 percent of respondents reported a rating of "4" or "5."[25]

Table 4-36. Interest in Installing Specialty CFLs of Respondents Aware of Specialty CFLs

Interest in Installing Specialty CFLs	Count	%
5 - Very interested	72	26.0%
4	38	13.7%
3	63	22.7%
2	29	10.5%
1- Not at all interested	66	23.8%
Don't know	9	3.2%
Total	277	100.0%

Respondents who were aware of LEDs were also asked to report their interest in installing LEDs in their home in the future. Figure 4-9 below indicates the responses to these questions, as reported by the 132 respondents who had never purchased LEDs and 32 respondents who had purchased LEDs in the past. As the figure shows, those who had already purchased LEDs expressed stronger interest in purchasing additional LEDs in the future, with 50 percent reporting either a "4" or "5." Overall, 58 percent of customers aware of LEDs expressed at least modest interest in purchasing LEDs for their homes in the future by reporting a "3" or higher (56 percent of non-purchasers and 66 percent of previous purchasers). This is less than what was reported in 2011 (67 percent), and this difference is statistically significant. [26]

[25] $t\ (573) = 0.484$, $p = 0.629$.

[26] $t\ (356) = 1.990$, $p < 0.05$

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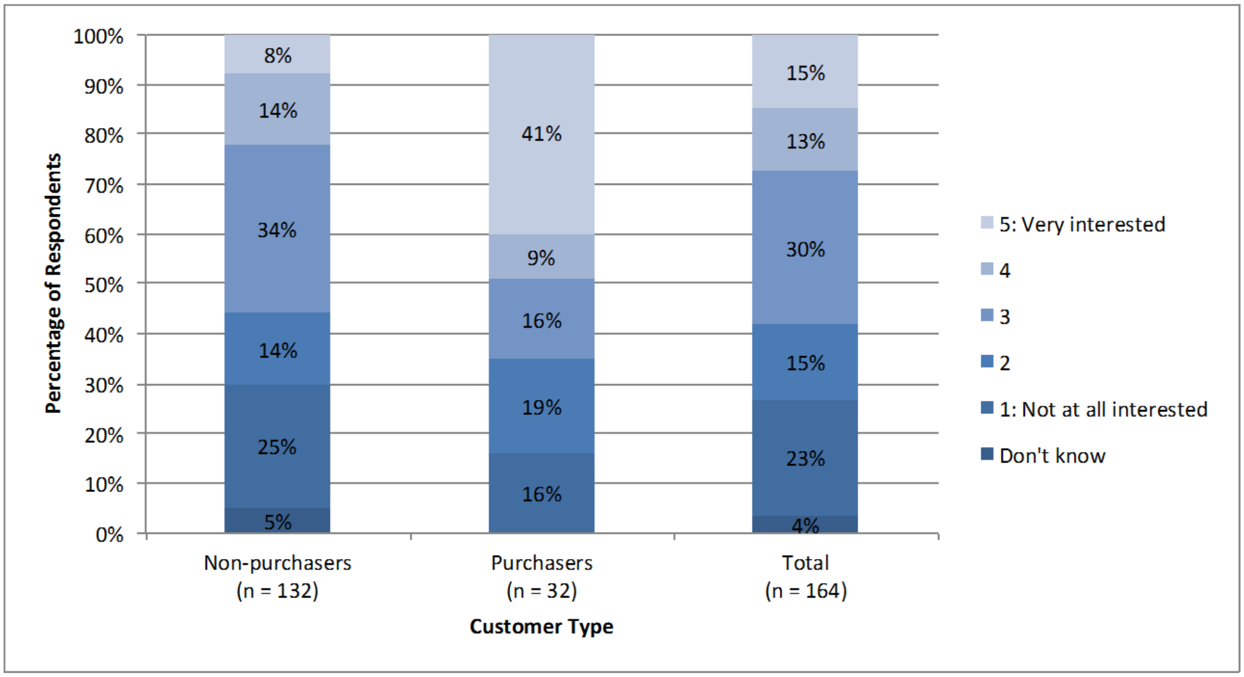
Figure 4-9. Interest in Installing LEDs at Home By Previous Purchasers and Non-Purchasers



4.7.7 Corporate Retailers' Experience and Satisfaction with the Program

The evaluation team conducted in-depth interviews with six corporate-level utility liaisons from retailers that participate in the Efficient Products Program. As was recommended in the 2011 evaluation, having corporate-level retailer staff—as opposed to store-level staff—speak to the evaluation team staff is critical in ensuring that the experiences of the corporate partners with the Efficient Products Program are satisfactory. These individuals were asked to participate in the interviews because of their familiarity with utility-run discount and rebate programs; all six had working knowledge of the AEP Ohio program and how the program operates on both a store level and regional level. In a few cases, these individuals were intimately involved in the MOU (memorandum of understanding)[27] process and thus had a deeper understanding of the program, its processes, its benefits to their stores, and potential areas for improvement. Their perspective verified that, for the most part, the program is running smoothly and in a manner that is beneficial to partners on the store level as well as the larger, corporate level. Key findings from the interviews are presented below, with additional detail provided in the Appendix.

The objectives of the interviews were to:

- Determine if corporate-level utility liaisons are knowledgeable of the program, and if their store-level staff are receiving adequate training and promotional materials to successfully promote the program to customers

[27] MOUs are the agreements signed with manufacturers or retailers that stipulate the models and discount amounts for each discounted lamp.

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- Determine barriers to customer participation in the appliance rebate and lighting portions of the program
- Assess the partnering retailers' satisfaction with the program, including the MOU process
- Assess the current program challenges from the retailers' perspectives
- Assess the retailers' suggestions for program improvement

The key findings from the interviews are presented below. Overall, participating retailers are satisfied with the Efficient Products Program and how it is currently being run. Retailers were able to provide critical insight into areas of potential program improvement, including expanded discounted LED lamps through the program, a wider diversity of CFL lamp discounts, and making the MOU and discounted lamp selection process more transparent to retailers.

4.7.7.1 Retailer Respondent Program Awareness

All retailer respondents were familiar with the program; four were specifically familiar with the AEP Ohio Efficient Products Program. However, two respondents could not speak to all of the specifics of the program, citing the fact that they oversee dozens of utility programs across the country.

4.7.7.2 Retailer In-Store Training

Four of six respondents emphasized how useful the trainings have been to their sales associates. The other two respondents said that trainings are not the best use of resources in their particular stores, either because staff already undergo extensive technology training or the store's business model facilitates an unassisted shopping experience for consumers,[28] so sales associate knowledge of the program or technologies does not impact the customer's experience. Overall, four respondents said their sales staff are actively encouraged to promote the program to customers, with one of those retailers financially incentivizing their staff to promote the program.

4.7.7.3 MOU Process – Retailer Perspective

Overall, four of the six respondents were satisfied with the Memorandum of Understanding (MOU) process, saying that is was predictable, streamlined, and comparable to those of other utility programs with which they work. However, two respondents said they thought the MOU process could be improved. Specifically, one retailer said that AEP Ohio should reconsider signing an agreement with their company, rather than only having an MOU with the lighting manufacturers. The other retailer said there is lack of transparency in terms of how the utilities determine which products to discount in which stores. This retailer said that they have repeatedly expressed interest in selling LEDs through the program, but the perception was that they have never been given the opportunity by AEP Ohio because they are a smaller retail chain and do not move the inventory of larger home improvement chains.
One respondent had a negative perception of the MOU process in general. He felt that utilities frequently use the MOU process as a passive bargaining tool by taking a long time to make changes to the agreement that his company proposes. Although this respondent did not specifically attribute this

[28] The respondent stating that the retailer business model facilitates an unassisted shopping experience only participates in the lighting discount portion of the program.

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behavior to AEP Ohio, it is important to note the negative perception that some retailers may have of the utility's process in order to avoid conflict in the future.

4.7.7.4 Retailer In-Store Signage

Respondents were asked about how they raise awareness of the program with their customers. Overall, the participating retailers promoted the program in the following ways:

- Four use AEP Ohio branded promotional signage in their stores.
- Two retailers use signage from their manufacturer that is created in collaboration with AEP Ohio.
- One exclusively uses signage created by their company, which features the ENERGY STAR and AEP Ohio logos.
- One respondent mentioned the use of store-specific hand-made signage in addition to official program signage.

Those four retailer respondents who indicated that their stores utilize promotional material provided by AEP Ohio view these materials as being central to the in-store promotion.

4.7.7.5 Program Satisfaction Among Retailer Respondents

Table 4-37 provides the results of satisfaction questions.[29] Overall, all respondents were satisfied with the lighting discount component and program staff, citing a variety of reasons including increased lighting sales, the presence of discounted LEDs, and program staff professionalism. The two respondents who were less than "very satisfied" expressed that there are not enough discounted LEDs as the main reason.

Table 4-37. Retailer Satisfaction with Lighting Discount Program and Program Staff

Program Element	Number of Retailers "Very Satisfied"	Reasons for Satisfaction	Number of Retailers "Somewhat Satisfied"	Reasons for Being Less Than Very Satisfied
Lighting Discount Program	4	APT staff; presence of LEDs; helps to boost lighting sales	2	Need more discounted LEDs
Program Staff (APT/EFI)	4	Program managers are responsive, efficient, and flexible; field staff is engaged	2	Does not stand out compared to other programs

All six respondents said that the Efficient Products Program benefits their company in some way, with five attesting to increased sales of energy efficient lamps as a result of the program.

[29] No interviewees provided satisfaction ratings for the appliance rebate portion of the program, because the one participating retailer interviewed was not familiar enough to confidently rate that component of the program.

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When respondents were asked if they are satisfied with the current level of communication with AEP Ohio staff, five out of six interviewees reported being satisfied. One respondent would like to have a direct line of communication with AEP Ohio in order to have an active discussion about what lamps will be included in their agreements.

4.7.7.6 Barriers to Customer Participation – Retailer Perspective

Overall, the respondents saw few reasons why customers would not participate in the Efficient Products Program. However, three respondents said that there are some customers who simply do not like CFL technology—for a number of reasons including aesthetics or warm up time—and that their minds will never be changed to purchase any CFLs.

4.7.7.7 Program Challenges – Retailer Perspective

Two respondents noted that processing and sending point-of-sale (POS) data is cumbersome and adds administrative costs that can limit an individual store's or entire retail chain's willingness to participate. Respondents from a big box retailer and hardware franchise store lamented the cost of this administrative step, and said it cuts into their bottom line. Additionally, one big box retailer said that the financial burden of paying for the discounted lamps up front is too great, and they do not secure the inventory they would like as a result.

One respondent cited the maturity of the CFL market as an impending challenge to discounted lighting programs. This respondent stated that customers are looking for new technologies, and if the programs are not adequately incentivizing new, desirable technologies like LEDs, these customers are falling behind.

4.7.7.8 Retailer Respondents' Suggestions for Improvement

Finally, the corporate-level retailer liaisons provided suggestions for program improvement considering their experiences with AEP Ohio as well as other utility-run lighting discount and appliance rebate programs across the country.

- Three respondents said that AEP Ohio should consider having more LED lamps discounted, now that CFLs are so ubiquitous; they emphasized that the remaining potential for sales of CFLs is declining.
- Two respondents also suggested focusing discount funds on different types of CFL lamps, such as globe, covered, indoor flood, and other specialty CFLs, since there is a considerable number of customers who dislike simple spiral CFLs.
- Both respondents who were able to comment on the appliance component of the program suggested rebating as wide a variety of appliances as possible to reach the most customers. One of those respondents also suggested restructuring incentives to be proportional to the potential energy savings of each appliance, instead of a singular discount amount for a number of different types of appliances.

As the retailer respondents suggested, there is room for improving the MOU process so that retailers feel more included and the decision of which lighting technologies will be discounted in each store can be

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arrived upon collaboratively. This includes more attention and transparency to smaller chains that also have an interest in selling LEDs with the program, but that don't have the reputation or influence of larger chains.

4.7.8 Mystery Shopping Observations

In order to determine whether retail sales associates at retailers participating in the appliance rebate component of the program are knowledgeable about the program and promoting it to customers, the evaluation team managed a series of mystery shopping visits to 20 different retailers participating in the appliance rebate component. The following sections describe the behavior of sales associated as observed by mystery shoppers and the ratings that mystery shoppers ascribed to the sales associates.

4.7.8.1 Sales Associate Behavior

This section describes the behavior of sales associates engaged by mystery shoppers at 20 different retailer locations. All of the retailers visited by mystery shoppers were participating retailers in the appliance rebate component of the 2012 Efficient Products Program. Table 4-38 summarizes the behavior of the sales associates as observed by the mystery shoppers.

- Four of the 20 sales associates did not mention the AEP Ohio appliance rebates despite being asked about rebates or discount programs by the mystery shoppers.
- Three of the four sales associates who did not mention the appliance rebates worked at the same national retailer.
- Two sales associates described the rebate as contingent upon turning in/recycling an old appliance. One sales associate who did this was unsure about the dehumidifier rebate, but described the process for the refrigerator rebate. The other sales associate said that if the shopper purchased a new freezer and turned in their old appliance, the shopper would receive a $60 credit. In both cases, it seems likely that the sales associates were somewhat confused about the relationship between the Efficient Products Program freezer rebate, which is $50, and the Appliance Recycling Program, which offered a $60 rebate to AEP Ohio customers who recycled a working refrigerator or freezer in November and December of 2012.

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Table 4-38. Appliance Rebate Mystery Shopping Salesperson Actions

Salesperson Actions/ Sales Techniques Observed by Mystery Shoppers	Number of Salespeople Engaging in Action	Percentage of Salespeople Engaged in Action
Mentions the appliance rebates or the Efficient Products Program? [(a)]	16	80%
Tells you that you must be an AEP Ohio customer to qualify?	15	94%
Tells you that you must purchase an ENERGY STAR appliance or high-efficiency water heater (or heat pump water heater) to qualify?	10	63%
Incorporates the availability of the rebate into sales pitch?	8	50%
Talks about the benefits of ENERGY STAR or high-efficiency appliances?	6	38%

[a.] For this question, mystery shoppers provided an answer for all 20 retailers. The remaining actions were only evaluated for the 16 salespeople who mentioned the appliance rebates or Efficient Products Program.

4.7.8.2 Sales Associate Rankings

This section summarizes the ratings that mystery shoppers gave to the 16 sales associates who mentioned the AEP Ohio appliance rebates in regards to program knowledge, knowledge of high-efficiency and ENERGY STAR appliances, and their ability to influence a shopper to purchase a high-efficiency or ENERGY STAR appliance. Table 4-39 shows the breakdown of ratings given to sales associates by the mystery shoppers.

- Thirteen of 16 sales associates (81%) were rated as somewhat or very knowledgeable about the AEP Ohio Appliance Rebate Program by the mystery shoppers.
- Twelve of 16 sales associates (75%) were rated as somewhat or very knowledgeable about high-efficiency/ENERGY STAR appliances.
- The majority of sales associates were rated as either somewhat knowledgeable or very knowledgeable about the rebates and high-efficiency or ENERGY STAR appliances. Three sales associates were described as very influential in their ability to influence the mystery shoppers to purchase high-efficiency or ENERGY STAR appliances. Six sales associates were described as somewhat influential and seven sales associates were described as not at all influential. Among those sales associates described as not at all influential, the most common observation from mystery shoppers was that sales associates did not bring up the program until the shoppers asked about it. A few mystery shoppers also felt that these sales associates were not influential because they did not incorporate the benefits of ENERGY STAR appliances into their sales technique.
- None of the 13 sales associates at national retailers were rated as very influential in their ability to influence the mystery shopper to purchase an ENERGY STAR-rated or efficient appliance. Two of the three sales associates who were rated as very influential in their ability to influence mystery shoppers worked at small independent retailers, while the third worked at a regional chain.

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Table 4-39. Appliance Rebate Mystery Shopping Salesperson Actions

Action	Rating [(a)]	Number of Salespeople	Percentage of Salespeople
Salesperson's knowledge of the program rebates [(a)]	Very knowledgeable	5	25%
	Somewhat knowledgeable	8	40%
	Not at all knowledgeable	3	15%
	Unaware of program [(b)]	4	20%
Salesperson's knowledge of high efficiency/ENERGY STAR appliances [(c)]	Very knowledgeable	4	25%
	Somewhat knowledgeable	8	50%
	Not at all knowledgeable	4	25%
Salesperson's ability to influence a customer to purchase a high-efficiency or ENERGY STAR appliance over a standard appliance [(c)]	Very influential	3	19%
	Somewhat influential	6	38%
	Not at all influential	7	43%

Note. Mystery shoppers rated salespeople on a three-point scale: from not at all knowledgeable to very knowledgeable

[a.] These percentages are based on 20 mystery shopping visits, including the 4 in which sales associates did not mention the rebate program despite prompting from mystery shoppers.
[b.] These sales associates are classified as unaware of the rebate program because they did not mention the program or rebates at all, even after being prompted by the mystery shoppers.
[c.] These percentages are based on the 16 salespeople who mentioned the program or rebate to mystery shoppers; knowledge or ability to influence purchases of ENERGY STAR appliances was not assessed if sales associates did not mention the program or available rebates.

4.7.9 Lighting Shelf Survey Results

The lighting shelf surveys had two primary goals: 1) to inventory the availability of 100-watt incandescent lamps, and 2) to inventory standard and specialty CFLs and the pricing of these products. High-level results are presented in this section, with additional detail shown in the Appendix.

4.7.9.1 Availability of 100-Watt Incandescent Lamps and Lumen-Equivalent Alternatives

Results showed that of the 69 stores where the evaluation team conducted shelf surveys, 84% of stores stocked no 100-watt traditional incandescent lamps. At least one model of 100-watt traditional incandescent lamp was stocked at the remaining 16% of stores.

4.7.9.2 Availability and Pricing of Standard and Specialty CFLs

Results showed that the most common incandescent-equivalent wattages for basic spiral CFLs are 60-watt equivalent CFLs, with an average of eight different models available per store. This is followed by 75-watt-equivalent and 100-watt-equivalent CFLs, both with about 5 different models available per store, on average.

Among specialty CFL types, there was a greater selection of reflector and A-lamp CFLs, with an average of six and five different models stocked per store, respectively. Additionally, although 3-way CFLs are stocked at 72 percent of stores, on average, there was only one model available per store.

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Regarding the price of basic spiral CFLs, these were generally cheaper at stores participating in the Efficient Products Program lighting discounts. Within participating stores, the average price of a discounted CFL was about $2 cheaper than the average price of a non-discounted CFL (the average price difference varies by wattage, and ranged from $1.72 to $2.21). Among specialty CFLs, the most costly models were dimmable, three-way, and reflector CFLs. As with basic spiral CFLs, specialty CFLs were generally cheaper at participating stores compared to non-participating stores. With a couple of exceptions, discounted lamps were less costly, ranging from $2.07 less for three-way CFLs to $3.65 less for globe CFLs.

4.8 Cost Effectiveness Review

This section addresses the cost effectiveness of the Efficient Products Program. Cost effectiveness is assessed through the use of the Total Resource Cost (TRC) test. Table 4-40 summarizes the unique inputs used in the TRC test.

Table 4-40. Inputs to Cost-Effectiveness Model for Efficient Products Program

Item	Value
Average Measure Life	10
Units	5,013,057
Annual Energy Savings (MWh)	207,998
Coincident Peak Savings (kW)	19,600
Third Party Implementation Costs	$1,945,917
Utility Administration Costs	$46,191
Utility Incentive Costs	$8,046,064
Participant Contribution to Incremental Measure Costs	$16,173,177

Based on these inputs, the TRC ratio is 4.4. Therefore, the program passes the TRC test. Table 4-41 summarizes the results of the cost-effectiveness tests. Results are presented for the Total Resource Cost test, the Participant test, the Ratepayer Impact Measure Test, and the Utility Cost Test.

Table 4-41. Cost Effectiveness Results for the Efficient Products Program

Test Results for Efficient Products	
Total Resource Cost	4.4
Participant Cost Test	7.5
Ratepayer Impact Measure	0.5
Utility Cost Test	8.0

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At this time, additional benefits related to reduction of greenhouse gas emissions have not been quantified in the calculation of the TRC. These additional benefits would increase the given TRC benefit/cost ratio.

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5 Conclusions and Recommendations

5.1 *Conclusions from Program Year 2012*

5.1.1 Energy and Demand Savings

Overall, the 2012 Efficient Products Program exceeded savings goals by 40 percent for energy and 42 percent for demand. Ex-post energy savings for units invoiced in 2012 were 176,211 MWh, compared to the 125,497 MWh goal. Total demand savings for units invoiced in 2012 was 16.77 MW, compared to the 11.84 MW goal. Including residual installations of 2011 and 2011 CFLs means that goals were exceeded by 66 percent for both energy and demand.

5.1.2 Realization Rates

Overall, AEP Ohio reported savings for the Efficient Products Program of 229,929 MWh *ex-ante* energy savings and 20.70 MW *ex-ante* demand savings.
The overall realization rates for 2012 activity were:

- 0.77 for energy savings
- 0.81 for demand savings

Including installations of CFLs purchased in prior years increases the realization rates to:

- 0.90 for energy savings
- 0.95 for demand savings

The program overestimated savings for lighting, which had realization rates of 0.75 for energy and 0.76 for demand, although these increase to 0.89 for energy and 0.90 for demand when installations of CFLS purchased in 2010 and 2011 are included. The largest factor in the difference between *ex-ante* and *ex-post* savings for 2012 lighting activity is the installation rate, which is assumed to be 1.0 in the *ex-ante* calculations and is 0.817 in the *ex-post* calculations.

The program underestimated savings for appliances, which had realization rates of 1.36 for energy savings and 2.08 for demand savings. The primary differences between the *ex-ante* and *ex-post* calculations were in how savings are determined for clothes washers and dehumidifiers, with AEP Ohio assuming smaller capacity for both. For televisions, the realization rates were 0.70 for energy savings, and 0.21 for demand. While *ex-ante* savings for televisions were based on deemed values and the 2012-2014 program plan, the evaluation team found lower ex-post savings using the calculation method described in this report.

5.1.3 Cost Effectiveness

This program is cost-effective under the TRC test, Participant Cost Test, and Utility Cost Test.

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5.1.4 Socket-Level CFL Saturation

Although the evaluation team would expect that CFL saturation would be increasing over time, indoor CFL socket-saturation has remained fairly stable. Saturation was found to be 37.8 percent in the Program Year 2012 evaluation.

5.1.5 Marketing and Program Awareness

Residential customer awareness of program components. Overall, respondents to the general population survey were:

- most aware of the rebates for refrigerators (37 percent)
- least aware of rebates for dehumidifiers (6 percent) and heat pump water heaters (7 percent)

Although lighting represents the largest proportion of program savings, only:

- 14 percent of respondents were aware of discounts on energy efficient lighting

Sources of awareness among the general population. General population respondents who indicated they were aware of one or more program components were asked how they first heard of that component.

- Overall, the most commonly reported channels of awareness were bill inserts, in-store sources such as sales associates or signage, friends and family, and television; however, television was rarely reported as a source of awareness for the lighting discounts.
- Of those aware of lighting discounts, 15 percent stated that they had learned of the discounts through the AEP Ohio website.

Participant awareness of the appliance rebates.

- The largest proportion of respondents heard about the rebates at a retail store, either through in-store advertising (64 percent) or from a store employee (48 percent).
- After these sources, mailing or bill inserts (43 percent), the AEP Ohio website (19 percent), and television (19 percent) accounted for the top five sources of awareness.

Effectiveness of in-store marketing materials for appliance rebates.

- In total, 75 percent of appliance rebate participants reported seeing AEP Ohio advertising at a retail store – and this was the most frequently mentioned source of awareness among participants.
- Overall, 40 percent of all participants across all appliance types reported that the in-store promotional materials had at least a moderate influence on their decision to purchase the ENERGY STAR appliance, by reporting a rating of 4 (influential) or 5 (very influential).

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Partnering retail sales associate knowledge of appliance rebates.

- Of all appliance rebate survey respondents, 72 percent reported that a store associate spoke with them about the available rebate.
- Of these, 76 percent of participants reported the sales associates were knowledgeable about the program, ranking them as either a 4 or 5 on a scale of 1 to 5 (1 meaning "not at all knowledgeable" and 5 meaning "very knowledgeable").
- During mystery shopping visits to 20 partnering appliance retailers, four of the 20 sales associates did not mention the AEP Ohio appliance rebates program when engaged by mystery shoppers.
- Of the sixteen sales associates who did mention the rebate, 13 were rated as either somewhat or very knowledgeable about the appliance rebates by the mystery shoppers.

5.1.6 Program Participation and Barriers

Customer experience and satisfaction with the appliance rebate process. Overall, participants reported being satisfied with all aspects of the program, from the process of applying for a rebate to the energy savings realized as a result of installing the new energy efficient appliances. Appliance rebate customers were:

- most satisfied with the ENERGY STAR appliance itself, although eight percent of heat pump water heater survey respondents reported that they were dissatisfied with the performance of the unit
- least satisfied with the amount of time it took to receive the rebate, although this component of the program still received a mean rating above a "4" (meaning "satisfied" on the 1 to 5 scale).

Participating retailers' experience and satisfaction with the program. Overall, all of the retailers interviewed by the evaluation team were satisfied with the lighting discounts and program staff, citing a variety of reasons, including increased lighting sales, the presence of discounted LEDs, and program staff professionalism. The two respondents who were less than "very satisfied" expressed that there are not enough discounted LEDs.

Barriers to purchases of program-discounted CFLs and LEDs. Among non-purchasing customers, barriers include:

- Lack of awareness of CFLs, indicated by 43 percent of non-purchasing respondents.
- Cost, indicated by 28 percent of non-purchasers.

Among those respondents who had previously purchased CFLs:

- Cost was also a barrier among 19 percent of purchasers.

Among respondents who reported already having CFLs installed either inside or outside their home (n = 267), 80 percent indicated that they were likely to purchase CFLs in the future.

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Misconceptions regarding CFLs and LEDs were not common. Four percent of purchasers said that they were not installing more CFLs in their home because they need lamps with 3-way and dimmable capabilities. Mercury content was mentioned by six percent of non-purchasers as a barrier to purchasing CFLs.

Demand for Specialty CFLs. Of all respondents who were at least somewhat familiar with specialty CFLs, 40 percent expressed moderate to strong interest (by reporting "4" or higher) in installing specialty CFLs in the future.

Demand for LEDs. Fifty percent of customers who had already purchased LEDs in the past reported that they were either interested or very interested in purchasing LEDs in the future. Among all of those customers aware of LEDs, 58 percent said they were at least somewhat interested in purchasing LEDs in the future.

5.1.7 Overall Program Design and Administration

Availability of 100-watt incandescent and 100-watt-equivalent lamps in AEP Ohio service territory. Among the 69 stores where the evaluation team conducted shelf surveys:

- 84 percent of stores stocked no 100-watt traditional incandescent lamps.
- Only 16% (n = 11) of the 69 stores visited had any 100-watt traditional incandescent models on the shelf.

Availability of standard CFLs in the AEP Ohio service territory. The most common incandescent-equivalent wattages for basic spiral CFLs were 60-watt equivalent CFLs, with an average of eight different models available per store. This was followed by 75-watt-equivalent and 100-watt-equivalent CFLs, both with about five different models available per store, on average

Pricing of standard CFLs in the AEP Ohio service territory. Basic CFLs were generally less expensive at stores participating in the Efficient Products Program. Within participating stores, the average price of a discounted CFL was about $2 less than the average price of a non-discounted CFL (the average price difference varies by wattage, and ranged from $1.72 to $2.21).

Availability of specialty CFLs in the AEP Ohio service territory. Among specialty CFL types, there was a greater selection of reflector and A-lamp CFLs, with an average of six and five different models stocked per store, respectively. Additionally, although 3-way CFLs are stocked at 72 percent of stores, on average, there was only one model available per store.

Pricing of specialty CFLs in the AEP Ohio service territory. Overall, the most costly specialty CFLs were dimmable, three-way, and reflector CFLs. As with basic spiral CFLs, specialty CFLs were generally cheaper at participating stores compared to non-participating stores. With a couple of exceptions, discounted lamps were less costly, ranging from $2.07 less for three-way CFLs to $3.65 less for globe CFLs.

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5.1.8 Current Program Challenges

Awareness of energy efficiency lighting technologies and appliances has decreased among general population respondents. For example, awareness of CFLs decreased from 95 percent in 2010 to 85 percent in 2012. It is not clear what is causing this decrease; it could reflect a general trend, as the marketing surrounding the 2009 ARRA funding could have spiked awareness in the following year in 2010.

Lack of awareness of the appliance rebates among retailer sales staff at some participating retailer locations. Although most sales associates were knowledgeable of the rebates, 20% did not mention the program despite being prompted by mystery shoppers. Three of these four associates worked at one big box retailer, indicating there may be an opportunity to conduct focused training with this retailer.

5.2 Recommendations for Program Improvements

In 2012, the Efficient Products Program witnessed increased energy and demand savings due to greater program activity with both lighting and rebated appliances. Because EISA federal standards will continue to raise the baseline for lighting products, it is important to continue to diversify product offerings outside of CFLs. Following are specific recommendations.

1. **Continue to diversify product offerings.** Appliances were a larger portion of savings in 2012, and the program should continue to expand appliance rebates, in terms of the variety of rebated appliances as well as the rebate period. The program should consider offering appliance rebates year-round to capitalize on savings from these products. Additionally, continuing to offer discounts for LEDs will help offset the lower baseline as a result of EISA.
2. **Adjust the baseline for lighting products that are equivalent to 100-watt and 75-watt incandescent lamps to account for the EISA standards.** For 2013, the evaluation team recommends assuming a continuing decreasing availability of 100-watt incandescent lamps. The availability of 75-watt incandescent lamps will also begin to decrease in 2013, with the new federal standard for these lamps taking effect this year.
3. **Record lumens for incentivized lighting products, when possible.** As the industry moves toward using lumens instead of wattage, tracking information on lumens will better enable AEP Ohio to determine replacement wattage for incented lighting products. The evaluation team recommends that AEP Ohio include the tracking of lumens in contracts when they are updated for the next program cycle, which will begin in 2015.
4. **Monitor customer satisfaction with respect to the new products that are being offered.** While only 8 percent of heat pump water heater survey respondents specifically reported that they were dissatisfied with the performance of the unit, it is important to monitor customer feedback. This is an important technology for the program, due to the high per-unit energy savings.
5. **Assess the program theory for televisions.** The 2012 evaluation did not assess the program theory for televisions. AEP Ohio should consider the evaluability of this portion of the program given its unique program theory.

Appendix A Methodology, Findings, and Survey Instruments

Appendix A describes additional details of the methodology and findings, as well as survey instruments used for data collection for the 2012 evaluation of the AEP Ohio Efficient Products Program.

A.1 Additional Methodology Detail

A.1.1 Pilot Methodology for Collecting Lighting Participant Data

The evaluation team piloted a new methodology for collecting lighting data in 2012. In previous years, the evaluation team used in-store intercepts to collect summary lighting purchase information and customer contact information for participants. A follow-up telephone survey was then conducted with the participants to collect additional information. However, because the number of intercepts needed to attain 95/5 confidence/precision is quite large, the use of intercepts is both costly and burdensome. As a result, past evaluations have only sought to attain 90/10 confidence/precision. In an attempt to improve confidence/precision, the evaluation team piloted an alternative approach to compiling customer contact information.

This alternate method involved placing tear-pads near discounted lighting products in a small sample of participating lighting discount retailers. The tear-pad contained a URL link to a short survey that collected the same information that was previously collected through the in-store intercepts (i.e., leakage out of the service territory, residential vs. commercial application, number and types of products purchased, purchase location, source of program awareness, and customer contact information needed for the lengthier follow-up telephone survey). The tear-pad designs echoed the logo and color scheme used in the in-store program marketing materials for the discounted lighting. As an incentive to the customer – and to help garner participation from the retailers – customers completing the short online survey were entered into a raffle to receive a $200 gift card redeemable at the store where they had purchased the discounted products.

For the 2012 evaluation, this method was piloted with one retailer at a limited number of store locations ($n = 7$) in Columbus, Newark, and Canton. Each store had four tear-pads, which APT staff placed on the shelves holding the discounted lighting. APT staff also ensured that the tear-pads were still in good condition and properly placed during their weekly in-store visits. The tear-pads were placed in stores starting in December 2012 and taken down in February 2013. The overall goal was to obtain enough participant contacts to enable follow-up telephone surveys with 100 customers. This pilot was not successful. In all, only 18 customers visited the website to take the survey and only 12 customers actually completed the survey. The evaluation team did not complete any follow-up phone surveys because the number of respondents would not have provided results at any suitable level of statistical confidence or precision. Because this pilot was not successful, it is not discussed in the body of the report.

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A.1.2 Appliance Rebate Survey Sampling – Additional Detail

Table A-1 shows the actual 2012 population of surveyed appliances rebated, the number of participant surveys completed, and the resulting sampling error. At the 90 percent level of confidence, +/- 9.8 percent precision was attained for freezers, +/-14.8 percent precision for electric water heaters, and +/- 9.9 percent precision for heat pump water heaters.

Table A-1. Program Year 2012 Appliance Rebate Survey Completes and Population-Level Sampling Error

Appliances Rebated	Population Size (N)	Survey Completes (n)	Sampling Error (90% CI)
Freezers	1,535	68	9.8%
Electric Water Heaters	64	21	14.8%
Heat Pump Water Heaters	170	49	9.9%
Total or Overall Value	1,769	138	6.72%

Table A-2 shows the final dispositions for these 538 program participants. As shown, the evaluation team completed surveys with 138 participants, reflecting an overall response rate of 25.7 percent. One in ten (10.0 percent) of participants contacted refused to participate in the survey.

Table A-2. Appliance Rebate Participant Survey Sample Disposition

Contact Disposition	Customers	Percent
Completes	138	25.7%
Unable to reach	262	48.7%
Refusal	54	10.0%
Telephone number issue	42	7.8%
Non-specific callback/Appointment scheduled	34	6.3%
Did not recall buying an appliance	3	0.6%
Language barrier	3	0.6%
Electric company not AEP Ohio	2	0.4%
Total Participants Attempted to Contact	538	100.0%

Note. Percentages do not sum to exactly 100% due to rounding.

A.1.3 General Population Survey Sampling – Additional Detail

The evaluation team designed the sampling plan for the General Population Survey with the goal of attaining +/- 5 percent precisions at the 95 percent level of confidence. Table A-3 shows the total

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population size of AEP Ohio residential customers, the total number of surveys completed, and the resulting sampling error for the General Population Survey.

Table A-3. General Population Survey Completes and Sampling Error

Residential Population Size (N)	Survey Completes (n)	Sampling Error (95% CI)
1,256,398 [a]	385	5.0%

a. This is the number of residential customer accounts as of March 21, 2013.

The evaluation team processed and randomized the sample frame of 3,500 contacts and provided the telephone survey house a sample file containing 3,498 cases (two cases were removed from the sample frame because they represented duplicate phone numbers). Of these, 3,451 customers were contacted to complete the survey. Table A-4 shows the final dispositions for these customers. Ultimately, surveys were completed with 385 AEP Ohio customers, reflecting an overall response rate of 11.2 percent. Roughly 33 percent of contacted customers refused to participate in the survey.

Table A-4. General Population Survey Sample Disposition

Contact Disposition	Customers	Percent
Completes	385	11.2%
Unable to reach	1,180	34.2%
Refusal	1,137	32.9%
Telephone number issue	644	18.7%
Non-specific callback/Appointment scheduled	36	1.0%
Language barrier	25	0.7%
Electric company not AEP Ohio	24	0.7%
Quota met	20	0.6%
Total Customers Attempted to Contact	3,451	100.0%

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A.1.4 Shelf Survey Lumen-Wattage Reference Table

Table A-5. Lumen Output for Incandescent Lamps and CFLs, by Wattage

Incandescent Lamps (Watts)	Minimum Light Output (Lumens)	Common ENERGY STAR Qualified CFLs (Watts)
25	250	4 to 9
40	450	9 to 13
60	800	13 to 15
75	1,110	18 to 25
100	1,600	23 to 30
125	2,000	22 to 40
150	2,600	40 to 45

Source: *http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_lumens*

A.1.5 Impact Methodology Detail

Savings Calculations for Lighting

The sources and definitions of key impact parameters for lighting products invoiced in 2012 are provided in Table A-6.

Table A-6. Key Impact Parameters for Lighting

Parameter Description	Parameter	Mean Value	Source
Program Wattage (CFLs)	$Watt_{PROG\_CFL}$	14.6 watts	PY 2011 Evaluation
Program Wattage (LEDs)	$Watt_{PROG\_LED}$	12.1 Watts	PY 2012 Tracking Data
Replaced Wattage	$Watt_{REP}$	63.48 watts	PY 2011 Evaluation, adjusted to account for the EISA standard affecting the declining availability of 100W lamps over time during 2012 based on lighting shelf surveys conducted for this evaluation. [a]
In-Service Rate	ISR	81.7%	PY 2011 Evaluation
Hours of Use	HOU	2.7 hours/day	PY 2011 Evaluation
Peak Demand Coincidence Factor	CF	0.087	PY 2011 Evaluation

[a.] PY 2011 in-store intercepts determined an average replaced wattage of 64.6 W; the evaluation team adjusted this value in order to account for implementation of EISA 2007 federal standards, reducing the number of available 100 W incandescent lamps.

The general equation for the *ex-post* energy savings is described by Equation A-1 .Per-lamp impacts for both CFLs and LEDs are a function of the differences in wattage between the lamps replaced ($Watt_{REP}$) and the program lamp installed ($Watt_{PROG}$), the average hours per day that the lamps are used (HOU), and the average in-service rate per lamp (ISR). For the 2011 evaluation, the evaluation team determined hours of use based on the room location where the participants installed the program-discounted CFLs and the HOU reported for those rooms in the EmPOWER Maryland 2011 Evaluation Report.

Equation A-1. Lighting Energy Savings Impact Calculation

$$\text{Per-Unit Savings (kWh)} = \frac{(Watt_{REP} - Watt_{PROG})}{1{,}000} * (HOU * 365) * ISR$$

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Total adjusted energy savings for lighting were estimated as the sum of per-unit savings for all lamps listed in the program-tracking database.

The equation for the peak demand impact is shown in Equation A-2. Peak demand savings is a function of the wattage differences between the lamps that are replaced ($Watt_{REP}$) and the program lamp installed ($Watt_{PROG}$), the average in-service rate per lamp (ISR), as well as the average summer demand coincidence factor (CF).

Equation A-2. Ex-Post Demand Savings Calculation for Lighting Products

$$\text{Per-Unit Ex-Post Demand Savings (kW)} = \frac{(Watt_{REP} - Watt_{PROG})}{1{,}000} * \text{ISR} * CF$$

The evaluation team also determined the impacts that can be credited to 2012 savings from lamps purchased in 2010 and 2011, but not installed until 2012. This methodology is explained in the body of the report.

Savings Calculations for Clothes Washers

According to the program logic, the appliance rebate motivates customers who are already going to purchase a clothes washer to purchase a more energy-efficient model. Therefore, savings are a function of the incremental energy usage between a clothes washer that meets the minimum federal standard for energy consumption and the AEP Ohio rebated model that meets a more stringent ENERGY STAR or CEE standard. Impact calculations were performed for all clothes washers discounted through the program in 2012. The sources, definitions, and values of key impact parameters for the clothes washer calculations are summarized in Table A-7.

Table A-7. Key Impact Parameters for Clothes Washers

Parameter Description	Parameter	Mean Value	Source
Unit Capacity	Volume	3.85 ft^3	ENERGY STAR [a]
Modified Energy Factor – Standard Unit	MEF_{std}	1.26 ft^3/kWh/cycle	Federal standard [b]
Modified Energy Factor – Energy-Efficient Unit	MEF_{EE}	2.56 ft^3/kWh/cycle	ENERGY STAR [a] and CEE [c]
Yearly Washer Loads	Cycles	344	PY 2011 participant survey data
Percent of Loads Heated with Electric Water Heat	EWH	18%	PY 2011 participant survey data
Percent of Loads Dried with Electric Clothes Dryers	ECD	84%	PY 2011 participant survey data
Fuel Adjustment Factor	FAF	0.63	Calculated based on 2011 parameters
Peak Demand Coincidence Factor	CF	0.049	DOE [d]

a. ENERGY STAR Qualified Clothes Washers list based on tracking data brand and model. https://data.energystar.gov/Government/ENERGY-STAR-Certified-Residential-Clothes-Washers/cmae-djp4
b. Department of Energy. 2001. DOE Residential Clothes Washer Final Rule (66 FR 3314)
c. CEE Residential Clothes Washer Qualifying Product Lists (March 2012- January 2013) based on model numbers reported in the tracking data. http://library.cee1.org/content/qualifying-product-lists-residential-clothes-washers
d Department of Energy: Energy Efficiency and Renewable Energy (EERE). 2011. Building America Analysis Spreadsheet. B10 Analysis - Existing Homes 2011.01.26.xlsm. Retrieved from http://www1.eere.energy.gov/buildings/building_america/analysis_spreadsheets.html

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The evaluation team matched brands and models from the program tracking database with the ENERGY STAR qualified products list to determine unit capacity and the Modified Energy Factor (MEF). When a brand and model did not match the qualified products list, the evaluation team found information on volume and MEF from the manufacturer website to determine if the model met the ENERGY STAR criteria; the evaluation team used this information to provide the necessary inputs to savings calculations.[30]

The *ex-post* adjusted energy savings were calculated by modeling the unit energy savings (UES) of the clothes washers discounted through the program. This algorithm was used in the 2011 evaluation and in an evaluation of the deemed savings values in the State of Wisconsin.[31]

To estimate savings, the first step was to estimate the potential unit energy savings ($UES_{potential}$) using an engineering algorithm that incorporates the capacity of the discounted unit (Volume), the minimum federal modified energy standard ($MEF_{Standard}$), the modified energy standard of the discounted unit (MEF_{EE}), and the annual usage in cycles (Cycles) of the unit, as shown in Equation A-3.

Equation A-3. Potential Unit Energy Savings for Discounted Clothes Washers

$$\boldsymbol{UES_{potential} = Volume \times \left(\frac{1}{MEF_{Standard}} - \frac{1}{MEF_{EE}}\right) \times Cycles}$$

The equation for potential energy savings uses volume, MEF_{EE}, and MEF_{std} from both the ENERGY STAR qualified model list and the CEE qualifying model list based on the brand and model. The average number of cycles per unit per year was estimated using responses on average number of cycles per week from the 2011 participant survey. The MEF variable captures the energy savings from efficient clothes washers by incorporating the following components of clothes washer energy usage:

- Energy usage directly from **clothes washer** operation ($S_{operation}$),
- Energy usage from **heating the water** that goes into a clothes washer (S_{water}), and
- The reduction in **dryer** energy usage that results from more efficient moisture removal by the clothes washer (S_{dryer}).

Electrical savings are associated with the latter two end uses only if the customer has an electric hot water heater and an electric dryer, respectively, and used them for a portion of laundry loads. Therefore, the evaluation team calculated a fuel adjustment factor (FAF) that incorporates the percentage of the UES from the three end uses (appliance operation, water heating, and drying) and the average percentage of AEP Ohio customers who use electricity for each end use. This FAF value was originally calculated for the 2011 evaluation and was determined using the formula shown in Equation A-4.

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[30] The ENERGY STAR qualified products list only includes current products. Discontinued products may meet ENERGY STAR criteria and may still remain on retail shelves after they are discontinued.
[31] State of Wisconsin Department of Administration Division of Energy. Focus on Energy Statewide Evaluation. 14 August 2002. Opinion Dynamics Corporation. PA Government Services, Inc.

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Equation A-4. Fuel Adjustment Factor

$$FAF = (S_{operation} * 1.00) + (S_{water} * EWH) + (S_{dryer} * ECD)$$

The percentages of the UES from the three end-uses, $S_{operation}$, S_{water}, and S_{dryer}, are derived based on consumption per load (kWh per load), by fuel type, for conventional clothes washer models and qualified models in the ENERGY STAR Clothes Washer Savings Calculator Assumptions.[32]

The percentage of the UES contributed by clothes washer operation ($S_{operation}$) was multiplied by 1.00 because all washing machines operate using electricity. The evaluation team used 2011 participant survey data to estimate the percentage of program participants who use electric water heaters and the percentage that use electric dryers.

To estimate actual per-unit savings, the evaluation team multiplied $UES_{potential}$ by a fuel adjustment factor (FAF). The final per-unit energy savings ($UES_{adjusted}$), after adjusting for fuel type, was calculated as shown in Equation A-5. Total clothes washer adjusted energy savings are the sum of per-unit savings for all clothes washers listed in the program-tracking database.

Equation A-5. Adjusted Unit Energy Savings for Discounted Clothes Washers

$$UES_{adjusted} = UES_{potential} * FAF$$

The *ex-post* adjusted demand savings were calculated by modeling the unit demand savings (UDS) of the discounted clothes washers. The UDS is a function of the unit demand and the likelihood that the unit is operational during the summer peak period. By assuming that the average clothes washer cycle lasts for one hour[33], the average unit demand during operation can be calculated by dividing the annual energy savings (UES_{adjust}) by the number of wash cycles in a year. This value is then multiplied by the coincidence factor (CF), or percentage of units in use during the peak demand period. The formula for the UDS calculation is shown in Equation A-6.

The CF is the minimum estimate of clothes washers that are in use between 2 pm and 6 pm, based on the U.S. DOE Building America Benchmark.[34] Total clothes washer adjusted demand savings were estimated as the sum of per-unit savings for all clothes washers listed in the program tracking database.

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[32] ENERGY STAR Clothes Washer Savings Calculator http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerClothesWasher.xls?dbb8-7981, last updated July 2011.

[33] United States. Department of Energy. Electronic Code of Federal Regulations: Title 10: Energy: Part 430: Energy Conservation for Consumer Products. 2011.

[34] Department of Energy, Energy Efficiency and Renewable Energy (EERE). 2011. Building America Analysis Spreadsheet. B10 Analysis - Existing Homes 2011.01.26.xlsm. Retrieved from http://www1.eere.energy.gov/buildings/building_america/analysis_spreadsheets.html

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Equation A-6. Unit Demand Savings for Discounted Clothes Washers

$$UDS = \left(\frac{UES_{adjust}}{Cycles}\right) \times CF$$

Savings Calculations for Dehumidifiers

According to the program logic, savings from dehumidifiers are generated because the rebate motivates customers to purchase more energy-efficient dehumidifiers when they were already going to purchase a new dehumidifier. Therefore, savings are a function of the incremental energy usage between a dehumidifier that meets the federal standard for energy consumption and the more efficient ENERGY STAR or CEE Tier-rated dehumidifier discounted through the program. Impact calculations were performed for all discounted dehumidifiers. The sources, definitions, and values of key parameters for the dehumidifier calculations are summarized in Table A-8.

Table A-8. Key Impact Parameters for Dehumidifiers

Definition	Variable	Mean Value	Source
Capacity of the Dehumidifier	DH_{cap}	50.4 pints/day	ENERGY STAR [(a)]
Hours of Use	HOU	1,095 hours/year	DOE [(b)]
Coincidence Factor	CF	0.843	2011 Participant survey data
Efficiency – Energy-Efficient Unit	EF_{EE}	1.60 L/kwh	ENERGY STAR [(a)]
Efficiency – Standard Unit	EF_{std}	1.34 L/kwh	ENERGY STAR [(a)]

[a.] U.S. EPA ENERGY STAR qualified product list for dehumidifiers, [http://downloads.energystar.gov/bi/qplist/dehumid_prod_list.xls?072a-1c98], 02/16/2012

[b] DOE test procedure published in Federal Register on 9/20/2011 http://www.gpo.gov/fdsys/pkg/FR-2011-09-20/html/2011-22812.htm.

The evaluation team matched the brand and model in the program tracking data to the ENERGY STAR list of qualified dehumidifier products.[35] When a brand and model did not match, the evaluation team found information on capacity and energy factors from the manufacturer's website to determine if the model qualified, but was no longer manufactured.[36]

The *ex-post* adjusted energy savings (UES) are a function of the capacity of the recycled unit (DH_{cap}), the minimum federal efficiency standard (EF_{std}), the efficiency of the discounted unit (EF_{EE}), and the annual usage in hours (HOU), as shown in Equation A-7. This equation also includes conversion factors to account for different measurement units of these input parameters.

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[35] ENERGY STAR qualified dehumidifier products:
http://downloads.energystar.gov/bi/qplist/dehumid_prod_list.xls?072a-1c98

[36] The ENERGY STAR qualified products list only includes current products. Discontinued products may meet ENERGY STAR criteria and may still remain on retail shelves after they are discontinued.

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Equation A-7. Unit Energy Savings for Dehumidifiers

$$UES = DH_{cap} \times \left(\frac{1}{EF_{EE}} - \frac{1}{EF_{std}}\right) \times \text{ HOU } \times \frac{0.473\ liters}{pint} \times \frac{day}{24\ hours}$$

Total dehumidifier adjusted energy savings are the sum of per-unit savings for all dehumidifiers listed in the program tracking database.

The *ex-post* adjusted demand savings (UDS) are also a function of the capacity of the recycled unit (DH_{cap}), the minimum federal efficiency standard (EF_{std}), the efficiency of the discounted unit (EF_{EE}), as well as the coincidence factor (CF), which captures the percent of units that are in use during the peak period, as shown in Equation A-8.[37] The coincidence factor (CF) was taken from 2011 participant survey data. Participants were asked if they use the dehumidifier during summer weekdays between 3 pm and 6 pm; the portion that said yes make up the coincidence factor.

Equation A-8. Unit Demand Savings for Dehumidifiers

$$\boldsymbol{UDS = DH_{cap} \times \left(\frac{1}{EF_{EE}} - \frac{1}{EF_{std}}\right) \times CF \times \frac{0.473\ liters}{pint} \times \frac{day}{24\ hours}}$$

Total dehumidifier adjusted demand savings are the sum of per-unit savings for all dehumidifiers listed in the program tracking database.

Savings Calculations for Refrigerators

According to the program logic, savings from refrigerators are generated because the incentive motivates customers to purchase more energy-efficient refrigerators when they were already going to purchase a new refrigerator; thus it is not an early replacement program. Therefore, savings are a function of the incremental energy usage between a refrigerator that meets the federal standard for energy consumption and the more efficient ENERGY STAR or CEE Tier rated discounted refrigerator. There are no calculated key impact parameters for the refrigerator impact analysis, with energy consumption values taken directly from model information in the ENERGY STAR qualifying products database. This direct assessment is different from the other appliances (excepting freezers), which depend upon calculated parameters from survey data for development of the *ex-post* savings.

Impact calculations were performed for all refrigerators discounted. For these units, full-year unit energy savings (UES) are a function of the rated annual energy usage of the efficient unit (UEC_{EE}) minus the rated energy usage of a standard unit (UEC_{std}) as shown in Equation A-9. Total refrigerator adjusted energy savings were estimated as the sum of per-unit savings for all refrigerators listed in the program tracking database.

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[37] The UDS calculation also includes multiplying by a factor of 0.0197. This value is derived from (0.473/24) which is the conversion factor for pints to liters divided by the number of hours in a day. This is necessary to convert DH_{cap} into the correct units for calculating the UDS.

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Equation A-9. Unit Energy Savings for Refrigerators

$$UES = PUF\ (UEC_{std} - UEC_{EE})$$

To estimate unit energy savings in Equation A-9, UEC_{EE} comes from the program-tracking database. Because the program tracking data do not capture UEC (only volume and percent better than standard), the evaluation team cross-referenced the brand and model numbers with the ENERGY STAR database to capture UEC.[38] UEC_{std} values come from the minimum federal standard; these values are included with the brand and model information in the ENERGY STAR database.

This approach assumes that refrigerators are in constant use throughout the year. The evaluation team feels this is a safe assumption, given that most new refrigerators will likely be used as primary refrigerators. Furthermore, 2011 survey data show that all customers planned to keep the new refrigerator in constant use. Thus, the part use factor (PUF) is 1.0.

Demand calculation methodology is different from 2011 and is explained in the body of the report.

Savings Calculations for Freezers

According to the program logic, savings from freezers are generated because the rebate motivates customers to purchase more energy-efficient freezers when they were already going to purchase a new freezer, thus it is not an early replacement program. Therefore, savings are a function of the incremental energy usage between a freezer that meets the federal standard for energy consumption and the more efficient ENERGY STAR or CEE Tier rated freezer discounted through the program. As with refrigerators, there are no calculated key impact parameters for the freezer impact analysis, with energy consumption values taken directly from model information in the ENERGY STAR qualifying products database.

To estimate the unit energy savings in Equation 3-2, UEC_{EE} comes from the program-tracking database. Because the program tracking data do not capture UEC (only volume and percent better than standard), the evaluation cross-referenced the brand and model numbers with the ENERGY STAR database to capture UEC.[39] UEC_{std} values come from the minimum federal standard; these values are included with the brand and model information in the ENERGY STAR database.

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[38] For seven refrigerator brand/model combinations, the appliances were not listed in the ENERGY STAR database. The evaluation team looked these models up through web searches and used information contained on various retailer websites to identify volume, configuration, defrost type, and UEC. The evaluation team used the volume, configuration, and defrost type to calculate UEC_{std} for refrigerators with these parameters. The standard calculations are found at: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/43

[39] For five freezer brand/model combinations, the appliances were not listed in the ENERGY STAR database. The evaluation team looked these models up to identify volume, configuration, defrost type, and UEC. The evaluation team used the volume, the 1.73 adjusted volume factor for freezers, configuration, and defrost type to calculate UEC_{std} for freezers with these parameters. The standard calculations are found at: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/43

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The Part-Use Factor (PUF) shown in Equation 3-2 is necessary because stand-alone freezers may be used to supplement an existing refrigerator-freezer unit, and may not be used all year long. Participant surveys gathered this information on the use of purchased freezers. Participants were asked the approximate the number of months they used the purchased freezers. The PUF is calculated as shown in Equation A-10. Total freezer adjusted energy savings are the sum of per-unit savings for all freezers listed in the program tracking database.

Equation A-10. Part-Use Factor

$$PUF = \frac{\#\ months\ used}{12\ months}$$

Savings Calculations for Heat Pump Water Heaters

According to the program logic, savings from heat pump water heaters are generated because the incentive motivates customers to purchase more energy-efficient water heaters when they were already going to purchase a new water heater. Savings are therefore a function of the incremental energy usage between an electric water heater that meets the federal standard for energy consumption and the more efficient heat pump water heater discounted through the program. The sources and definitions of key parameters for the water heater calculations are summarized in the body of the report in Table 3-2.

For unit energy savings (see Equation 3-3 in the body of the report), EF_{EE} values are from the program tracking database, and EF_{std} values are calculated based on the volume of the program unit. The minimum energy factor for electric water heaters manufactured after January 20, 2004 is calculated based on volume as 0.97 - (0.00132 × Rated Storage Volume in gallons).[40] The other values are derived as noted in the key impact parameters table.

For demand savings, the Heat Pump Factor (HPF) applied to the program units is the average HPF based on 2012 Participant Survey responses about the typical operating mode of participants' heat pump water heaters. The HPF for each respondent is equal to 1 when the unit is operated in heat pump mode, 0.5 when the unit is operated in hybrid mode, and 0 when the unit is operated in normal mode.

Savings for Electric Water Heaters

According to the program logic, savings from electric water heaters are generated because the incentive motivates customers to purchase more energy-efficient water heaters when they were already going to purchase a new water heater. Savings are therefore a function of the incremental energy usage between a water heater that meets the federal standard for energy consumption and the more efficient program qualifying water heater (with minimum EF of 0.95). The sources and definitions of key parameters for the water heater calculations are summarized in the body of the report in Table 3-3.

For unit energy savings (see
Equation 3-5 in the body of the report), EF_{EE} values come from specifications on vendor or manufacturer websites, and EF_{std} values are calculated based on the volume of the program unit. The minimum energy

[40] Per 10-CFR-430.32.

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factor for electric water heaters manufactured after January 20, 2004 is calculated based on volume as 0.97 - (0.00132 × Rated Storage Volume in gallons).[41]

For demand savings (see
Equation 3-6) in the body of the report), *CF* is the fraction of the discounted water heaters that are in use coincident with the AEP Ohio summer peak and was based on participant survey results. *PF* represents an adjustment for summer hourly demand; this factor is based on the assumption that average hourly water heater load, for water heaters in use, varies with time of day and season. For 2012, *PF* was assumed to be equal to one (a flat load shape).[42] *CF* was determined based on the responses to the following questions from the Appliance Rebate Participant Survey:

- BWH2a. Between 3PM and 6PM on summer weekdays, does anyone in your household use any hot water? [IF NEEDED: Hot water might be used if you run the dishwasher, use the clothes washer, take a shower, or draw a bath.]

- BWH2b. Between 3PM and 6PM on summer weekdays, about what percentage of the time, on average, is hot water used? Your best guess is fine.

[IF NEEDED: In other words, across all weekday afternoons in the summer, during the 3-hour block of time from 3PM to 6PM, what percentage of all of that time is hot water used? For example, if hot water is used for 1 hour of the 3-to-6PM time block, on each day, that would be about 33%. One hour on just one weekday afternoon per week would be about 7% of the time.]

Savings Calculations for Televisions

The evaluation team matched the model numbers of program televisions from the program tracking data to Version 5.3[43] of the ENERGY STAR qualified product list for televisions to determine the following impact parameters for each model:

- Program Television Annual Energy Use
- Maximum ENERGY STAR Television Annual Energy Use
- Program Television Power Consumption
- Maximum ENERGY STAR Television Power Consumption

To determine the peak demand coincidence factor for program televisions, the evaluation team referenced a PG&E work paper[44]. This approach uses Nielsen data for television viewing periods to calculate the percentage of television viewing hours that are likely to overlap with the PG&E summer

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[41] Per 10-CFR-430.32.
[42] The evaluation team used the Standard Building America Domestic Hot Water Schedule, assuming a 3-bedroom house in Columbus, Ohio to determine expected hot water use in the performance period.
[43] Six of the models in the program tracking database are not in the Version 5.3 qualifying list, but were on previous qualifying product lists. Four of these models were on the 12.3.2012 list, one was on the 10.15.2012 list, and one was on the 9.17.2012 list.
[44]PG&E Work Paper PGECOAPP104 Energy Efficient Televisions Revision # 5. August 24. 2012.

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peak demand period of 2 to 5 pm. The evaluation team made the assumption that television usage patterns in the AEP Ohio service territory are similar to those in the PG&E service territory. This enabled the evaluation team to use the same Nielsen data as PG&E and modify the summer peak demand period assumptions to match the PJM EE Performance Hours of 2 to 6 pm.[45] The evaluation team also used the ENERGY STAR estimate of 5 hours per day for television viewing instead of the 5.15 hours used by PG&E. Although the 5 hours per day assumption used by the evaluation team is slightly less than the PG&E assumption of 5.15 hours, the extra hour in the PJM peak period (2pm-6pm) compared to the PG&E peak period (2pm-5pm) resulted in a coincidence factor of 0.162, which is slightly higher than the coincidence factor of 0.153 found in the PG&E work paper.

[45] PJM Manual 18B: Energy Efficiency Measurement and Verification Rev.01. March 1. 2010.

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A.2 Additional Results Detail

CFL Impact Parameters

In-Service Rate for CFLs

The in-service rate for program CFLs was determined as part of the 2011 Evaluation through participant surveys. The evaluation team assumed the same annual in-service rate of 81.7 percent for the 2012 evaluation, for both CFL and LED impact calculations.

Hours of Use for CFLs

The evaluation team used the hours of use (HOU) value for CFLs that was determined as part of the Program Year 2011 evaluation, which was 2.7 hours per day (or 979 hours per year). This value for hours of use is used for the both CFL and LED impact calculations.

Peak Demand Coincidence Factor for CFLs

For program CFLs, the evaluation team used a coincidence factor (CF) of 0.087, which was determined as part of the 2011 evaluation.

Clothes Washer Impact Parameters

Yearly Washer Loads

Yearly washer loads (cycles) are a parameter for determining energy savings. The yearly load value of 344 loads of clothes (mean value) per year was taken from the 2011 value, which was estimated based on participant survey responses.

Percent of Loads Heated with Electric Water Heat

The percentage of loads that are heated with electric water heat were determined as part of the 2011 evaluation, based on participant surveys asking about water heating type and load water temperature. This 2011 evaluation found that 18 percent of all loads (46% of 42%) use hot or warm water from an electric water heater. This value of 18% was also used in the 2012 impact calculations.

Percent of Loads Dried with Electric Clothes Dryers

The percentage of loads run in program-rebated washers that are then dried in electric clothes dryers was also determined as part of the 2011 evaluation, again based on participant surveys. The 2011 evaluation found that 84% of loads run in program-rebated clothes washers are dried with an electric clothes dryer. This value of 84% was also used in the 2012 impact calculations.

Fuel Adjustment Factor

As described in Section 3.7.2, the Fuel Adjustment Factor (FAF) is used to determine the savings attributed to a clothes washer based on the related use of electric water heaters and electric clothes dryers. This FAF accounts for the fact that the majority of savings from efficient clothes washers result from less water use and more efficient water removal, in turn requiring a reduced drying time. Using the equation for the FAF (Equation A-4) and data from 2011 Participant Surveys, the FAF was calculated to be 0.63.

Peak Demand Coincidence Factor for Clothes Washers

The evaluation team relied on the Building American Benchmark study for the clothes washer coincidence factor; the minimum value based on this study for the performance peak hours of 2 pm to 6 pm is 0.049.[46] The 2011 survey responses suggested that coincident peak use could be as high as 0.113. However, in keeping with other studies, and to be conservative, this evaluation used the Building America Benchmark value of 0.049.

Dehumidifier Impact Parameters

Coincidence Factor for Dehumidifiers

The coincidence factor for dehumidifiers is 0.843, based on 2011 participant survey responses. Participants were asked if they use their dehumidifiers during summer weekdays between 3 pm and 6 pm and 84.3 percent said that they did. This is consistent with use, where 42 percent of dehumidifiers are in use year round while the others are turned on mostly during the summer.

Customer Satisfaction

When asked to rate the Efficient Products Program overall, 97 percent of participants said they were at least somewhat satisfied. All respondents were asked an open-ended question about why they gave the satisfaction rating they did. The most frequent positive comments included:

- Satisfactory rebate amount (45 percent of all participants)
- Easy process (28 percent of all participants)
- Savings on energy bill (12 percent of all participants)
- Promptness in receiving rebate and customer service (10 percent of all participants)

A few participants also commented on program elements that left them less than satisfied (even if they indicated being satisfied with the program overall). These included:

- Inadequate rebate amount (7 percent of all participants)
- Difficult rebate application process (5 percent of all participants)
- Savings on energy bill not realized (3 percent of all participants)
- The program should include more appliances (1 percent of all participants)

An additional 7 percent of all participants did not provide an explanation of their satisfaction rating of the program by either not having any particular reason or refusing to answer the question.

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[46] Department of Energy, Energy Efficiency and Renewable Energy (EERE). 2011. Building America Analysis Spreadsheet. B10 Analysis - Existing Homes 2011.01.26.xlsm. Retrieved from http://www1.eere.energy.gov/buildings/building_america/analysis_spreadsheets.html

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Participants in the appliance rebate survey and respondents of the general population survey were asked to report on their satisfaction with AEP Ohio as their electric service provider. Results are shown in Table A-9. Overall, program participants and residential customers are satisfied with AEP Ohio. Appliance rebate participants reported a somewhat higher opinion of AEP Ohio, with 85 percent reporting being at least somewhat satisfied with having AEP Ohio as their service provider, compared to 74 percent of the residential general population, and this difference was statistically significantly.[47]

Table A-9. Participant and General Population Satisfaction with AEP Ohio

Satisfaction Rating	Appliance Rebate Participants (*n* = 138)	Residential Customers (*n* = 385)
Very satisfied	42.6%	40.8%
Somewhat satisfied	41.9%	33.0%
Neither Satisfied nor Dissatisfied	7.4%	13.4%
Somewhat dissatisfied	5.1%	10.5%
Very dissatisfied	2.9%	2.4%
Total	100.0%	100.0%

Note. Percentages due not sum to exactly 100% due to rounding.

Those participants who indicated being dissatisfied with AEP Ohio were asked what would make them more satisfied. Of the appliance rebate survey participants, seven said lowering rates, four said better service and less power outages, and an additional four said better billing processes. Of the residential general population customers who were asked why they reported dissatisfaction with AEP Ohio, 27 said high rates, 10 said poor service and power outages, and 4 said poor customer service.

Retailer Interviews – Sample Description

Corporate retailer interviewees represented a variety of types of retailer partners, including big box stores, home improvement stores, specialty stores, and hardware franchise chains. Although in 2012 a total of 36 retailer companies participated in the appliance rebate potion of the program and 21 retailer companies participated in the lighting markdown portion of the program, the retailers interviewed represented the stores responsible for a sizable portion of total sales of program discounted and rebated products.[48] The positions the six respondents held in their respective companies included: Energy Program Specialist, Associate Buyer, Senior Buyer, Senior Manager of Utility and Government Rebates,

[47] X^2 (1) = 6.458, $p < .05$. For this analysis, satisfaction was dichotomized to avoid low cell counts with the Chi-square test.

[48] An initial review of sales data showed that these six retailers accounted for 71.7 percent of all instant markdown lamp sales (not including lamps discounted with coupons). Within these six stores, there was also substantial range in number of lamps sold, from less than 1 percent to 38 percent of all instant markdown lighting. As for the appliance rebate portion of the program, of the 36 participating retailers, only two interviewees had involvement in this portion of the program, representing 47 of the 119 brick and mortar participating store locations; unfortunately, these interviewees also did not recall enough about this portion of the program to provide much specific feedback.

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Account Supervisor, and Global Product Merchant. These different titles indicate the different ways in which corporate retailers relate to utility programs as a whole, with some having key positions set aside for utility program management while others do not. Additionally, two of the retailers work on a franchise business model, and do not centrally run the program; rather, the individual franchisees choose whether to participate in the program and to what extent they market the program to their local customers. In these cases, there is an extra step after the corporate office coordinates and establishes the MOUs with AEP Ohio in which each individual store must be recruited by the corporate retail office and APT to participate in the program. Due to these diverse interactions with utility programs from retailer to retailer, each respondent provided unique insight into the Efficient Products Program.

Retailer Interviews – Detailed Findings

Program Awareness

All retailer respondents were familiar with the AEP Ohio Efficient Products Program. However, two respondents could not speak to all of the specifics of the program, citing the fact that they oversee dozens of utility programs across the country. Those who did not have detailed feedback on this specific program said that this is a sign that the program is comparable to other programs across the country in terms of process and their general satisfaction; in other words, this program does not stand out as being especially different from other similarly modeled programs. These two respondents were able to provide insight into best practices for discount and rebate programs from their experience with programs from across the country.

In-Store Training

All six respondents felt that the training provided to their store-level associates was not lacking in any regard. In fact, four respondents emphasized how useful the trainings have been to their sales associates. Specifically, the trainings help teach them how to interact with the customers, why to sell the program, why the in-store signage is important, and generally grow their knowledge of technologies. In fact, one respondent said that there is a notable difference in sales associate knowledge between those stores that have APT-provided trainings (i.e., those that participate in the program) and those that do not. However, there were two respondents who said that trainings are not the best use of resources in their particular stores, either because staff already undergo extensive technology training or the store's business model facilitates an unassisted shopping experience for consumers,[49] so sales associate knowledge of the program or technologies does not impact the customer's experience. Overall, four respondents said their sales staff are actively encouraged to promote the program to customers, with one of those stores financially incentivizing their staff to promote the program.

In-Store Signage

Those four retailer respondents who indicated that their stores utilize promotional material provided by AEP Ohio mentioned two-inch by three-inch stickers that are placed near the price label on the shelf, six-inch by two-foot tall aisle violators (signs that extend outwards from the shelves into the aisle), and end-

[49] The respondent stating that the retailer business model facilitates an unassisted shopping experience only participates in the lighting discount portion of the program.

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cap signage. These respondents viewed the materials provided by AEP Ohio as being central to the in-store promotion. One respondent offered that having multiple signs on the shelf with consistent messaging—such as a small sign by each product and a larger sign that provides more detail on the program—produces the best results in terms of increased volume of sales of discounted lamps. The one retailer that uses materials created by their company will not be continuing that strategy beyond 2012; moving forward, they will be using the in-store materials provided by AEP Ohio to lend consistency to the program branding so that there is a singular message about the program throughout the entire the electric service territory. Finally, the one respondent who mentioned the use of store-specific hand-made signage in their stores in addition to official program signage said this strategy is important because it "gives the store some accountability and an actionable item to take. It makes sure the associates are aware…It gives them the opportunity to participate."

Retailer Satisfaction

When respondents were asked if they are satisfied with the current level of communication with AEP Ohio staff, five reported being satisfied. All of those said that APT is very competent and has answered all of their questions, so there is no need for AEP Ohio to be involved in program implementation. However, one respondent would like to have a direct line of communication with AEP Ohio in order to have an active discussion about what lamps will be included in their agreements. He said, "We are getting to the point that we are talking more to our vendors to see what they are rolling out. AEP [Ohio] staff has the final say on [what products are discounted]. We want to talk more and make them more aware of the product. If we have something in the pipeline, they might be more agreeable to say yes to [approving discounts of these new products]. [We would like] more direct communication so our voice is heard."

Finally, respondents were asked to report the greatest strengths of the program. Included in the responses were:

- The retailer's ability to provide better value to customers (n = 1)
- The discounts' tendency to widen customer access to energy efficient technology by lowering the cost barrier (n = 1)
- A good diversity of lighting products that are rebated (n = 1)
- The exceptional work of the program staff (n = 1)
- A smooth and predictable MOU process (n = 1)
- The dollar amount in incentives that are offered to customers (n = 1)

One respondent specifically stated that compared to other utilities he works with, AEP Ohio provides exceptional deals to their customer in the form of lighting discounts.

General Population Familiarity with Specialty CFLs and LEDs

General population survey respondents were asked about their familiarity with different types of specialty CFLs. Figure A-1 shows respondents' familiarity with *specialty* CFLs and LEDs for general-purpose lighting. Between 40 and 50 percent of the general population were at least somewhat aware of specialty CFLs and LEDs. Familiarity was highest for three-way CFLs (46 percent), floodlight CFLs (46

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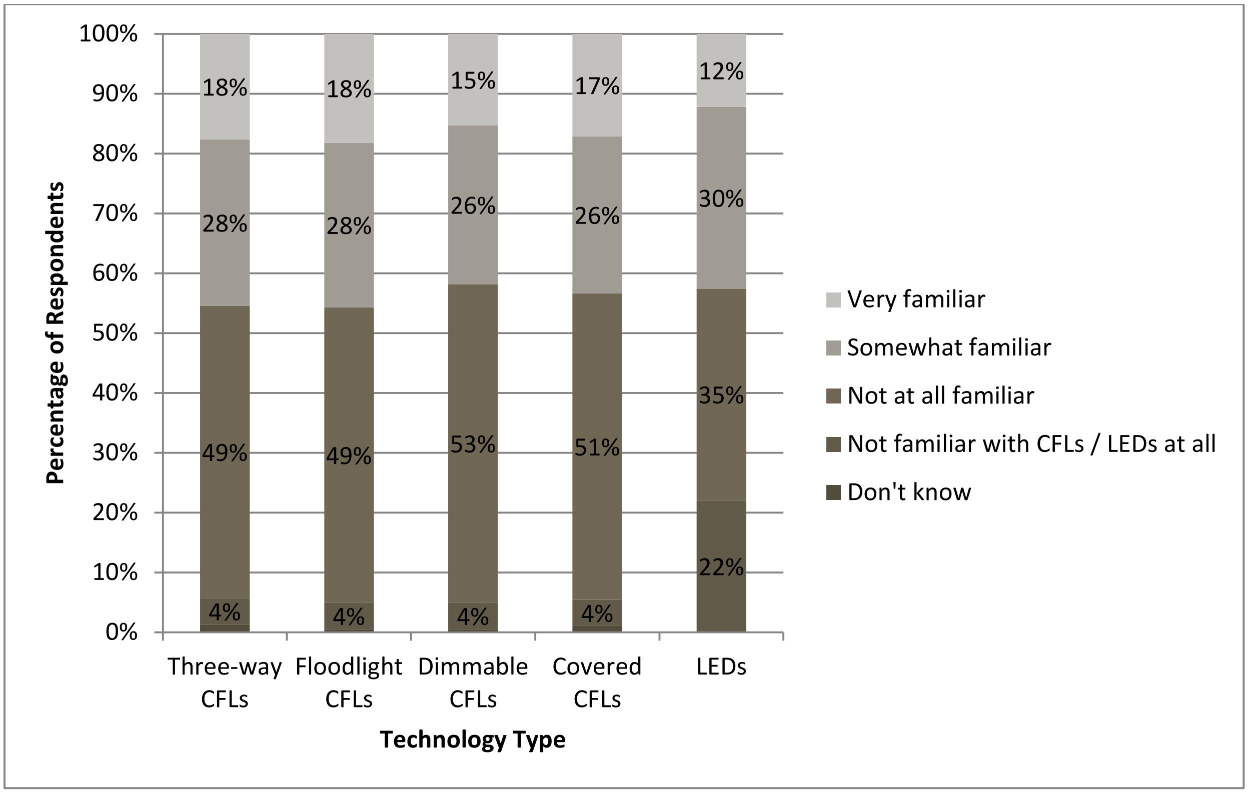
percent), and covered CFLs (43 percent). These percentages have decreased since 2011, when 65 percent of the population reported being at least somewhat familiar with three-way CFLs, 61 percent with floodlight CFLs, and 54 with covered CFLs.

Out of all 385 respondents, 78 percent reported that they had heard of LEDs prior to taking the survey. In total, only 12 percent reported being very familiar and 30 percent being somewhat familiar with LEDs, compared to 15 percent and 38 percent, respectively, in 2011. These results suggest that awareness and familiarity with specialty CFLs and LEDs have diminished over time.

Figure A-1. Familiarity with Specialty CFLs and LEDs



Detailed Shelf Survey Results

Availability of 100-Watt Incandescent lamps and Lumen-Equivalent Alternatives

As shown in Table A-10, 84% of stores stocked no 100-watt traditional incandescent lamps. Only 16% (n = 11) of the 69 stores visited had any 100-watt traditional incandescent models on the shelf. Nine out of 32 (28%) participating stores stocked at least one model of 100-watt traditional incandescent, while only two of the 37 (5%) non-participating stores visited stocked any 100-watt traditional incandescent lamps. This difference is likely due to the amount of inventory available at participating stores, as large lighting retailers tend to be participants in the AEP Ohio Efficient Products Program.

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Table A-10. Frequency of 100-Watt Incandescent Lamps Stocked (Number of Models)

Number of 100W Incandescent Models Stocked	Frequency: Participating Stores (n = 32)	Frequency: Non-Participating Stores (n = 37)	TOTAL Frequency (n = 69)	TOTAL Percent (n = 69)
None	23	35	58	84.1%
One	4	1	5	7.2%
Two	2	0	2	2.9%
Three	0	1	1	1.4%
Four	2	0	2	2.9%
Five	1	0	1	1.4%
Total	32	37	69	100.0%

Note. Percentages do not sum to exactly 100% due to rounding.

Table A-11 shows the average number of models available per store, as well as the average price per lamp, for 100-watt incandescent lamps and lumen-equivalent efficient halogens and CFLs. Again, participating stores tended to stock a greater variety of models available across all types of lamps, compared to retailers that are not participating in the Efficient Products Program. While 100-watt traditional incandescent lamps were not very common, there were on average, almost three different models of 72-watt efficient halogen lamps (with lumens equivalent to a traditional 100-watt incandescent) per store. Also worth noting is that across both participating and non-participating stores, basic spiral CFLs were the most prevalent type of 100-watt equivalent lamp. The most notable difference was at participating stores, where there were on average, seven different models of 100-watt equivalent basic spiral CFLs, and less than one model of 100-watt traditional incandescent lamp.

While the price of incandescent lamps was more expensive at participating stores, the prices of efficient (72-watt) incandescent/halogen lamps and CFLs were less expensive at participating stores, compared to non-participating stores. At the average non-participating store, a 100-watt incandescent, if available, was almost $6 cheaper than a 100-watt equivalent basic spiral CFL ($.46 compared to $6.38). However, at participating stores, the value proposition for CFLs is much more compelling; 100-watt incandescent lamps are only $2.50 cheaper than their CFL counterparts.

Table A-11. Average Number of 100-Watt Incandescent Models and Equivalents Available, Per Store

	Participating Stores (n = 32)		Non-participating Stores (n = 37)	
Lamp Type	Number of Models (Mean)	Price (Mean)	Number of Models (Mean)	Price (Mean)
100W Incandescent	0.66	$1.04	0.11	$0.46
100W Equivalent (72W) Efficient Incandescent/ Halogen	2.72	$2.46	2.08	$3.94
100W Equivalent Basic Spiral CFL	7.31	$3.54	3.73	$6.38
100W Equivalent Dimmable CFL	0.28	$10.04	0.08	$12.72
100W Equivalent A-Lamp CFL	0	-	0	-

Note. Mean number of models is across all stores, and thus includes zeroes entered for stores that did not stock any of the type specified.

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Availability of Basic Spiral CFLs

Table A-12 shows the availability of basic spiral CFLs in the AEP Ohio service territory. The most common incandescent-equivalent wattages for basic spiral CFLs are 60-watt equivalent CFLs, with an average of eight different models available per store. This is followed by 75-watt-equivalent and 100-watt-equivalent CFLs, both with about 5 different models available per store, on average. Again, across wattages, participating stores tended to stock a greater number of different models, compared to non-participating stores. Within participating stores, there tend to be a greater number of models that are not discounted, as opposed to models that are discounted by AEP Ohio. For example, on average at participating stores, there are four AEP Ohio discounted 60-watt equivalent basic spiral CFL models stocked per store, compared with seven models that are not discounted by AEP Ohio.

Table A-12. Availability of Basic Spiral CFLs – Average Number Stocked Per Store

Basic Spiral CFL Incandescent-Equivalent Wattage	Participating Stores			Non-participating Stores	
	Non-Discounted Mean	Discounted Mean	Total	Non-Discounted Mean	GRAND TOTAL
25W	< 1	0	< 1	< 1	< 1
40W	2	2	4	1	2
60W	7	4	11	6	8
75W	4	2	6	4	5
100W	4	3	7	4	5
125W	< 1	0	< 1	< 1	< 1
150W	1	< 1	1	< 1	1
>150W	< 1	< 1	< 1	0	< 1

Note. Only includes basic spiral CFLs that are not dimmable and not three-way wattage. Wattages shown are incandescent-equivalent wattages. Mean number of models is across all stores, and thus includes zeroes entered for stores that did not stock any of the type specified.

Table A-13 shows the number of stores that stock at least one model of each incandescent-equivalent wattage basic spiral CFL. The most commonly stocked wattage equivalencies were 60-watt, 75-watt, and 100-watt-equivalent CFLs, which were stocked at nearly every store surveyed. The least-frequently stocked basic spiral CFLs were 25-watt and 125-watt equivalencies, which were each stocked at only 10 percent of stores surveyed. In general, participating stores were more likely to stock low (i.e., less than 60-watt-equivalent) and high (i.e., greater than 100-watt-equivalent) wattage CFLs, compared to nonparticipating stores.

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Table A-13. Availability of Basic Spiral CFLs – Number of Stores that Stock Each Wattage

Basic Spiral CFL Equivalent Wattage	Participating Stores (n = 32)		Non-participating Stores (n = 37)		TOTAL (n = 69)	
	N	n	%	%	n	%
25W	4	3	8%	13%	7	10%
40W	30	25	68%	94%	55	80%
60W	32	37	100%	100%	69	100%
75W	31	36	97%	97%	67	97%
100W	31	36	97%	97%	67	97%
125W	6	1	3%	19%	7	10%
150W	23	3	8%	72%	26	38%
> 150W	8	0	0%	25%	8	12%

Pricing of Basic Spiral CFLs

Table A-14 shows that even non-discounted basic spiral CFLs at participating stores were cheaper than those at non-participating stores. Again, this could be due to the fact that large lighting retailers tend to be participants in the AEP Ohio Efficient Products Program. Within participating stores, the average price of a discounted CFL was about $2 cheaper than the average price of a non-discounted CFL (the average price difference varies by wattage, and ranged from $1.72 to $2.21).

Table A-14. Pricing of Basic Spiral CFLs

Basic Spiral CFL Incandescent-Equivalent Wattage	Participating Stores			Non-participating Stores	GRAND TOTAL
	Non-Discounted Mean	Discounted Mean	Total	Non-Discounted Mean	
25W	$4.01	N/A	$4.01	$6.82	$5.22
40W	$4.48	$2.27	$2.93	$6.52	$4.56
60W	$4.29	$2.35	$3.31	$5.76	$4.62
75W	$4.94	$2.81	$3.71	$7.83	$5.92
100W	$4.50	$2.78	$3.54	$6.38	$5.07
125W	$10.02	N/A	$10.02	$7.54	$9.67
150W	$11.65	$9.80	$11.04	$10.95	$11.03
>150W	$15.22	$13.17	$13.68	N/A	$13.68

Availability of Specialty CFLs

Table A-15 shows the average number of models stocked per store. There was a greater selection of reflector and A-lamp CFLs, with an average of six and five different models stocked per store, respectively. Comparing the results presented in Table A-16, although 3-way CFLs are stocked at 72 percent of stores, on average, there was only one model available per store.

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Table A-15. Availability of Specialty CFLs – Average Number Stocked Per Store

CFL Specialty Types	Participating Stores (n = 32) Non-Discounted Mean	Participating Stores (n = 32) Discounted Mean	Participating Stores (n = 32) Total	Non-participating Stores (n = 37) Non-Discounted Mean	GRAND TOTAL (n = 69)
Reflector [a]	7	2	9	3	6
A-lamp [a]	4	2	6	4	5
Globe [a]	2	2	4	1	2
Dimmable	2	1	3	1	2
3-Way	1	1	2	1	1
Torpedo [a]	< 1	< 1	1	< 1	< 1

Note. Dimmable and 3-way models can be any shape: spiral, A-lamp, reflector, or torpedo. Mean number of models is across all stores, and thus includes zeroes entered for stores that did not stock any of the type specified.
[a] Only shows specialty CFL models that are not dimmable and not 3-way.

Table A-16 shows the availability of specialty CFLs in the AEP Ohio service territory. The most common types of specialty CFLs available are A-lamp and reflector CFLs, which were stocked in more than 90 percent of all stores surveyed. Although three-way CFLs were found in 91 percent of participating stores, they were only found in 57 percent of non-participating stores. Similarly, globe and dimmable CFLs were commonly found in participating stores, but were much less common in non-participating stores.

Table A-16. Availability of Specialty CFLs – Number of Stores that Stock Each Type

Specialty CFL Type	Participating Stores (n = 32)		Non-participating Stores (n = 37)		TOTAL (n = 69)	
	n	n	%	%	n	%
A-Lamp [a]	31	33	89%	97%	64	93%
Reflector [a]	32	31	84%	100%	63	91%
3-Way	29	21	57%	91%	50	72%
Globe [a]	27	16	43%	84%	43	62%
Dimmable	27	8	22%	84%	35	51%
Torpedo [a]	8	9	24%	25%	17	25%

Note. Dimmable and 3-way models can be any shape: spiral, A-lamp, reflector, or torpedo.
[a] Only shows specialty CFL models that are not dimmable and not 3-way.

Pricing of Specialty CFLs

Table A-17 shows the average price of specialty CFLs per store. Overall, the most costly specialty CFLs are dimmable, three-way, and reflector CFLs. As with basic spiral CFLs, specialty CFLs are generally cheaper at participating stores compared to non-participating stores. Within participating stores, discounted dimmable and torpedo CFLs were around the same price, on average, compared to non-discounted CFLs. For dimmable lamps, this is most likely explained by the fact that non-discounted dimmable lamps were more likely to also have special shapes rather than basic spiral shapes (i.e., discounted dimmable lamps were more likely to be spiral shaped). For torpedo CFLs, this is due to an outlier price of $8.99 for one of the discounted models; this skewed results due to the low overall

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number of discounted torpedo CFLs stocked. For the remaining types of specialty CFLs, discounted lamps were less costly, ranging from $2.07 less for three-way CFLs to $3.65 less for globe CFLs.

Table A-17. Pricing of Specialty CFLs – Average Price Per Store

	Participating Store			Non-participating Store	
CFL Specialty Types	Non-Discounted Mean	Discounted Mean	Total	Non-Discounted Mean	Overall Mean
Dimmable	$11.50	$11.65	$11.84	$17.18	$13.06
3-Way	$11.22	$9.15	$10.44	$15.87	$12.72
Reflector [a]	$9.37	$6.21	$7.97	$12.25	$10.07
A-lamp [a]	$6.94	$4.49	$6.40	$10.48	$8.50
Globe [a]	$7.34	$3.69	$6.28	$9.87	$7.62
Torpedo [a]	$3.90	$3.75	$4.29	$8.37	$6.45

Note. Dimmable and 3-way models can be any shape: spiral, A-lamp, reflector, or torpedo.
[a] Only shows specialty CFL models that are not dimmable and not 3-way.

Tracking Data Review – Description of Tracking Databases

The lighting markdown database included separate entries for each invoice submitted from manufacturers/retailers to APT. Each invoice includes data on all the sales of a specific type of lighting sold at a specific retailer over a given time period. This database includes information on the lighting manufacturers, the participating retailers, the timing of lighting sales, the size of the rebate, and characteristics of the lighting sold including wattage, pack size, type (i.e., specialty vs. standard designation), and product name.

In addition to lighting products, the lighting markdown database also included the entries for each invoice submitted by the retail partner for the mid-stream television incentive component of the program. Similarly to the lighting products, the database includes information on the television manufacturers, the retailer, the timing of the television sales, and the television model number.

The lighting coupon data included data submitted by retailers that are not participating in direct markdowns. There is a record for each individual coupon submitted which includes data on the manufacturer, retailer, customer, date of purchase, the amount of the rebate, and characteristics of the CFLs sold including wattage, pack size, lamp life, and product name. This database does not include a field indicating whether the product is specialty and/or standard CFL, as identified in the markdown database.

Data for CFL distributions show the number of CFLs distributed at the MHA and food bank sites. These data were provided in separate spreadsheets. For the food bank distributions, data include distribution sites, total lamps, lamp type, and distribution dates. For the MHA, data are the count of lamps distributed by county housing authority.

The appliance data contained customer level information for appliance rebates. The data included customer name and address, the brand and model of rebated appliances, purchase price, and purchase

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date. The brand/model combinations were used to determine the key parameters for the appliance program savings.

Data Tracking Review - Results

The evaluation team conducted a review of the program tracking data and documented any issues that were discovered. A general description of each database is provided in the Appendix.

Lighting Tracking Data

- **The coupon tracking data for lighting did not include the number of units (lamp packs, regardless of size) sold in each transaction.** Whereas the other tracking data included a variable for quantity sold, the coupon tracking data did not. The evaluation team calculated the number of units (lamp packs) sold using the total rebate and per-unit rebate values.
- **Standard/specialty designations were not included in the coupon tracking data.** This variable is needed in determining whether a CFL was standard or specialty; there was no specialty or standard designation in the coupon tracking data.
- **Specialty lamp information was contained in the Markdown tracking data, as variable "ItemType."** However, it was difficult to discern the type of specialty lamp from the model number information in the tracking data. Some model numbers explicitly indicated the type of specialty CFL (i.e. globe, 3-way, dimmable), but most did not. This specialty designation was added to the program tracking data in 2012, increased detail could facilitate deeper analysis of the types of lighting being purchased.
- **The markdown tracking data for lighting included repetitive variable names for the same information; the information was stored across multiple variables.** Namely, the variables "Rebate1" and "Rebate_1" appeared in the tracking data. These data appeared to represent the same information, but neither was a complete record. Rebate_1 contained values for 55.2% of the markdown tracking data; Rebate1 contained values for 44.8% of the markdown tracking data. Between the two variables, a full record was gathered from the tracking data, but consistency across coding can avoid possible errors or prevent mistakenly "missing" data.

Appliance Rebate Tracking Data

- **One heat pump water heater was incorrectly coded as a unit receiving an electric water heater rebate in the appliance tracking data.** The unit also appeared in the tracking data as a rebated heat pump water heater. The evaluation team attributed savings for this unit to the heat pump water heater rebate category, and this unit was not counted toward electric water heater savings.

Thirty-eight dehumidifier units (38 out of 6,167) could not be matched with a unit capacity using available model numbers and specifications from manufacturer websites or ENERGY STAR and CEE databases. The evaluation team applied the average unit energy savings and unit demand savings value for these dehumidifiers.

A.3 AEP Ohio Efficient Products General Population Survey

☐**INTRODUCTION AND SCREENER**

☐

☐SC1. Hello, my name is _____________. I'm calling on behalf of your electric utility, AEP Ohio. AEP Ohio is very interested in learning about your thoughts regarding energy efficiency and conservation in your home. We are particularly interested in your use of energy-efficient products in order to assist with our residential consumer program design.

☐

☐[IF ASKED: The interview will take about 20 minutes.]

☐All responses are strictly confidential and will be used for research purposes only, they will not be associated in any way with you or your home. First I'd like to verify your address, this ensures that we survey customers throughout AEP Ohio's territory. Is your address <<ADDRESS>> …?

☐

☐[CLARIFY, IF NEEDED]: This is a research survey to help AEP Ohio understand how electricity is used in homes in its service area. We are not selling anything, and responses will not be connected with you or your home in any way. Your input to the study is very important.

☐Is now a good time to speak with you?

☐

1	Yes	CONTINUE
2	No, schedule callback	Set up callback date and time, confirm contact name and phone number

1. Is your electric company AEP Ohio, Ohio Power (OP), Columbus Southern Power (CSP) or another company?
    1. AEP Ohio, Ohio Power (OP), or Columbus Southern Power (CSP)
    2. Another company (SPECIFY____)**[THANK AND TERMINATE]**
    99. REFUSED **[THANK AND TERMINATE]**
    98. DON'T KNOW **[THANK AND TERMINATE]**

1a. I'd like to start by asking a few questions about the appliances in your home.

Do you currently have a ***working stand-alone freezer*** in your home thatis separate from your main refrigerator? By "working," I mean that the freezer effectively cools its contents. Please include any working stand-alone freezer, regardless of how often you use it and whether or not it is currently plugged in.

1. Yes

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2. No
99. REFUSED
98. DON'T KNOW

1b. How many ***working refrigerators*** do you have in your home? By "working," I mean that the refrigerator effectively cools its contents. Please include any working refrigerator, regardless of how often you use it and whether or not it is currently plugged in.

[ENTER NUMBER] (RANGE 0 TO 10)
99. REFUSED
98. DON'T KNOW

2. Now I'd like to ask you a few questions about your awareness of different types of lighting. Before this call today had you ever heard of compact fluorescent light bulbs, or CFLs?
    1. Yes **[SKIP TO Q4]**
    2. No
    99. REFUSED **[SKIP TO Q15]**
    98. DON'T KNOW

3. Compact fluorescent light bulbs– also known as CFLs – usually do not look like regular incandescent light bulbs. The most common type of CFL is made with a glass tube bent into a spiral, resembling soft-serve ice cream and fits in a regular light bulb socket. Before today, were you familiar with this technology?
    1. Yes
    2. No **[CODE HAS_CFL = "NO" AND SKIP TO Q15]**
    99. REFUSED **[CODE HAS_CFL = "NO" AND SKIP TO Q15]**
    98. DON'T KNOW **[CODE HAS_CFL = "NO" AND SKIP TO Q15]**

4. Have **you** personally ever purchased **any** CFLs to use in your home?
    1. Yes **[CODE HAS_CFL="YES" AND SKIP TO Q6]**
    2. No
    99. REFUSED
    98. DON'T KNOW

5. Has anyone else in your household ever purchased any CFLs to use in your home?
    1. Yes **[ASK TO SPEAK TO THAT PERSON AND START SURVEY OVER.**
    2. **2. IF THEY ARE NOT AVAILABLE, SCHEDULE A CALL-BACK]**
    3. No [CODE HAS_CFL="NO" **AND CONTINUE]**
    99. REFUSED **[CODE HAS_CFL = "NO" AND CONTINUE]**
    98. DON'T KNOW **[CODE HAS_CFL = "NO" AND CONTINUE]**

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[PROGRAMMING NOTE: IF EITHER Q4 = 1, CODE HAS_CFL = "YES" OTHERWISE CODE HAS_CFL = "NO"]

6. How familiar are you with compact fluorescent lights? Would you say you are…
    1. Not at all familiar?
    2. Somewhat familiar, or
    3. Very familiar
    99. REFUSED
    98. DON'T KNOW

7. While most compact fluorescent light bulbs are spiral shaped, these also come in other shapes and some have special features. We call these 'specialty CFLs.' I'm going to ask about your familiarity with a few types of specialty CFLs. [RANDOMIZE AND READ EACH CATEGORY A THROUGH D, AND RECORD RESPONSE.] Would you say you are…?
    1. Not at all familiar
    2. Somewhat familiar, or
    3. Very familiar
    99. REFUSED
    98. DON'T KNOW

    A. Dimmable CFL bulbs. These bulbs can be used with a dimmer switch to adjust the level of brightness.
    B. 3-way CFL bulbs. These bulbs can be switched between three levels of brightness.
    C. CFL floodlights or CFL bulbs meant for recessed lighting. These generally have a spiral tube in a reflective housing that looks like a standard incandescent floodlight.
    D. Covered CFLs with a round glass or plastic cover that are made to look and feel like a traditional incandescent light bulb. These are usually called Globe CFL bulbs.

8. Have you heard of the program AEP Ohio offers that provides discounts for purchasing CFLs at participating retail stores?
    1. Yes
    2. No **[SKIP TO Q9]**
    99. REFUSED **[SKIP TO Q9]**
    98. DON'T KNOW **[SKIP TO Q9]**

8a. How did you first become aware of the discounts on CFLs? **[DO NOT READ RESPONSE LIST.]**

1. Bill insert
2. In-store demonstration/booth
3. In-store signage
4. Store sales associate
5. Friend or family member
6. Television commercial
7. Radio commercial
8. Other advertisement
9. AEP Ohio website

97.Other **[RECORD VERBATIM]**
99. REFUSED
98. DON'T KNOW

9. **[ASK IF HAS_CFL = "NO" AND Q6= 2OR 3. NOTE: THOSE WHO HAVE PURCHASED CFLS ARE ASKED THIS QUESTION LATER IN Q20.]**What factors are preventing you from installing CFLs in your home? **[DO NOT READ, ALLOW MULTIPLE RESPONSES]**

1. WAITING FOR INSTALLED BULBS TO BURN OUT
2. OPERATING HOURS—DON'T USE THE OTHER BULBS/LAMPS ENOUGH **[SKIP TO Q15]**
3. CFLS ARE TOO EXPENSIVE/COST TOO MUCH **[SKIP TO Q15]**
4. NEED DIMMABLE BULBS/CAN'T GET DIMMABLE CFLS/CAN'T USE CFLS WITH DIMMER SWITCHES **[SKIP TO Q15]**
5. NEED 3-WAY BULBS/CAN'T GET 3-WAY CFLS/CAN'T USE CFLS IN MY 3-WAY FIXTURES/WHEN I USE REGULAR CFLS IN MY 3-WAY FIXTURES THEY DON'T WORK **[SKIP TO Q15]**
6. DON'T LIKE THE WAY CFLS LOOK IN FIXTURES **[SKIP TO Q15]**
7. DON'T LIKE THE WAY CFLS FIT IN FIXTURES **[SKIP TO Q15]**
8. CFLS AREN'T BRIGHT ENOUGH **[SKIP TO Q15]**
9. CFL LIGHT COLOR ISN'T WHAT I WANT/ISN'T RIGHT **[SKIP TO Q15]**
10. CFLS TAKE TOO LONG TO LIGHT UP **[SKIP TO Q15]**
11. CFLS CONTAIN MERCURY **[SKIP TO Q15]**
12. ALL FIXTURES ALREADY HAVE CFLS **[SKIP TO Q15]**
13. CFLS DON'T LAST LONG ENOUGH/SHORT LIFESPAN

97. OTHER [RECORD VERBATIM] **[SKIP TO Q15]**
99. REFUSED **[SKIP TO Q15]**
98. DON'T KNOW **[SKIP TO Q15]**

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9b. **[ASK IF Q9 = 1,13]** You said that you were waiting for bulbs to burn out before installing CFLs in your home. Are the bulbs that you are waiting to burn out traditional incandescent light bulbs or CFLs?

1. Incandescent light bulbs **[SKIP TO Q15]**
2. CFLs **[SKIP TO Q15]**
3. A mixture of incandescents and CFLs**[SKIP TO Q15]**

97.Other (Specify___________) **[SKIP TO Q15]**
99. REFUSED **[SKIP TO Q15]**
98. DON'T KNOW **[SKIP TO Q15]**

[ASK IF Q8=1, ELSE SKIP TO Q15]

10. Have you purchased any CFLs discounted by AEP Ohio since January 2012?
    1. Yes
    2. No

    99. REFUSED
    98. DON'T KNOW

Non-Discounted CFL Purchases

11. Since January 2012, have you purchased and installed any CFLs for your home at the regular, non-discounted retail price?

    1. Yes
    2. No **[SKIP TO Q15]**
    99. REFUSED **[SKIP TO Q15]**
    98. DON'T KNOW **[SKIP TO Q15]**

12. How many CFLs have you purchased at regular retail price?

    [NUMERIC ANSWER. RANGE: 0-100] **[IF RESPONDENT IS UNSURE, ASK FOR THEIR BEST GUESS]**
    99. REFUSED

13. I'm going to read a statement about your purchase of energy efficient lighting. On a scale of 1 to 5, with 1 indicating that you strongly disagree and 5 indicating that you strongly agree, please rate the following: "The AEP Ohio Lighting Discount Program influenced my decision to purchase energy-efficient lighting products."

    1. 1 [STRONGLY DISAGREE]
    2. 2
    3. 3
    4. 4
    5. 5 [STRONGLY AGREE]

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99. REFUSED
98. DON'T KNOW

[ASK IF Q11=1, ELSE CONTINUE TO Q15]

14. Why did you purchase these lighting products at regular retail price and not at the discounted rate? **[DO NOT READ RESPONSES; ACCEPT MULTIPLE]**
    1. THE PRICE DISCOUNTS HAD ENDED, SO I PURCHASED THE SAME LIGHTS AT REGULAR RETAIL PRICE
    2. THE PRICE DIFFERENCE WASN'T GREAT ENOUGH
    3. I BOUGHT THE LIGHTING AT A STORE THAT DID NOT HAVE THE PRICE DISCOUNTED BULBS
    4. THE PRICE DISCOUNTED CFLS HAD SOLD OUT
    97. OTHER (SPECIFY) ________________________________
    98. DON'T KNOW
    99. REFUSED

Lighting Installation

The next few questions address the lighting in your home.

15. Approximately how many light bulbs do you have in all the lamps and fixtures **inside** your home, including light bulbs installed inside any garages? Please include all types of light bulbs.
    NUMERICAL OPEN END RANGE 0-100**[IF RESPONDENT IS UNSURE, ASK FOR THEIR BEST GUESS]**
    99. REFUSED

16. **[ASK ONLY IF HAS_CFL = "YES"AND Q15>0]** Of all the light bulbs in your home, how many are compact fluorescent light bulbs (CFLs)? [MUST BE LESS THAN OR EQUAL TO Q15 ANSWER]

    1. NUMERICAL OPEN END RANGE 0-100**[IF RESPONDENT IS UNSURE, ASK FOR THEIR BEST GUESS]**
    99. REFUSED

17. Approximately how many light bulbs do you have in all the lamps and fixtures **outside** your home? Please include all types of light bulbs.
    NUMERICAL OPEN END RANGE 0-100**[IF RESPONDENT IS UNSURE, ASK FOR THEIR BEST GUESS]**

NAVIGANT

99. REFUSED

18. **[ASK ONLY IF HAS_CFL = "YES"AND Q17>0]** Of all your outdoor light bulbs **outside** your home, how many are compact fluorescent light bulbs (CFLs)? [MUST BE LESS THAN OR EQUAL TO Q17ANSWER]

    NUMERICAL OPEN END RANGE 0-100[**IF RESPONDENT IS UNSURE, ASK FOR THEIR BEST GUESS]**
    99. REFUSED

19. **[IF Q16> 0 OR Q18> 0]** How satisfied are you with the compact fluorescent light bulbs you have installed? Would you say you are Very Dissatisfied, Somewhat Dissatisfied, Neither Satisfied nor Dissatisfied, Somewhat Satisfied, or Very Satisfied? (DO NOT READ)
    1. VERY DISSATISFIED
    2. SOMEWHAT DISSATISFIED
    3. NEITHER SATISFIED NOR DISSATISFIED
    4. SOMEWHAT SATISFIED
    5. VERY SATISFIED
    99. REFUSED
    98. DON'T KNOW

20. **[ASK IF HAS_CFL = "YES" Q16< Q15 OR Q18< Q17]** What factors are preventing you from installing [MORE] CFLs in your home? **[ALLOW MULTIPLE RESPONSES] [DO NOT READ]**
    1. WAITING FOR INSTALLED BULBS TO BURN OUT
    2. OPERATING HOURS—DON'T USE THE OTHER BULBS/LAMPS ENOUGH
    3. CFLS ARE TOO EXPENSIVE/COST TOO MUCH
    4. NEED DIMMABLE BULBS/CAN'T GET DIMMABLE CFLS/CAN'T USE CFLS WITH DIMMER SWITCHES
    5. NEED 3-WAY BULBS/CAN'T GET 3-WAY CFLS/CAN'T USE CFLS IN MY 3-WAY FIXTURES/WHEN I USE REGULAR CFLS IN MY 3-WAY FIXTURES THEY DON'T WORK
    6. DON'T LIKE THE WAY CFLS LOOK IN FIXTURES
    7. DON'T LIKE THE WAY CFLS FIT IN FIXTURES
    8. CFLS AREN'T BRIGHT ENOUGH
    9. CFL LIGHT COLOR ISN'T WHAT I WANT/ISN'T RIGHT
    10. CFLS TAKE TOO LONG TO LIGHT UP

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11. CFLS CONTAIN MERCURY
12. ALL FIXTURES ALREADY HAVE CFLS
13. CFLS DON'T LAST LONG ENOUGH/SHORT LIFESPAN
97.OTHER [RECORD VERBATIM]
99. REFUSED
98. DON'T KNOW

20b. **[ASK IF Q20 = 1]**You said that you were waiting for bulbs to burn out before installing [more] CFLs in your home. Are the bulbs that you are waiting to burn out traditional incandescent light bulbs or CFLs?

1. Incandescent light bulbs
2. CFLs
3. A mixture of incandescents and CFLs
97. Other (Specify___________)
99. REFUSED
98. DON'T KNOW

21. **[IF Q16> 0 OR Q18> 0]** On a scale from 1 to 5, where 1 means "Not at all likely" and 5 means "Very likely," how likely is it that you will replace the CFLs in your home with more CFLs when they burn out?

1. 1 [Not at all likely]
2. 2
3. 3
4. 4
5. 5 [Very likely]
99. REFUSED
98. DON'T KNOW

Specialty CFL Demand

22. [DO NOT ASK IF (SKIPPED Q7) or (Q7 A – D ALL EQUAL 1, 98, or 99)]. Earlier we talked about 'specialty CFLs,' such as three-way CFLs, dimmable CFLs, covered CFLs, or CFL bulbs with reflectors that look like a floodlight. On a scale of 1 to 5, with 1 meaning "not at all interested" and 5 meaning "very interested," how interested are you in installing specialty CFL light bulbs in your home?

1. 1 [NOT AT ALL INTERESTED]
2. 2
3. 3
4. 4
5. 5 [VERY INTERESTED]
99. REFUSED

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98. DON'T KNOW

LED Awareness and Demand

23. Now I would like to ask you a few questions about your awareness of a different type of light bulb. Before this call today had you ever heard of light-emitting diodes, or LED light bulbs?
    1. Yes
    2. No **[SKIP TO Q31]**
    99. REFUSED **[SKIP TO Q31]**
    98. DON'T KNOW **[SKIP TO Q31]**

24. How familiar are you with LEDs used for general purpose lighting in homes? [READ IF NECESSARY: not for flashlights, nightlights, or holiday string lights] Would you say you are…?
    1. Not at all familiar **[SKIP TO Q31**]
    2. Somewhat familiar, or
    3. Very familiar
    99. REFUSED
    98. DON'T KNOW

25. Do you have any LED light bulbs currently installed in your home? This does not include nightlights, holiday string lights, or exterior lights.
    1. Yes
    2. No **[SKIP TO Q29]**
    99. REFUSED **[SKIP TO Q29]**
    98. DON'T KNOW **[SKIP TO Q29]**

26. How many LED light bulbs do you have installed in your home?[READ IF NECESSARY: This does not include nightlights, holiday string lights, or exterior lights.]
    [NUMERIC ANSWER. RANGE: 0-100] **[IF RESPONDENT IS UNSURE, ASK FOR THEIR BEST GUESS]**
    99. REFUSED

27. On a scale of 1 to 5, with 1 meaning "not at all interested" and 5 meaning "very interested," how interested are you in installing additional LED light bulbs in your home?
    1. 1 [NOT AT ALL INTERESTED]
    2. 2
    3. 3
    4. 4

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5. 5 [VERY INTERESTED]
99. REFUSED
98. DON'T KNOW

28. **[ASK IF Q26 < Q15]**What factors are preventing you from installing additional LEDs in your home? [ALLOW MULTIPLE RESPONSES] (DO NOT READ)
    1. WAITING FOR INSTALLED BULBS TO BURN OUT **[SKIP TO Q31]**
    2. OPERATING HOURS—DON'T USE THE OTHER BULBS/LAMPS **[SKIP TO Q31]**
    3. LEDS ARE TOO EXPENSIVE/COST TOO MUCH **[SKIP TO Q31]**
    4. NEED DIMMABLE BULBS/CAN'T GET DIMMABLE LEDS/CAN'T USE LEDS WITH DIMMER SWITCHES **[SKIP TO Q31]**
    5. NEED 3-WAY BULBS/CAN'T GET 3-WAY LEDS/CAN'T USE LEDS IN MY 3-WAY FIXTURES/WHEN I USE REGULAR LEDS IN MY 3-WAY FIXTURES THEY DON'T WORK **[SKIP TO Q31]**
    6. DON'T LIKE THE WAY LEDS LOOK IN FIXTURES **[SKIP TO Q31]**
    7. DON'T LIKE THE WAY LEDS FIT IN FIXTURES **[SKIP TO Q31]**
    8. LEDS AREN'T BRIGHT ENOUGH **[SKIP TO Q31]**
    9. LED LIGHT COLOR ISN'T WHAT I WANT/ISN'T RIGHT **[SKIP TO Q31]**
    10. LEDS TAKE TOO LONG TO LIGHT UP **[SKIP TO Q31]**
    11. ALL FIXTURES ALREADY HAVE LEDS **[SKIP TO Q31]**
    97. OTHER [RECORD VERBATIM] **[SKIP TO Q31]**
    99. REFUSED **[SKIP TO Q31]**
    98. DON'T KNOW **[SKIP TO Q31]**

[ASK Q29 IF Q25≠1, ELSE SKIP TO Q31]

29. On a scale of 1 to 5, with 1 meaning "not at all interested" and 5 meaning "very interested," how interested are you in installing LED light bulbs in your home?
    1. 1 [NOT AT ALL INTERESTED]
    2. 2
    3. 3
    4. 4
    5. 5 [VERY INTERESTED]
    99. REFUSED
    98. DON'T KNOW

30. What factors are preventing you from installing LEDs in your home? [ALLOW MULTIPLE RESPONSES] (DO NOT READ)
    1. WAITING FOR INSTALLED BULBS TO BURN OUT

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2. OPERATING HOURS—DON'T USE THE OTHER BULBS/LAMPS
3. LEDS ARE TOO EXPENSIVE/COST TOO MUCH
4. NEED DIMMABLE BULBS/CAN'T GET DIMMABLE LEDS/CAN'T USE LEDS WITH DIMMER SWITCHES
5. NEED 3-WAY BULBS/CAN'T GET 3-WAY LEDS/CAN'T USE LEDS IN MY 3-WAY FIXTURES/WHEN I USE REGULAR LEDS IN MY 3-WAY FIXTURES THEY DON'T WORK
6. DON'T LIKE THE WAY LEDS LOOK IN FIXTURES
7. DON'T LIKE THE WAY LEDS FIT IN FIXTURES
8. LEDS AREN'T BRIGHT ENOUGH
9. LED LIGHT COLOR ISN'T WHAT I WANT/ISN'T RIGHT
10. LEDS TAKE TOO LONG TO LIGHT UP
11. ALL FIXTURES ALREADY HAVE LEDS

97.OTHER [RECORD VERBATIM]
99. REFUSED
98. DON'T KNOW

Awareness of Efficient Appliances

31. How familiar are you with the following energy efficient technologies? Please tell me if you are not at all familiar, somewhat familiar or very familiar with…?

    1. Not at all Familiar,
    2. Somewhat Familiar, or
    3. Very Familiar with?
    99. REFUSED
    98. DON'T KNOW

A. ENERGY STAR Clothes Washers
B. ENERGY STAR Refrigerators
C. ENERGY STAR Dehumidifiers
D. ENERGY STAR Freezers
E. High Efficiency Electric Water Heaters
F. Electric Heat Pump Water Heaters

Program Awareness & Participation

Now I am going to ask you about a few AEP Ohio energy efficiency programs.

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[INTERVIEWER NOTE: WE WANT TO LEARN WHETHER MARKETING EFFORTS ARE SUCCEEDING SO 'UNAWARE' IS NOT A BAD RESPONSE. AVOID COACHING RESPONDENTS.]

[PROGRAMMING NOTE: ASK ALL RESPONDENTS ABOUT PROGRAM A (APPLIANCE RECYCLING). THEN PLEASE RANDOMLY SELECT SIXOF THE REMAINING ELEVENPROGRAMS TO ASK RESPONDENTS ABOUT. THERE SHOULD BE APPROXIMATELY EQUAL SETS OF RESPONDENTS WHO GET ASKED ABOUT EACH OF THE REMAINING ELEVENPROGRAMS.]

[PROGRAMMING: ASK Q32-36b FOR EACH 'PROGRAM NAME X' BELOW:

A. The Appliance Recycling Program [Program Description: AEP Ohio picks up and recycles your old working secondary refrigerator or freezer and provides a $50 or $60 incentive.]
B. The Clothes Washer Rebate Program [Program Description: AEP Ohio offered a $50 rebate for the purchase of a qualifying ENERGY STAR clothes washer purchased between April 1st and December 31st of last year.]
C. The Refrigerator Rebate Program [Program Description: AEP Ohio offered a $50 rebate for the purchase of a qualifying ENERGY STAR refrigerator purchased between April 1st and December 31st of last year.]
D. The Dehumidifier Rebate Program [Program Description: AEP Ohio offered a $25 rebate for the purchase of a qualifying ENERGY STAR dehumidifier purchased between April 1st and December 31st of last year.]
E. The Freezer Rebate Program [Program Description: AEP Ohio offered a $50 rebate for the purchase of a qualifying ENERGY STAR freezer purchased between April 1st and December 31st of last year.]
F. The High Efficiency Electric Water Heater Program [Program description: AEP Ohio offered a $50 rebate for the purchase of a qualifying high efficiency electric water heater purchased between April 1st and December 31st of last year.]
G. The Electric Heat Pump Water Heater Program [Program description: AEP Ohio offered a $300 rebate for the purchase of a qualifying electric heat pump water heater purchased between April 1st and December 31st of last year.]
H. The In-home Energy Program. [Program description: AEP Ohio provides professional in-home assessments of energy use in your home for a small fee. Several energy-saving items are installed, and you are provided with recommendations for improvements to make your home more comfortable and energy efficient.]
I. Online Energy Checkup [Program description: AEP Ohio provides a free online tool to help you find ways to make your home more energy efficient. A free energy-efficiency kit is then mailed to your home.]

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J. Community Assistance Program [Program description: Customers enrolled in an AEP Ohio payment assistance plan can receive free energy efficiency and repair services for their home.]
K. ENERGY STAR New Homes Program [Program description: If you are interested in building a new home, a participating builder works with you to build an ENERGY STAR® New Home, which can help you reduce your energy usage by as much as 35%.]
L. E3 Smart Program [Program description: AEP Ohio provides energy efficiency education curriculum to schools in the AEP Ohio service area for children in grades 5 through 12.]

32. How aware of [PROGRAM NAME X] are you? For this program, [INSERT PROGRAM DESCRIPTION]. Would you say you are not at all aware, somewhat aware, or very aware of this program?
    1. NOT AT ALL AWARE [**SKIP TO NEXT PROGRAM NAME]**
    2. SOMEWHAT AWARE
    3. VERY AWARE
    99. REFUSED [**SKIP TO NEXT PROGRAM NAME]**
    98. DON'T KNOW [**SKIP TO NEXT PROGRAM NAME]**

33. How did you first become aware of this program? **[DO NOT READ RESPONSE LIST.]**
    1. BILL INSERT
    2. IN-STORE DEMONSTRATION/BOOTH
    3. IN-STORE SIGNAGE
    4. STORE SALES ASSOCIATE
    5. FRIEND OR FAMILY MEMBER
    6. TELEVISION COMMERCIAL
    7. RADIO COMMERCIAL
    8. OTHER ADVERTISEMENT
    9. AEP OHIO WEBSITE
    97. OTHER [RECORD VERBATIM]
    99. REFUSED
    98. DON'T KNOW

34. Have you ever participated in the [PROGRAM NAME X]?
    1. YES [**SKIP TO NEXT PROGRAM NAME]**
    2. NO
    99. REFUSED [**SKIP TO NEXT PROGRAM NAME]**
    98. DON'T KNOW

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35. How interested would you be in participating in this program? Would you say you are: **[READ LIST 1-3]**
    1. Not at all interested
    2. Somewhat interested or
    3. Very interested
    99. REFUSED
    98. DON'T KNOW

(ASK IF Q34=2)

36. **[ASK ONLY FOR PROGRAMS A – G]** Why haven't you participated in the [PROGRAM NAME X]? **[ACCEPT MULTIPLE ANSWERS] (DO NOT READ)**
    1. HAD ALREADY PURCHASED PROGRAM EQUIPMENT
    2. PROGRAM HAS EXPIRED
    3. COST OF NEW APPLIANCE/CAPITAL CONSTRAINTS
    4. EXISTING EQUIPMENT STILL WORKS
    5. DON'T HAVE AN EXTRA APPLIANCE TO RECYCLE
    6. COST EFFECTIVENESS CONCERNS
    7. RELIABILITY CONCERNS
    8. SAFETY CONCERNS
    9. DON'T NEED PROGRAM EQUIPMENT
    10. REBATES TAKE TOO LONG TO GET
    11. TAKES TOO LONG TO GET APPLIANCES RECYCLED
    12. RENT HOME/APARTMENT, AND LANDLORD TAKES CARE OF APPLIANCES
    97. OTHER [SPECIFY REASON/RECORD VERBATIM]
    99. REFUSED
    98. DON'T KNOW

36b. **[ASK ONLY FOR PROGRAMS H – L AND IF Q35 = 2 OR 3]** Would you like us to provide your contact information to AEP Ohio so they can send more information to you about this program?

    1. YES
    2. NO
    99. REFUSED
    98. DON'T KNOW

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Non-Rebated Appliance Purchases

37. Have you purchased any of the following appliances in the past year? **[READ LIST; INDICATE ALL THAT APPLY]**
    1. Clothes Washer
    2. Refrigerator
    3. Dehumidifier
    4. Freezer
    5. Electric water heater
    6. Electric heat pump water heater
    96. NONE OF THESE [**SKIP TO Q42]**
    99. REFUSED [**SKIP TO Q42]**
    98. DON'T KNOW [**SKIP TO Q42]**

PROGRAMMING NOTE: RECORD ALL APPLIANCES CHOSEN IN Q37 AS APPLIANCE1 THROUGH APPLIANCE6. ASK QUESTIONS Q38– Q41 FOR EACH [APPLIANCE] CHOSEN IN Q37]

38. Was this [APPLIANCE] an ENERGY STAR or high efficiency [APPLIANCE]?
    1. Yes
    2. No **[SKIP TO NEXT APPLIANCE]**
    99. REFUSED
    98. DON'T KNOW

39. Did AEP Ohio offer a rebate on this [APPLIANCE], at the time you purchased it?
    1. Yes
    2. No **[SKIP TO NEXT APPLIANCE]**
    99. REFUSED **[SKIP TO NEXT APPLIANCE]**
    98. DON'T KNOW **[SKIP TO NEXT APPLIANCE]**

40. Did you mail in your [APPLIANCE] rebate form?
    1. Yes **[SKIP TO NEXT APPLIANCE]**
    2. No
    99. REFUSED **[SKIP TO NEXT APPLIANCE]**
    98. DON'T KNOW **[SKIP TO NEXT APPLIANCE]**

41. I'm going to read a statement about the [APPLIANCE] that you purchased on your own, without sending in your AEP Ohio rebate form. On a 1 to 5 scale, with 1 being strongly disagree and 5 being strongly agree, how much do you agree with the

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following statement: "The rebate from AEP Ohio was a critical factor in my decision to purchase the [appliance type]."

1. 1 [STRONGLY DISAGREE] **[SKIP TO NEXT APPLIANCE]**
2. 2 **[SKIP TO NEXT APPLIANCE]**
3. 3 **[SKIP TO NEXT APPLIANCE]**
4. 4 **[SKIP TO NEXT APPLIANCE]**
5. 5 [STRONGLY AGREE] **[SKIP TO NEXT APPLIANCE]**

99. REFUSED **[SKIP TO NEXT APPLIANCE]**
98. DON'T KNOW **[SKIP TO NEXT APPLIANCE]**

42. Do you plan to purchase any of the following appliances in the next six months? **[READ LIST; INDICATE ALL THAT APPLY] [DO NOT ASK ABOUT APPLIANCES FOR WHICH Q37 = "YES."]**

1. Clothes Washer
2. Refrigerator
3. Dehumidifier
4. Freezer
5. Electric water heater
6. Electric heat pump water heater
7. Air purifier
8. Dish washer

96. NONE OF THESE
99. REFUSED
98. DON'T KNOW

Satisfaction with AEP Ohio

45. How satisfied are you with AEP Ohio as an electric provider? Would you say you are:

1. Very dissatisfied
2. Somewhat dissatisfied
3. Neither satisfied nor dissatisfied [**SKIP TO Q47]**
4. Somewhat satisfied [**SKIP TO Q47]**
5. Very satisfied [**SKIP TO Q47]**

99. REFUSED [**SKIP TO Q47]**
98. DON'T KNOW

46. Why did you rate it that way?

[RECORD VERBATIM]

99. REFUSED
98. DON'T KNOW

NAVIGANT

Background Information

I only have a few questions left. I just need to get a little information about your home.

47. Which of the following describes your home / residence? Is it a:
    1. Single-family home, detached construction [NOT A DUPLEX, TOWNHOME, OR APARTMENT; ATTACHED GARAGE IS OK]
    2. Factory manufactured/modular home [single family]
    3. Mobile home [single family]
    4. Row House
    5. Two or Three family attached residence
    6. Apartment (4 + families)
    7. Condominium

    97.Other [SPECIFY]
    99. REFUSED
    98. DON'T KNOW

48. Do you own or rent this residence?
    1. OWN **[SKIP TO Q50]**
    2. RENT

    99. REFUSED **[SKIP TO Q50]**

49. Do you pay your own electric bill or is it included in your rent?
    1. PAY ELECTRIC BILL
    2. INCLUDED IN RENT

    99. REFUSED
    98. DON'T KNOW

50. Approximately when was your home constructed? [DO NOT READ]
    1. Before 1960
    2. 1960-1969
    3. 1970-1979
    4. 1980-1989
    5. 1990-1999
    6. 2000-2005
    7. 2006 or later

    99. REFUSED
    98. DON'T KNOW

51. How many square feet is the above-ground living space (IF NECESSARY: this excludes any kind of basement)?
    [NUMERIC OPEN END. RANGE: 10-99,997] **[SKIP TO Q52]**
    99. REFUSED **[ASK Q51A]**
    98. DON'T KNOW **[ASK Q51A]**

51A.**[IF Q51 = 98 or 99]**Would you estimate the above-ground living space is about:

1. less than 1,000 sqft
2. 1,001-2,000 sqft
3. 2,001-3,000 sqft
4. 3,001-4,000 sqft
5. 4,001-5,000 sqft, or
6. Greater than 5,000 sqft?
    99. REFUSED
    98. DON'T KNOW

52. How many square feet of conditioned living space is below-ground (IF NECESSARY: this includes walk out basements)?
    [NUMERIC OPEN END. RANGE: 10-99,999] **[SKIP TO 53]**
    99.REFUSED**[ASK Q52A]**
    98. DON'T KNOW**[ASK Q52A]**

52A.**[IF Q52 = 98 or 99]**Would you estimate the below-ground living space is about:

1. less than 1,000 sqft
2. 1,001-2,000 sqft
3. 2,001-3,000 sqft
4. 3,001-4,000 sqft
5. 4,001-5,000 sqft
6. Greater than 5,000 sqft
    99. REFUSED
    98. DON'T KNOW

53. How long have you lived at your current residence?
    ## **[RECORD YEARS]**
    00. LESS THAN 1 YEAR
    99. REFUSED

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54. How many people live in your household year-round? [1-100]
    ## **[NUMERIC OPEN END]**
    99. REFUSED
    98. DON'T KNOW

55. Which range does your age fall into? Are you…? **[READ LIST]**
1. Under 18
2. 18-24
3. 25-34
4. 35-44
5. 45-54
6. 55-64
7. 65-74
8. 75-84
9. 85 or older
    99. REFUSED
    98. DON'T KNOW

56. What is the highest level of education you have completed? **[READ RESPONSE LIST]**
    1. Less than high school
    2. High school graduate or equivalent (e.g., ged)
    3. Attended some college (includes junior/community college)
    4. Bachelors degree
    5. Advanced degree **[specify]**
    6. Technical or trade school
    97.OTHER **[SPECIFY]**
    99. REFUSED
    98. DON'T KNOW

57. Was your total family income in 2011 before taxes <u>under or over</u>$50,000?

    1. UNDER $50,000
    2. OVER $50,000 **[SKIP TO 59]**
    3. EXACTLY $50,000 **[SKIP TO Q60]**
    99. REFUSED**[SKIP TO Q60]**
    98. DON'T KNOW**[SKIP TO Q60]**

58. **[ASK IF Q57 = 1]**Was it under $15,000, between $15,000 and $30,000 or between $30,000 and $50,000? **[INTERVIEWER NOTE: IF EXACTLY $30,000 ENTER AS '3. $30,000-$50,000']**

    1. UNDER $15,000 **[SKIP TO Q60]**

2. $15,000-$30,000 **[SKIP TO Q60]**
3. $30,000-$50,000 **[SKIP TO Q60]**
99. REFUSED**[SKIP TO Q60]**
98. DON'T KNOW**[SKIP TO Q60]**

59. **[ASK IF Q57 = 2]** Was it between $50,000 and $75,000, or between $75,000 and $100,000, or was it over $100,000? **[INTERVIEWER NOTE: IF EXACTLY $75,000 ENTER AS '2. $75,000-$100,000'. IF EXACTLY $100,000, ENTER AS '3. OVER $100,000']**

1. $50,000-$75,000
2. $75,000-$100,000
3. OVER $100,000
99. REFUSED
98. DON'T KNOW

60. [DON'T ASK BUT RECORD THE GENDER OF THE RESPONDENT]

1. Male
2. Female
98. DON'T KNOW (Cannot tell by voice or inflection)

Thank You & Terminate

Those are all the questions that we have. On behalf of AEP Ohio, I'd like to thank you very much for taking the time to participate in this study.

NAVIGANT

A.4 AEP Ohio Efficient Products Appliance Rebate Participant Survey

INTRODUCTION AND SCREENER

INTRO: May I please speak with **<CONTACT>**?

Hello, this is **<INTERVIEWER NAME>** from DataPrompt International calling on behalf of AEP Ohio, your electric utility. We are contacting customers who received a rebate from AEP Ohio for purchasing a new **<PRODUCT TYPE>.**

Are you the person who was most involved and familiar with the decision to purchase a new **<PRODUCT TYPE>**? **[IF NOT: May I please speak with the person who was most involved with the purchase decision? REPEAT INTRO WITH NEW PERSON]**

[CONTINUE WITH RIGHT PERSON]: We are conducting a study to evaluate AEP Ohio's appliance rebate program and would like to include your opinions. This is required by the Public Utilities Commission of Ohio and will be used to verify the effectiveness of the program and to make improvements to the program.

[IF NEEDED]: It will take about 15 minutes.

This call may be monitored or recorded for quality purposes, but all of your responses are confidential and will only be reported anonymously.

SECTION A: SCREENING & BACKGROUND

A1. Is your electric company AEP Ohio, Ohio Power (OP), Columbus Southern Power (CSP) or another company?

1. AEP OHIO, OHIO POWER COMPANY (OPC) OR COLUMBUS SOUTHERN POWER (CSP)
2. ANOTHER COMPANY (SPECIFY) **[TERMINATE]**

98. DON'T KNOW **[TERMINATE]**
99. REFUSED **[TERMINATE]**

A2a. According to our records, you bought a/an **<PRODUCT TYPE>** at **<STORE NAME>** on **<PURCHASE DATE>**. Is that correct?

1. YES **[SKIP TO E1a]**
2. NO, DID NOT PURCHASE a/an **<PRODUCT TYPE>**

98. DON'T KNOW **[TERMINATE]**

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99. REFUSED [**TERMINATE**]

A2b. Did someone in your household purchase a/an **<PRODUCT TYPE>** at **[STORE NAME]**?

1. YES
2. NO, DID NOT PURCHASE A/AN <**PRODUCT TYPE**> [**TERMINATE]**
98. DON'T KNOW **[TERMINATE]**
99. REFUSED [**TERMINATE**]

A2c. May I speak with them?

1. YES
2. NO [ASK FOR A GOOD TIME TO CALL BACK]
98. DON'T KNOW [ASK FOR A GOOD TIME TO CALL BACK]
99. REFUSED [**TERMINATE**]

A2d. According to our records, you bought a/an **<PRODUCT TYPE>** at **<STORE NAME>** on **<PURCHASE DATE>.** Is that correct?

1. YES
2. NO [TERMINATE]
98. DON'T KNOW **[TERMINATE]**
99. REFUSED [**TERMINATE**]

E1a. How did you **first** find out that AEP Ohio was offering rebates for the purchase of a/an **<PRODUCT TYPE>**?
[DO NOT READ; ACCEPT SINGLE RESPONSE ONLY]

1. UTILITY MAILING/BILL INSERT
2. THE AEP OHIO WEBSITE
3. SIGNS IN THE STORE, ON THE PRODUCT OR IN STORE AISLE
4. A STORE EMPLOYEE MADE ME AWARE OF THE DISCOUNT
5. TELEVISION
6. NEWSPAPER
7. COMMUNITY EVENT (SUCH AS HOME SHOW, FAIR, OR FESTIVAL)
8. PLUMBER OR CONTRACTOR
9. RADIO
97. OTHER [SPECIFY: ____________]
98. DON'T KNOW **[SKIP TO A2e]**
99. REFUSED [SKIP TO A2e]

E1b. Have you learned about the AEP Ohio appliance discounts from any of these other sources…? **[READ RESPONSES 1 THROUGH 9; DON'T READ RESPONSE SELECTED IN E1a; MULTIPLE RESPONSES ACCEPTED]**

1. UTILITY MAILING/BILL INSERT
2. THE AEP OHIO WEBSITE
3. SIGNS IN THE STORE, ON THE PRODUCT OR IN STORE AISLE
4. A STORE EMPLOYEE

5. TELEVISION
6. NEWSPAPER
7. COMMUNITY EVENT, SUCH AS HOME SHOW, FAIR, OR FESTIVAL
8. PLUMBER OR CONTRACTOR
9. RADIO
10. NONE/NO OTHER WAY
97. OR ANY OTHER WAY? [SPECIFY: ____________]
98. DON'T KNOW
99. REFUSED

[ASK A2e IF <PRODUCT TYPE> = FREEZER, ELSE SKIP TO A2f]

A2e. Prior to purchasing this ENERGY STAR freezer, were you…**[READ LIST]**
1. NOT AT ALL FAMILIAR WITH ENERGY STAR FREEZERS
2. SOMEWHAT FAMILIAR WITH ENERGY STAR FREEZERS OR
3. VERY FAMILIAR WITH ENERGY STAR FREEZERS
98. DON'T KNOW
99. REFUSED

[ASK A2f IF <PRODUCT TYPE> = ELECTRIC WATER HEATER, ELSE SKIP TO A2g]

A2f. Prior to purchasing this **<PRODUCT TYPE>**, were you…**[READ LIST]**
1. NOT AT ALL FAMILIAR WITH HIGH EFFICIENCY ELECTRIC WATER HEATERS
2. SOMEWHAT FAMILIAR WITH HIGH EFFICIENCY ELECTRIC WATER HEATERS
3. VERY FAMILIAR WITH HIGH EFFICIENCY ELECTRIC WATER HEATERS
98. DON'T KNOW
99. REFUSED

[ASK A2g IF <PRODUCT TYPE> = HEAT PUMP WATER HEATER]

A2g. Prior to purchasing this **<PRODUCT TYPE>**, were you…**[READ LIST]**
1. NOT AT ALL FAMILIAR WITH HEAT PUMP WATER HEATERS
2. SOMEWHAT FAMILIAR WITH HEAT PUMP WATER HEATERS OR
3. VERY FAMILIAR WITH HEAT PUMP WATER HEATERS
98. DON'T KNOW
99. REFUSED

SECTION B: IMPACT EVALUATION

[IF <PRODUCT TYPE> = ELECTRIC WATER HEATER OR HEAT PUMP WATER HEATER SKIP TO BWH.INTRO]

NAVIGANT

FREEZER QUESTIONS

BF.INTRO: The next several questions concern the ENERGY STAR freezer for which you received a rebate from AEP Ohio.

BF1a. Thinking about how you will be using this new freezer, will this freezer be plugged in and running…? **[READ FROM LIST; RECORD ONLY ONE RESPONSE]**

1. ALL THE TIME **[SKIP TO C1]**
2. FOR SPECIAL OCCASIONS ONLY
3. DURING CERTAIN MONTHS OF THE YEAR, ONLY
4. NEVER PLUGGED IN AND RUNNING **[SKIP TO C1]**
98. DON'T KNOW
99. REFUSED

BF1b. If you add up the total time that you plan on having your new freezer plugged in and running over the next 12 months, about how many total months will that be? Your best estimate is okay.

1. [OPEN ENDED, NUMBER OF MONTHS FROM 1-12]
13. LESS THAN 1 MONTH
98. DON'T KNOW
99. REFUSED

BF1c. Will you be using your freezer during the summer or will it mainly be running during other times of year? **[ONLY RECORD ONE RESPONSE]**

1. RUNNING DURING THE SUMMER
2. MAINLY RUNNING OTHER TIMES OF THE YEAR
3. A MIX OF BOTH SUMMER AND OTHER TIMES OF YEAR
98. DON'T KNOW
99. REFUSED

[IF <PRODUCT TYPE> = FREEZER, SKIP TO C1]

WATER HEATER QUESTIONS

BWH.INTRO. The next several questions concern the water heater for which you received a rebate from AEP Ohio.

BWH1. In terms of gallons, what is the capacity of your new water heater?

1. 30 gallons
2. 40 gallons
3. 50 gallons
4. 55 gallons

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5. 60 gallons
6. 66 gallons
7. 80 gallons
97. OTHER [SPECIFY___________]
98. DON'T KNOW
99. REFUSED

BWH2a. Between 3PM and 6PM on summer weekdays, does anyone in your household use any hot water? [IF NEEDED: Hot water might be used if you run the dishwasher, use the clothes washer, take a shower, or draw a bath.]

1. YES
2. NO **[SKIP TO BWH3]**
3. SOMETIMES
98. DON'T KNOW **[SKIP TO BWH3]**
99. REFUSED **[SKIP TO BWH3]**

BWH2b. Between 3PM and 6PM on summer weekdays, about what percentage of the time, on average, is hot water used? Your best guess is fine.
[IF NEEDED: In other words, across all weekday afternoons in the summer, during the 3-hour block of time from 3PM to 6PM, what percentage of all of that time is hot water used? For example, if hot water is used for 1 hour of the 3-to-6PM time block, on each day, that would be about 33%. One hour on just one weekday afternoon per week would be about 7% of the time.]
[ONLY RECORD ONE RESPONSE]

1. ALWAYS (VERIFY HOT WATER IS USED 100% OF THE TIME FROM 3PM TO 6PM ON SUMMER WEEKDAYS)
2. 75% to 99% of the time
3. 50% to 74% of the time
4. 25% to 49% of the time
5. 1% to 24% of the time
6. NEVER (VERIFY 0%; IF NECESSARY, CHANGE RESPONSE TO BWH2A TO "NO.")
98. DON'T KNOW
99. REFUSED

[SHOW BWH3-BWH5 ONLY IF <PRODUCT TYPE>=Heat pump water heater; ELSE SKIP TO C1]
BWH3. What mode is the water heater typically set in? [LIST RESPONSE OPTIONS 1-3 IF NEEDED]

1. HYBRID
2. HEAT PUMP ONLY
3. ELECTRIC RESISTANCE ONLY
97. OTHER; [SPECIFY_____________]

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98. DON’T KNOW
99. REFUSED

BWH4. Where in your house is the water heater installed? [ONLY RECORD ONE RESPONSE]
1. GARAGE [SKIP TO C1]
2. BASEMENT
3. OTHER ROOM
98. DON’T KNOW **[SKIP TO C1]**
99. REFUSED **[SKIP TO C1]**

BWH5. Is that a conditioned space, meaning that your air conditioner or heater work in that space?
1. YES
2. NO
98. DON’T KNOW
99. REFUSED

SECTION C: ADDITIONAL APPLIANCE PURCHASES

C1. In addition to the **<PRODUCT TYPE> we already discussed,** have you purchased and installed any other appliances within the past 12 months? This can include other types of appliances.
1. YES
2. NO [SKIP TO D.INTRO]
98. DON’T KNOW [SKIP TO D.INTRO]
99. REFUSED [SKIP TO D.INTRO]

C2. Which appliances have you purchased within the past 12 months? (IF RESPONSE IS “WATER HEATER,” SPECIFY WHETHER ELECTRIC, GAS, OR HEAT PUMP – CODE ELECTRIC WATER HEATER AS “5” – CODE <u>GAS</u> WATER HEATER AS “OTHER” – CODE HEAT PUMP WATER HEATER AS “6”)
[EXCLUDE <PRODUCT TYPE> FROM CHOICES BELOW]
[RECORD MULTIPLE RESPONSES]
1. FREEZER
2. CLOTHES WASHER
3. REFRIGERATOR
4. DEHUMIDIFIER
5. ELECTRIC WATER HEATER
6. ELECTRIC HEAT PUMP WATER HEATER
97. OTHER [SPECIFY___________]
98. DON’T KNOW [SKIP TO D.INTRO]
99. REFUSED [SKIP TO D.INTRO]

NAVIGANT

FREEZER

[SHOW ONLY IF C2 = 1, ELSE SKIP TO NEXT APPLIANCE SELECTED IN C2]

C3a. Was the **freezer** labeled as ENERGY STAR?
1. YES
2. NO [SKIP TO C4a]
98. DON'T KNOW **[SKIP TO C4a]**
99. REFUSED [SKIP TO C4a]

C3b. Did AEP Ohio offer a rebate for the **freezer**?
1. YES
2. NO [SKIP TO C4a]
98. DON'T KNOW **[SKIP TO C4a]**
99. REFUSED [SKIP TO C4a]

C3c. Did you mail in an AEP Ohio rebate form for the **freezer**?
1. YES [SKIP TO C4a]
2. NO [SKIP TO C3d]
98. DON'T KNOW **[SKIP TO C4a]**
99. REFUSED [SKIP TO C4a]

C3d. I'm going to read a statement about the **freezer** that you purchased on your own, without sending in your AEP Ohio rebate form. On a scale from 1 to 5, with 1 indicating that you strongly disagree, and 5 indicating that you strongly agree, please rate the following statement: My purchase of the AEP Ohio rebated **<PRODUCT TYPE>** influenced my decision to purchase the **freezer**.
1. 1 [STRONGLY DISAGREE]
2. 2
3. 3
4. 4
5. 5 [STRONGLY AGREE]
98. DON'T KNOW
99. REFUSED

CLOTHES WASHER

[SHOW ONLY IF C2 = 2, ELSE SKIP TO NEXT APPLIANCE SELECTED IN C2]

C4a. Was the **clothes washer** labeled as ENERGY STAR?
1. YES
2. NO [SKIP TO C5a]
98. DON'T KNOW **[SKIP TO C5a]**

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99. REFUSED [SKIP TO C5a]

C4b. Did AEP Ohio offer a rebate for the **clothes washer**?
1. YES
2. NO [SKIP TO C5a]
98. DON'T KNOW **[SKIP TO C5a]**
99. REFUSED **[SKIP TO C5a]**

C4c. Did you mail in an AEP Ohio rebate form for the **clothes washer**?
1. YES [SKIP TO C5a]
2. NO [SKIP TO C4d]
98. DON'T KNOW **[SKIP TO C5a]**
99. REFUSED [SKIP TO C5a]

C4d. I'm going to read a statement about the **clothes washer** that you purchased on your own, without sending in your AEP Ohio rebate form. On a scale from 1 to 5, with 1 indicating that you strongly disagree, and 5 indicating that you strongly agree, please rate the following statement: My purchase of the AEP Ohio rebated **<PRODUCT TYPE>** influenced my decision to purchase the **clothes washer.**
1. 1 [STRONGLY DISAGREE]
2. 2
3. 3
4. 4
5. 5 [STRONGLY AGREE]
98. DON'T KNOW
99. REFUSED

REFRIGERATOR

[SHOW ONLY IF C2 = 3, ELSE SKIP TO NEXT APPLIANCE SELECTED IN C2]

C5a. Was the **refrigerator** labeled as ENERGY STAR?
1. YES
2. NO [SKIP TO C6a]
98. DON'T KNOW **[SKIP TO C6a]**
99. REFUSED [SKIP TO C6a]

C5b. Did AEP Ohio offer a rebate for the **refrigerator**?
1. YES
2. NO [SKIP TO C6a]
98. DON'T KNOW **[SKIP TO C6a]**
99. REFUSED **[SKIP TO C6a]**

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C5c. Did you mail in an AEP Ohio rebate form for the **refrigerator**?
1. YES [SKIP TO C6a]
2. NO [SKIP TO C5d]
98. DON'T KNOW **[SKIP TO C6a]**
99. REFUSED [SKIP TO C6a]

C5d. I'm going to read a statement about the **refrigerator** that you purchased on your own, without sending in your AEP Ohio rebate form. On a scale from 1 to 5, with 1 indicating that you strongly disagree, and 5 indicating that you strongly agree, please rate the following statement: My purchase of the AEP Ohio rebated **<PRODUCT TYPE>** influenced my decision to purchase the **refrigerator.**
1. 1 [STRONGLY DISAGREE]
2. 2
3. 3
4. 4
5. 5 [STRONGLY AGREE]
98. DON'T KNOW
99. REFUSED

DEHUMIDIFIER

[SHOW ONLY IF C2 = 4, ELSE SKIP TO NEXT APPLIANCE SELECTED IN C2]

C6a. Was the **dehumidifier** labeled as ENERGY STAR?
1. YES
2. NO [SKIP TO C7a]
98. DON'T KNOW **[SKIP TO C7a]**
99. REFUSED [SKIP TO C7a]

C6b. Did AEP Ohio offer a rebate for the **dehumidifier**?
1. YES
2. NO [SKIP TO C7a]
98. DON'T KNOW **[SKIP TO C7a]**
99. REFUSED [SKIP TO C7a]

C6c. Did you mail in an AEP Ohio rebate form for the **dehumidifier**?
1. YES [SKIP TO C7a]
2. NO [SKIP TO C6d]
98. DON'T KNOW **[SKIP TO C7a]**
99. REFUSED [SKIP TO C7a]

C6d. I'm going to read a statement about the **dehumidifier** that you purchased on your own, without sending in your AEP Ohio rebate form. On a scale from 1 to 5, with 1 indicating that

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you strongly disagree, and 5 indicating that you strongly agree, please rate the following statement: My purchase of the AEP Ohio rebated **<PRODUCT TYPE>** influenced my decision to purchase the **dehumidifier.**

1. 1 [STRONGLY DISAGREE]
2. 2
3. 3
4. 4
5. 5 [STRONGLY AGREE]
98. DON'T KNOW
99. REFUSED

ELECTRIC WATER HEATER

[SHOW ONLY IF C2 = 5, ELSE SKIP TO NEXT APPLIANCE SELECTED IN C2]

C7a. Does the **electric water heater** have an Energy Factor of 0.95 or higher?

1. YES [SKIP TO C7c]
2. NO [SKIP TO C8a]
98. DON'T KNOW
99. REFUSED [SKIP TO C8a]

C7b. Is the water heater a high-efficiency unit?

1. YES
2. NO [SKIP TO C8a]
98. DON'T KNOW **[SKIP TO C8a]**
99. REFUSED [SKIP TO C8a]

C7c. Did AEP Ohio offer a rebate for the **electric water heater**?

1. YES
2. NO [SKIP TO C8a]
98. DON'T KNOW **[SKIP TO C8a]**
99. REFUSED **[SKIP TO C8a]**

C7d. Did you mail in an AEP Ohio rebate form for the **electric water heater**?

1. YES [SKIP TO C8a]
2. NO [SKIP TO C7e]
98. DON'T KNOW **[SKIP TO C8a]**
99. REFUSED [SKIP TO C8a]

C7e. I'm going to read a statement about the **electric water heater** that you purchased on your own, without sending in your AEP Ohio rebate form. On a scale from 1 to 5, with 1 indicating that you strongly disagree, and 5 indicating that you strongly agree, please rate the following

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statement: My purchase of the AEP Ohio rebated **<PRODUCT TYPE>** influenced my decision to purchase the **electric water heater.**

1. 1 [STRONGLY DISAGREE]
2. 2
3. 3
4. 4
5. 5 [STRONGLY AGREE]
98. DON'T KNOW
99. REFUSED

ELECTRIC HEAT PUMP WATER HEATER

[SHOW ONLY IF C2 = 6, ELSE SKIP TO NEXT APPLIANCE SELECTED IN C2]

C8a. Did AEP Ohio offer a rebate for the **electric heat pump water heater**?

1. YES
2. NO [SKIP TO C9a]
98. DON'T KNOW **[SKIP TO C9a]**
99. REFUSED **[SKIP TO C9a]**

C8b. Did you mail in an AEP Ohio rebate form for the **electric heat pump water heater**?

1. YES [SKIP TO C9a]
2. NO [SKIP TO C8c]
98. DON'T KNOW **[SKIP TO C9a]**
99. REFUSED [SKIP TO C9a]

C8c. I'm going to read a statement about the **electric heat pump water heater** that you purchased on your own, without sending in your AEP Ohio rebate form. On a scale from 1 to 5, with 1 indicating that you strongly disagree, and 5 indicating that you strongly agree, please rate the following statement: My purchase of the AEP Ohio rebated **<PRODUCT TYPE>** influenced my decision to purchase the **electric heat pump water heater.**

1. 1 [STRONGLY DISAGREE]
2. 2
3. 3
4. 4
5. 5 [STRONGLY AGREE]
98. DON'T KNOW
99. REFUSED

OTHER APPLIANCE

[SHOW ONLY IF C2 = 7, ELSE SKIP TO D.INTRO]

NAVIGANT

C9a. Was the **["OTHER" APPLIANCE INDICATED IN C2]** labeled as ENERGY STAR?
1. YES
2. NO [SKIP TO D.INTRO]
98. DON'T KNOW [SKIP TO D.INTRO]
99. REFUSED [SKIP TO D.INTRO]

C9b. Did AEP Ohio offer a rebate for the **["OTHER" APPLIANCE INDICATED IN C2]**(s)**?**
1. YES
2. NO [SKIP TO D.INTRO]
98. DON'T KNOW [SKIP TO D.INTRO]
99. REFUSED [SKIP TO D.INTRO]

C9c. Did you mail in an AEP Ohio rebate form for the **["OTHER" APPLIANCE INDICATED IN C2]?**
1. YES [SKIP TO D.INTRO]
2. NO [SKIP TO C9d]
98. DON'T KNOW [SKIP TO D.INTRO]
99. REFUSED [SKIP TO D.INTRO]

C9d. I'm going to read a statement about the **["OTHER" APPLIANCE INDICATED IN C2]** that you purchased on your own, without sending in your AEP Ohio rebate form. On a scale from 1 to 5, with 1 indicating that you strongly disagree, and 5 indicating that you strongly agree, please rate the following statement: My purchase of the AEP Ohio rebated **<PRODUCT TYPE>** influenced my decision to purchase the **["OTHER" APPLIANCE INDICATED IN C2].**
1. 1 [STRONGLY DISAGREE]
2. 2
3. 3
4. 4
5. 5 [STRONGLY AGREE]
98. DON'T KNOW
99. REFUSED

SECTION D: PARTICIPATION DRIVERS

D.INTRO. Now I am going to ask you some additional questions about the **<PRODUCT TYPE>** you purchased.

D1. If the rebate from AEP Ohio had not been available, would you still have purchased a/an **<PRODUCT TYPE>** …**[READ RESPONSES]**
1. AT THE SAME TIME
2. WITHIN A FEW MONTHS
3. WITHIN A YEAR
4. MORE THAN A YEAR LATER, **[SKIP TO E2A]**
5. OR NOT AT ALL **[SKIP TO E2A]**

NAVIGANT

98. DON'T KNOW [DO NOT READ -- SKIP TO E2A]
99. REFUSED [DO NOT READ -- SKIP TO E2A]

D2. If the rebate from AEP Ohio had not been available would you still have purchased the **same** **<PRODUCT TYPE>?**

1. YES [SKIP TO D4]
2. NO
88. DON'T KNOW
99. REFUSED

[ASK D3a IF <PRODUCT TYPE> = FREEZER; ELSE SKIP TO D4]

D3a. Would you still have purchased an ENERGY STAR **freezer?**

1. YES
2. NO
3. WHAT IS AN ENERGY STAR FREEZER?
98. DON'T KNOW
99. REFUSED

[ASK D3b IF <PRODUCT TYPE> = ELECTRIC WATER HEATER; ELSE SKIP TO D4]

D3b. Would you still have purchased a high-efficiency electric water heater**?**

1. YES
2. NO
3. WHAT IS A HIGH EFFICIENCY ELECTRIC WATER HEATER?
98. DON'T KNOW
99. REFUSED

D4. On a 1 to 5 scale, with 1 being not at all likely and 5 being very likely, how likely is it that you would have purchased the same **<PRODUCT TYPE>** if the AEP Ohio rebate was not available?

1. 1 [NOT AT ALL LIKELY]
2. 2
3. 3
4. 4
5. 5 [VERY LIKELY]
98DON'T KNOW
99. REFUSED

D5. On a 1 to 5 scale, with 1 being strongly disagree and 5 being strongly agree, how much do you agree with the following statement: The rebate from AEP Ohio was a critical factor in my decision to purchase this particular **<PRODUCT TYPE>.**

1. 1 [STRONGLY DISAGREE]

2. 2
3. 3
4. 4
5. 5 [STRONGLY AGREE]
98. DON'T KNOW
99. REFUSED

SECTION E: PROCESS

E2a. [ASK IF E1A ≠ 4 AND E1B ≠ 4; ELSE, SKIP TO E2AA] Did a sales associate at the store ever talk to you about the rebate available for the **<PRODUCT TYPE>**s?

1. YES
2. NO **[SKIP TO E3A]**
98. DON'T KNOW **[SKIP TO E3A]**
99. REFUSED **[SKIP TO E3A]**

E2aa. Did the sales associate at the store tell you about the rebate before or after you had chosen the **<PRODUCT TYPE>** you ended up purchasing?

1. BEFORE
2. AFTER
98. DON'T KNOW
99. REFUSED

E2b. On a 1 to 5 scale, with 1 being not at all knowledgeable and 5 being very knowledgeable, how knowledgeable was the sales associate about the rebate program?

1. 1: NOT AT ALL KNOWLEDGEABLE
2. 2
3. 3 [SKIP TO E2D]
4. 4 [SKIP TO E2D]
5. 5: VERY KNOWLEDGEABLE **[SKIP TO E2D]**
98. DON'T KNOW **[SKIP TO E2D]**
99. REFUSED [SKIP TO E2D]

E2c. What further information would you have liked to receive from the sales associate?

97. [OPEN ENDED RESPONSE]
2. NOTHING MORE
98. DON'T KNOW
99. REFUSED

E2d. On a 1 to 5 scale, with 1 being not at all influential and 5 being very influential, how influential was the sales associate in your decision to buy the **<PRODUCT TYPE>**?

1. 1: NOT AT ALL INFLUENTIAL

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2. 2
3. 3
4. 4
5. 5: VERY INFLUENTIAL
98. DON'T KNOW
99. REFUSED

E3a. [ASK IF E1A ≠ 3 AND E1B ≠ 3; ELSE, SKIP TO E3B] Do you remember seeing any AEP Ohio energy efficiency promotional materials or informational displays at the store that mentioned the rebate for the **<PRODUCT TYPE>**s?

1. YES
2. NO **[SKIP TO E4A]**
98. DON'T KNOW **[SKIP TO E4A]**
99. REFUSED **[SKIP TO E4A]**

E3b. On a 1 to 5 scale, with 1 being not at all influential and 5 being very influential, how influential were the in-store promotional materials in your decision to buy the **<PRODUCT TYPE>** that you purchased?

1. 1: NOT AT ALL INFUENTIAL
2. 2
3. 3
4. 4
5. 5: VERY INFLUENTIAL
98. DON'T KNOW
99.REFUSED

E4a. Next, I'd like you to rate your satisfaction with various aspects of the program. How satisfied were you with the process of applying for your rebate for the **<PRODUCT TYPE>**? Would you say you were: **[READ LIST]**

1. VERY SATISFIED **[SKIP TO E5A]**
2. SOMEWHAT SATISFIED **[SKIP TO E5A]**
3. NEITHER SATISFIED NOR DISSATISFIED **[SKIP TO E5A]**
4. SOMEWHAT DISSATISFIED
5. VERY DISSATISFIED
88. DON'T KNOW **[SKIP TO E5A]**
99. REFUSED [SKIP TO E5A]

E4b. What would have made you more satisfied with the rebate application process?

97. [RECORD RESPONSE]
98. DON'T KNOW
99. REFUSED

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E5a. Once the rebate application was submitted, about how many weeks did it take for you to receive your rebate? **[RECORD ONLY ONE RESPONSE]**

1. **[SPECIFY NUMBER OF WEEKS]** _____________ RANGE[1-97]
98. DON'T KNOW **[SKIP TO E6A]**
99. REFUSED **[SKIP TO E6A]**

E5b. How satisfied were you with how long it took to receive your rebate? Would you say you were…?

1. VERY SATISFIED **[SKIP TO E6A]**
2. SOMEWHAT SATISFIED **[SKIP TO E6A]**
3. NEITHER SATISFIED NOR DISSATISFIED **[SKIP TO E6A]**
4. SOMEWHAT DISSATISFIED
5. VERY DISSATISFIED
98. DON'T KNOW **[SKIP TO E6A]**
99. REFUSED **[SKIP TO E6A]**

E5c. What would have been an appropriate turn-around time for you rebate?

97. **[RECORD RESPONSE]**
98. DON'T KNOW
99. REFUSED

E6a. How satisfied are you with the rebate amount you received from AEP Ohio for the purchase of the **<PRODUCT TYPE>**? Would you say you are: **[READ LIST]**

1. VERY SATISFIED **[SKIP TO E7A]**
2. SOMEWHAT SATISFIED **[SKIP TO E7A]**
3. NEITHER SATISFIED NOR DISSATISFIED **[SKIP TO E7A]**
4. SOMEWHAT DISSATISFIED
5. VERY DISSATISFIED
98. DON'T KNOW **[SKIP TO E7A]**
99. REFUSED [SKIP TO E7A]

E6b. What would have been an appropriate amount for your rebate?

1. [RECORD RESPONSE]
98. DON'T KNOW
99. REFUSED

E7a. In the course of participating in the AEP Ohio program, how often did you contact AEP Ohio or program staff with questions?

1. NEVER [SKIP TO E8AA]
2. ONCE
3. 2 OR 3 TIMES
4. 4 TIMES OR MORE

98. DON'T KNOW
99. REFUSED [SKIP TO E8AA]

E7b. How did you contact them? **[CHECK ALL THAT APPLY]**
1. PHONE
2. EMAIL OR FAX
3. LETTER
4. IN PERSON
5. THROUGH WEBSITE (AEP OHIO OR GRIDSMART)
98. DON'T KNOW
99. REFUSED

E7c. How satisfied are you with your communication with AEP Ohio and program staff? Would you say you were: **[READ LIST]**
1. VERY SATISFIED **[SKIP TO E8AA]**
2. SOMEWHAT SATISFIED **[SKIP TO E8AA]**
3. NEITHER SATISFIED NOR DISSATISFIED **[SKIP TO E8AA]**
4. SOMEWHAT DISSATISFIED
5. VERY DISSATISFIED
98. DON'T KNOW **[SKIP TO E8AA]**
99. REFUSED [SKIP TO E8AA]

E7d. Why were you dissatisfied?
97. [RECORD EXACT RESPONSE]
88. DON'T KNOW
99. REFUSED

[ASK E8aa if PRODUCT TYPE = FREEZER, ELSE SKIP TO E8a]

E8aa. Was the freezer for which you received a rebate from AEP Ohio a replacement freezer? That is, did you get rid of another freezer about the same time that you purchased the new one?
1. YES
2. NO **[SKIP TO E9A]**
98. DON'T KNOW **[SKIP TO E9A]**
99. REFUSED **[SKIP TO E9A]**

[ASK E8a if PRODUCT TYPE = ELECTRIC WATER HEATER or PRODUCT TYPE = HEAT PUMP WATER HEATER or E8aa = YES.]

E8a. Have you noticed any savings on your electric bill since installing your new **<PRODUCT TYPE>**?
1. YES

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2. NO [SKIP TO E9A]
98. DON'T KNOW **[SKIP TO E9A]**
99. REFUSED [SKIP TO E9A]

E8b. How satisfied are you with any savings you noticed on your electric bill since installing your new **<PRODUCT TYPE>?** Would you say you were **[READ FROM LIST]**
1. VERY SATISFIED
2. SOMEWHAT SATISFIED
3. NEITHER SATISFIED NOR DISSATISFIED
4. SOMEWHAT DISSATISFIED
5. VERY DISSATISFIED
98. DON'T KNOW
99. REFUSED

E9a. How satisfied are you with your new **<PRODUCT TYPE>?** Would you say you are: **[READ LIST]**
1. VERY SATISFIED **[SKIP TO E10A]**
2. SOMEWHAT SATISFIED **[SKIP TO E10A]**
3. NEITHER SATISFIED NOR DISSATISFIED **[SKIP TO E10A]**
4. SOMEWHAT DISSATISFIED
5. VERY DISSATISFIED
98. DON'T KNOW **[SKIP TO E10A]**
99. REFUSED [SKIP TO E10A]

E9b. Why aren't you satisfied?
97. [RECORD VERBATIM]
98. DON'T KNOW
99. REFUSED

E10a. If you were rating your overall satisfaction with the AEP Ohio Appliance Rebate Program, would you say you were: **[READ LIST]**
1. VERY SATISFIED
2. SOMEWHAT SATISFIED
3. NEITHER SATISFIED NOR DISSATISFIED
4. SOMEWHAT DISSATISFIED
5. VERY DISSATISFIED
98. DON'T KNOW **[SKIP TO E11]**
99. REFUSED [SKIP TO E11]

E10b. Why do you give it that rating?
1. [RECORD VERBATIM]
98. DON'T KNOW
99. REFUSED

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E11. Do you have any suggestions to improve the program?

97. [RECORD VERBATIM]
2. NO SUGGESTIONS
98. DON'T KNOW
99. REFUSED

E12a. Based on your overall experience with AEP Ohio's service, how satisfied are you with having them as your electric company? Would you say you are: **[READ LIST]**

1. VERY SATISFIED **[SKIP TO F1.INTRO]**
2. SOMEWHAT SATISFIED **[SKIP TO F1.INTRO]**
3. NEITHER SATISFIED NOR DISSATISFIED **[SKIP TO F1.INTRO]**
4. SOMEWHAT DISSATISFIED
5. VERY DISSATISFIED
98. DON'T KNOW [SKIP TO F1.INTRO]
99. REFUSED [SKIP TO F1.INTRO]

E12b. What would make you more satisfied to have AEP Ohio as your electric company?

97. [RECORD RESPONSE]
98. DON'T KNOW
99. REFUSED

SECTION F: BACKGROUND

F1.INTRO. I have just a few questions left for background purposes only.

F1. Which of the following best describes your home/residence? **[READ LIST]**

1. Single-family home, detached construction [NOT A DUPLEX, TOWNHOME, OR APARTMENT; ATTACHED GARAGE IS OK]
2. Factory manufactured/modular home [Single family]
3. Mobile home [Single family]
4. Row House
5. Two or Three family attached residence
6. Apartment building (4 + families)
7. Condominium
8. OTHER [SPECIFY______________________________]
98. DON'T KNOW
99. REFUSED

F2. Do you own or rent this residence?

1. OWN [SKIP TO F3B]
2. RENT
98. DON'T KNOW **[SKIP TO F3B]**
99. REFUSED **[SKIP TO F3B]**

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F3a. Do you pay your own electric bill or is it included in your rent?
1. PAY BILL
2. INCLUDED IN RENT
98. DON'T KNOW
99. REFUSED

F3b. Approximately when was your home constructed? [**DO NOT READ]**
1. Before 1960
2. 1960-1969
3. 1970-1979
4. 1980-1989
5. 1990-1999
6. 2000-2005
7. 2006 OR LATER
98. DON'T KNOW
99. REFUSED

F3c. How many people live in your household ***year-round***? Range[1-20]
1. [NUMERIC OPEN END]
98. DON'T KNOW
99. REFUSED

F4. Which range does your age fall into? Are you…? **[READ LIST]**
1. Under 18
2. 18-24
3. 25-34
4. 35-44
5. 45-54
6. 55-64
7. 65-74
8. 75-84
9. 85 or older
98. DON'T KNOW
99. REFUSED

F5a. How many square feet is the above-ground living space **[IF NECESSARY, THIS EXCLUDES WALK-OUT BASEMENTS]?**
97. **[NUMERICAL OPEN END: RANGE 0-99,999] [SKIP TO F5C]**
98. DON'T KNOW
99. REFUSED

F5b. Would you estimate the above-ground living space is about: **[READ LIST]**
1. Less than 1,000 sqft

2. 1,001-2,000 sqft
3. 2,001-3,000 sqft
4. 3,001-4,000 sqft
5. 4,001-5,000 sqft
6. Greater than 5,000 sqft
98. DON'T KNOW
99. REFUSED

F5c. How many square feet of conditioned living space is below-ground?

[IF NECESSARY: THIS INCLUDES WALKOUT BASEMENTS]

[IF NECESSARY: "CONDITIONED LIVING SPACE" ARE AREAS OF YOUR HOME THAT ARE HEATED OR COOLED]

97. **[NUMERICAL OPEN END: RANGE 0-99,999] [SKIP TO F6]**
98.. DON'T KNOW
99. REFUSED

F5d. Would you estimate the below-ground living space is about:

1. less than 1,000 sqft
2. 1,001-2,000 sqft
3. 2,001-3,000 sqft
4. 3,001-4,000 sqft
5. 4,001-5,000 sqft
6. Greater than 5,000 sqft
98.. DON'T KNOW
99. REFUSED

F6. How long have you lived at your current residence?

1. [RECORD YEARS/MONTHS GIVEN]
98. DON'T KNOW
99. REFUSED

F7. What is the highest level of education you have completed?

1. LESS THAN HIGH SCHOOL
2. HIGH SCHOOL GRADUATE OR EQUIVALENT (E.G. GED)
3. ATTENDED SOME COLLEGE (INCLUDED JUNIOR/COMMUNITY COLLEGE)
4. BACHELORS DEGREE
5. TECHNICAL OR TRADE SCHOOL CERTIFICATE OR DEGREE

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6. ADVANCED DEGREE (MASTERS OR PHD)
77. OTHER, SPECIFY
98. DON'T KNOW
99. REFUSED

F8a. Was your total family income in 2011 before taxes under or over $50,000?

1. UNDER $50,000
2. OVER $50,000 **[SKIP TO F8C]**
3. EXACTLY $50,000 **[SKIP TO END]**
98. DON'T KNOW **[SKIP TO END]**
99. REFUSED **[SKIP TO END]**

F8b. [ASK IF F8A=1] Was it under $15,000, between $15,000 and $30,000 or between $30,000 and $50,000? **[INTERVIEWER NOTE: IF EXACTLY $30,000 ENTER AS '3. $30,000-$50,000']**

1. UNDER $15,000 **[SKIP TO END]**
2. $15,000-$30,000 **[SKIP TO END]**
3. $30,000-$50,000 **[SKIP TO END]**
98. DON'T KNOW **[SKIP TO END]**
99. REFUSED [SKIP TO END]

F8c. [ASK IF F8B=2] Was it between $50,000 and $75,000, or between $75,000 and $100,000, or was it over $100,000? **[INTERVIEWER NOTE: IF EXACTLY $75,000 ENTER AS '2. $75,000-$100,000'. IF EXACTLY $100,000 ENTER AS '3. OVER $100,000']**

1. $50,000-$75,000
2. $75,000-$100,000
3. OVER $100,000
98. DON'T KNOW
99. REFUSED

END. Those are all the questions I have for you today. I want to thank you for taking the time to answer my questions today. Have a great day!

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A.5 AEP Ohio Efficient Products Program Lighting Shelf Survey

Field researcher:	Date & Time:
Store name:	Store address:
Participating store: Yes / No	Store city & zip:

BULB INVENTORIES

Incandescent Inventory

- Standard (A-shape) incandescent bulbs greater than or equal to 100 watts (excluding 3-way bulbs).

Efficient Incandescent/Halogen Inventory

- Standard (A-shape) efficient incandescent/halogen bulbs equivalent to 100-watt standard incandescent bulbs (e.g. 72-watt)

CFL Inventory

- A-lamps
- Spiral
- Globe
- Reflector/Floodlight/Spotlight
- Torpedo/Bullet (w/standard base)
- Tube Style (w/standard base)

LEDs **will not** be inventoried

CODES FOR REFERENCE

Product Type (Column 2)

PRODUCT	CODE
Incandescent	I
CFL	CFL
Efficient Incandescent / Halogen	EI/H

Bulb Style (Column 3)

STYLE NAME	CODE	IMAGE
A-lamp	AL	
Spiral	SP	
Globe	GL	
Reflector/Floodlight/Spotlight	RF	
Torpedo/Bullet	TP	
Tube Style	TU	

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Brand	Product Type	Bulb Style	Wattage (Actual)	Lumens	Model Number	# in Pack	Original Price	Discounted Price	Discount Provider	3-Way?	Dimmable?
										☐	☐
										☐	☐
										☐	☐
										☐	☐
										☐	☐
										☐	☐
										☐	☐

APPENDIX C

APPLIANCE RECYCLING PROGRAM

Program Year 2012 Evaluation Report

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Executive Summary

This report describes the results of an evaluation of the 2012 AEP Ohio Appliance Recycling Program. The Executive Summary provides a high-level description of the program summary, key impact findings, key process findings, and recommendations stemming from these findings. Detailed methodology and findings are contained in the body of the report following this Executive Summary. In 2012, Navigant completed an in-situ metering study of appliances recycled for a similar program for another Midwest utility, ComEd. Because this in-situ study showed substantially lower savings compared to the savings calculated using the method used in prior evaluations of the AEP Ohio program, which was developed from a lab-metering study, the evaluation team was prompted to conduct an extensive review of other recent in-situ metering studies. This review yielded additional, recently-published, in-situ metering studies showing similarly reduced savings for recycled appliances. Thus, the evaluation team used a new method to calculate savings based on these in-situ metering studies, which is described briefly in the section Key Impact Findings below and more extensively in the body of this report. This new method resulted in lower per-unit savings in 2012 compared to previous evaluations.

Program Summary

The objective of the AEP Ohio Appliance Recycling Program is to remove old, inefficient refrigerators and freezers from operation as secondary units in homes and therefore reduce energy use and peak demand. The program also prevents existing primary appliances from being retained and used as secondary units after customers purchase new units. In addition to these primary program objectives, the Appliance Recycling Program allows AEP Ohio customers to dispose of room air conditioners (RACs) through the program, although no savings are claimed for these units. In 2012, the AEP Ohio Appliance Recycling Program collected a total of 15,643 appliances, which is a 7 percent increase from 2011 and the most appliances collected in one year since the program began in 2009. In 2012, changes to the program included increasing the incentive from $35 to $50 and adding a second retail partner.

Key Impact Findings

For the 2012 evaluation, the evaluation team introduced a different energy savings calculation method. This change resulted in a reduction in *ex-post* energy savings that are 78 percent of the program's energy savings goal and 51 percent of the peak demand goal. Table ES–1 shows the 2012 program goals, ex-ante savings claimed by the program, and the *ex-post* savings. The *ex-post* energy and demand savings for 2012 were 14,783 MWh and 1.86 MW, respectively. This result occurred because for 2012, to calculate *ex-post* savings, the evaluation team averaged the regression results of five different equations from recently-published in-situ metering studies, as opposed to the method used for evaluations in previous years, which was based on lab-metering results.

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Table ES–1. Overall Evaluation Results

2012 Program Goals		2012 *Ex-Ante* Claimed Savings		2012 *Ex-post* Savings	
MWh	MW	MWh	MW	MWh	MW
18,962	3.67	27,254	3.81	14,783	1.86

As shown in Table ES–2, the previous impact calculation method, which was utilized by AEP Ohio in setting goals and in calculating ex-ante savings, resulted in audited savings values of 27,252 MWh and 3.81 MW, which exceed energy and demand savings goals. However, as mentioned earlier, the evaluation team used a new method to estimate *ex-post* savings, which resulted in realization rates of 0.54 for energy and 0.49 for demand savings.

Table ES–2. Program Savings and Adjustments

Ex-Ante Savings (a)	Audited Savings (b)	Engineering Adjustment (c)	*Ex-Post* Savings (d) = (b) x (c)	Realization Rate RR = (d) / (a)
Energy Savings (MWh)				
27,254	27,252	0.54	14,783	0.54
Demand Savings (MW)				
3.81	3.81	0.49	1.86	0.49

Key Process Findings

The Appliance Recycling Program processes functioned very smoothly in 2012. Participant satisfaction was very high. Compared to past years, there was more consistent month-to-month collection volume throughout the 2012 program year, which enabled more consistent staffing on the collection team. The field data collection process has improved, with the rates of missing or inaccurate information decreasing substantially. The program dropout rate has decreased from 2011, supporting the conclusion that program processes are operating smoothly. The overwhelming majority of surveyed participants reported that their appliance was working when it was picked up, indicating that the program is predominantly picking up operational appliances as intended.

Awareness of the program among the general population of residential customers (55 percent) has significantly increased over 2011 (43 percent), suggesting that marketing efforts are producing intended results. The only potential challenge from a process perspective is the low enrollment rate achieved through the retail partnership.

Recommendations

1. **Adjust how AEP Ohio calculates ex-ante claimed savings.** The evaluation team recommends that AEP Ohio reach out to utilities for which the metering studies used to calculate 2012 *ex-post* savings were conducted. AEP Ohio can then choose a method for calculating 2013 ex-ante

savings based on the sample of metered appliances that most closely represents the population of recycled units in the AEP Ohio service territory. Metering is being conducted in 2013 in the AEP Ohio service territory, and the resulting regression model will be used to calculate 2013 *ex-post* savings.

2. **Revise savings goals.** The methodology used to set energy savings goals assumed higher per-unit savings than what was found in this evaluation. Goals for the program should be revised to take into account the decreased per-unit savings.
3. **Continue cross-promotions with retailers participating in other programs such as the Efficient Products Program.** In-store sales associates are playing a larger role in increasing initial and overall awareness of the program, and 43 percent of those who had heard of the program through a retailer reported hearing about it from a retailer that partners with the Efficient Products Program, This result suggests that cross-promotions are effective.

1 Introduction and Purpose of Study

This section provides a brief overview of the evaluation objectives and methods. A detailed summary of methodology is found in Section 3 of this report.

1.1 Evaluation Objectives

This report presents the findings from the impact and process evaluations of the AEP Ohio residential Appliance Recycling Program for Program Year 2012. The objectives of the evaluation were to: (1) quantify energy and peak demand savings impacts as a result of the program during 2012, and (2) determine key process-related program strengths and weaknesses, and (3) provide recommendations to improve the program. Specific evaluation questions are summarized in Section 3.2.

1.2 Evaluation Methods

Data collection activities are summarized in Table 1-1. As part of the process evaluation, the evaluation team first reviewed any program documentation that differed from Program Year 2011 (e.g., new marketing materials). The evaluation team also conducted a literature review of metering studies conducted for other utility appliance recycling programs that generated regression models fit to their respective sample populations. This literature review was undertaken to identify updated approaches to calculating energy and demand savings.

Primary data collection efforts included in-depth telephone interviews with program staff at AEP Ohio and the program implementers (JACO and Appliance Distribution). Telephone surveys were conducted with program participants to assess satisfaction with program processes as well as to collect data needed for the impact analysis.

For this report, program impacts for the Appliance Recycling Program were evaluated in terms of energy and demand savings and were based on an assessment of the program tracking data, coupled with results from the telephone surveys with participants. The evaluation team used a new method for 2012 that is based on in-situ metering studies published in the past three years. In previous evaluations, the method used to calculate impacts came from a relatively older lab metering study. After reviewing five recently published in-situ metering studies, the evaluation team decided to calculate the energy savings for AEP Ohio using all five equations used by these five studies. Then, the mean of the results of these five equations was calculated. A part-use adjustment was then applied to account for the number of months out of the year that appliance would have been operating in the absence of the program. This method was determined to be the best approach because no one study was clearly more applicable to the AEP Ohio program. Although the evaluation team attempted to contact the metering studies' authors to obtain sample characteristics, utility approval was required, and unfortunately time constraints did not allow the evaluation team to gain approval to obtain sample characteristics.

The *ex-post* demand savings were based on the average unit energy consumption, using the regression equations from the five recently published metering studies. Demand savings were calculated as a

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function of the average daily unit energy consumption and a performance period factor, which accounted for the effect of weather on demand. The resulting value was then adjusted by a summer use adjustment factor to account for the percent of participants who use their appliance during the summer. This summer use adjustment was informed by participants' survey responses on their summer-use patterns of the recycled appliances. While these data are also collected at the time of pickup, the evaluation team used the survey data in part because these responses were more granular.

Additionally, the evaluation team conducted an analysis of appointment cancellation data to determine the percent of customers who cancel appointments and never re-enroll. The evaluation team also conducted an analysis of survey data collected from the general population of AEP Ohio residential customers, initially conducted for the Efficient Products Program evaluation, to assess barriers to participation among eligible non-participants. Impact evaluation findings were based on the assessment of the tracking data, coupled with results from the telephone surveys with participants.

Table 1-1. Summary of Data Collection Activities

Data Collection Type	Targeted Population	Supported Evaluation Activities
Review of New Program Documentation	Program documentation and marketing materials new for 2012	Process evaluation
Secondary Literature Review	Publicly available evaluations and metering studies for other utility appliance recycling programs	Impact evaluation
In-depth Telephone Interviews	Program staff	Process evaluation
Telephone Surveys	Program participants	Impact and process evaluation
Cancellation Data Review	All cancelled appointments	Process evaluation
General Population Survey Analysis	General population of AEP Ohio residential customers (conducted for Efficient Products evaluation)	Process evaluation
Tracking Data Review	All program participants	Impact and process evaluation

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2 Program Description and Theory

This section provides a description of the AEP Ohio Appliance Recycling Program, as well as a brief discussion of the underlying program theory and logic. In addition, this section describes minor differences in how the 2012 program is implemented compared to the 2011 program. The reader is directed to the Program Year 2010 evaluation report for a thorough review of the program processes and theory. While there were minor changes made in 2012, the core processes and program theory of the Appliance Recycling Program are unchanged from program inception. As a result, the discussion of the program theory is less extensive here than in previous evaluation reports and the program logic model has been omitted from this report.

2.1 *Program Description*

The objective of the AEP Ohio Appliance Recycling Program is to remove old, inefficient refrigerators and freezers from operation as secondary units in homes, and ultimately from the secondary market, therefore reduce energy use and peak demand. The program also prevents existing primary appliances from being retained and used as secondary units after customers purchase new units. In addition to these primary program objectives, the Appliance Recycling Program allows AEP Ohio customers to dispose of room air conditioners (RACs) through the program; that portion of the program is provided as a customer service only.

AEP Ohio offers free removal and recycling of refrigerators and freezers and provides a cash incentive to customers who retire these appliances. The incentives include $50 per appliance (increased to a $60 payment November 1st through December 24th). For a customer to qualify, the refrigerator and/or freezer must be between 10 and 30 cubic feet in size, empty, clean, and operational at the time of pickup. For RACs, there are no financial incentives, and AEP Ohio is not claiming energy or demand savings for these units. In 2012, the program collected a total of 15,643 appliances (12,139 refrigerators, 3,381 freezers, and 123 RACs).

The implementation contractor, JACO Environmental, provides complete implementation services, including verification of customer eligibility, scheduling of appliance pick-up, collection of appliances from the homes of customers, transfer to a recycling facility (transfer is performed by subcontractor Appliance Distribution), and incentive processing and payment. The implementation contractor also handles the development of marketing materials, media placement and promotion of the program, and data tracking and reporting for the appliance scheduling and collection.

In addition to direct pick-up by the program contractor, the Appliance Recycling Program also recycles some units through a partnership with two retail chains in the AEP Ohio service territory, because working appliances picked up by these stores may otherwise find their way back into the secondary market. This retailer partnership component of The Appliance Recycling Program was initiated as a pilot program in August 2010. In the retailer partnership component of the program, the retailer promotes the program and enrolls customers who are purchasing new appliances from the retailer. The retailer then

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collects the old appliance(s) when they deliver the new appliance(s) to the customer. The pilot operated with a single retailer in 2011 and added a second retailer in September of 2012.

2.2 2012 Program Changes

Compared to the 2011 Appliance Recycling Program, there were two differences in the 2012 program: (1) the addition of a second retailer partner in September 2012, and (2) increased incentive payment amounts to participants. From January of 2011 to September of 2012, there was only one retailer, a national department store chain, partnering with the program. In September of 2012, a second retail partner, a regional consumer electronics retailer, joined the program. In addition to adding a second retail partner in 2012, the 2012 program also offered participants an increased incentive payment compared to previous program years. In 2011, the program offered a $35 incentive for most of the year; a promotional $50 incentive amount was offered June through August, November, and December. In comparison, the 2012 program offered an incentive amount of $50 from January through October and a $60 incentive amount in November and December.

2.3 Program Theory

The basic program theory of the 2012 program is unchanged compared to the 2011 program theory. In the absence of the AEP Ohio Appliance Recycling Program, customers who purchase new refrigerators and freezers would be more likely to either: (1) retain their old appliance and use it as a spare, or (2) sell or give away their old appliance to someone else. Reasons that customers may keep secondary appliances include year-round extra cold storage or increased capacity for particular times of the year, like holidays. Customers who decide to sell or give away their old appliance after installing a new primary appliance may do so for the monetary incentive, and/or because doing this saves a trip to the landfill or recycling center, thus avoiding the hassle and dumping costs. Selling or giving away the old appliance means that an inefficient appliance remains in use (albeit by another, unknown customer) and continues to contribute to energy use and peak demand within the AEP Ohio service territory. The program aims to motivate these customers to sign up for the program and have these appliances removed and recycled rather than going into the secondary market.

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3 Methodology

This section describes the methodology used to complete the 2012 process and impact evaluations.

3.1 *Overview of Approach*

This evaluation was driven by three overarching objectives: (1) quantify impacts from the program; (2) determine key process-related program strengths and weaknesses; and (3) identify ways in which the program can be improved. To meet these objectives, the evaluation team first developed a list of specific research questions to guide the evaluation, which are discussed below.

3.2 *Evaluation Questions*

The evaluation sought to answer the following key research questions:

3.2.1 Impact Questions

1. How many appliances were collected through the program, by type (refrigerator or freezer), status (primary vs. secondary use), configuration (e.g., upright vs. chest), and pickup mechanism (i.e., JACO vs. retail partnership)?
2. What is the energy (kWh) and summer peak demand (kW) savings per-unit? How are savings affected by adjusting for customer part-use or summer-use factors? How have the per-unit savings changed over time?
3. What are the annual energy (kWh) and summer peak demand (kW) impacts resulting from the program? Did the program meet its energy and demand savings goals? If not, why not?
4. What were the realization rates? (Defined as evaluation-verified (*ex-post*) savings divided by program-reported (*ex-ante*) savings.)
5. What is the cost effectiveness of this program?

3.2.2 Process Questions

3.2.2.1 Marketing and Program Awareness

1. How do participants become aware of the program? How does participant awareness of marketing efforts compare to prior program years?

3.2.2.2 Program Participation and Barriers

1. What are key barriers to participation in the program for eligible customers who do not participate, and how can these be addressed by the program?
2. Are participants satisfied with various aspects of the program (i.e., enrollment, appliance pickup, incentive payment)? If not, why not? How does perceived incentive payment wait time compare to timing of incentive payments as tracked by JACO?

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3. In the absence of the program, what percent of primary units would participating customers have disposed of anyway (as opposed to keeping them as secondary units or giving them away/selling them)? What would participating customers do with secondary units in the absence of the program?
4. How many customers enroll in the program but then cancel? How many of these never re-enroll in the program?

3.2.2.3 Overall Program Design and Administration

1. Has the program as implemented changed from the original plan? If so, how, why, and was this an advantageous change?
2. Are data regarding configuration of units (e.g., "upright" or "side-by-side") tracked in a manner that is consistent with how savings are calculated?
3. Do participants report that their appliances were in working condition prior to being picked up by the program?
4. How does the frequency and content of retailer training compare to that in 2011?
5. What are the current program challenges and how are these being addressed?
6. What are the opportunities for program improvement?

3.3 Tracking Data Review

The program tracking data is critical for determining the impacts of the Appliance Recycling Program, as it describes the number and types of appliances collected through the program. Thus, reviewing the tracking system is important for calculating program impacts and for assessing the effectiveness of program processes.

The tracking data collected by JACO was provided by AEP Ohio to the evaluation team for review. First, the evaluation team determined key data fields essential for consideration in the impact and process evaluations. Next, the team examined frequency distributions for each of the key fields, identifying missing, incomplete, or inconsistent data. Finally, the team formulated assumptions that are used in subsequent analyses to account for missing, incomplete, or inconsistent data. The result was a more complete and accurate evaluation and assessment of the impacts of the Appliance Recycling Program. The tracking review also included additional assessments of the data, including:

» Analysis of the key characteristics (e.g., age, size, model) of appliances recycled through the program.
» Assessment of how refrigerator and freezer configuration is tracked.
» Analysis of duplicate account numbers to determine how many customers recycled more than one appliance through the program.

The assessment of the tracking data is discussed in Section 4.1 where program activity is discussed along with the necessary adjustments that were made to account for missing or erroneous data. In addition, further process findings regarding the program-tracking systems and their effectiveness are discussed in Section 4.3.11.

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3.4 Cancellation Data Review

The evaluation team merged the appointment cancellation data with the participation data to determine how many customers cancelled a pickup appointment at some point, how many customers initially cancelled their appointments but then participated at a later date, and how many customers enrolled in the program but ultimately dropped out.

3.5 Review of New Program Documentation

The evaluation team reviewed new marketing materials used for the 2012 program and the program marketing reports prepared by JACO detailing program marketing efforts for 2012. According to the JACO Development Program Manager and the JACO Retail Program Manager, there were no significant changes in the retailer training strategies or training materials for the 2012 program. As a result, the evaluation team did not review retailer training materials for the 2012 program.

3.6 Secondary Literature Review

The evaluation team reviewed recently published appliance recycling studies that used actual program/population data, rather than strictly deemed measure values, to calculate unit energy consumption or program savings values. This secondary research was intended to identify updated approaches to calculating energy and demand savings, including new or updated regression equations used to estimate savings values.

This secondary literature review was conducted with a focus on metering studies that generated regression models fit to their respective sample populations. Of 13 appliance recycling evaluation studies the evaluation team identified, eleven used equations from metering studies, one used deemed values, and one used past year unit savings. Of the 11 studies using equations from metering studies, one was the same regression previously utilized for AEP Ohio from the California Statewide Appliance Recycling Program, while the other ten studies relied on five recent metering studies or combinations of recent metering studies. For all of these studies, in situ metering and unit energy consumption modeling were conducted. The evaluation team reviewed these five recent metering studies, developed for ComEd in Illinois, Consumers Energy and Detroit Edison in Michigan, First Energy in Ohio, and Rocky Mountain Power in Utah.[1] This review informed the impact evaluation methodology, discussed in Section 3.8.1.

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[1] Documents describing these metering studies include:
(1) Memo from Opinion Dynamics to ComEd (dated Aug 10, 2012), "Fridge & Freezer Recycle Rewards Program PY4 Metering Study: Final Savings Results".
(2) The Cadmus Group. 2012. *Rocky Mountain Power Utah See ya later, refrigerator® 2009-2010 Evaluation Final Report.* Available at http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/UT_SYLR_Evaluation_Report.pdf.
(3) Memo from Cadmus and Opinion Dynamics to Michigan Evaluation Working Group (dated August 20, 2012).
(4) ADM. 2012. Appendix C to *Portfolio Status Report on the status of the Companies Energy Efficiency and Peak Demand Reduction Results for the year ended December 31, 2011: Impact and Process Evaluation of 2011 Appliance Turn In Program.* Available under Dockets 12-1533-EL-EEC, 12-1534-EL-EEC, and 12-1535-EL-EEC at http:// http://dis.puc.state.oh.us.

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3.7 Primary Data Collection

The evaluation team conducted a series of primary data collection activities in order to answer the key research questions. Qualitative data were collected through in-depth interviews with program staff; quantitative and qualitative data were collected through telephone surveys with program participants who had at least one appliance recycled through the program.

Rather than conducting a separate non-participant survey specific to the Appliance Recycling evaluation, a question asking about awareness of the Appliance Recycling Program was included in the survey conducted with the general population of AEP Ohio customers as part of the Efficient Products Program evaluation. During this telephone survey, all general population respondents were asked about their awareness of the program, but the evaluation team also ensured that enough *ex-post* non-participating customers (i.e., those with a secondary refrigerator or freezer but did not participate in the Appliance Recycling Program) were captured to attain +/- 10 percent precision at a 90 percent level of confidence. Customers were also asked about barriers to participating in the Appliance Recycling Program.

A summary of these data collection activities is provided in Table 3-1. The summary is followed by a discussion of the sample design and expected sampling error and precision for the data collection efforts undertaken with customers. The primary data collected were used to inform the impact and process evaluations as described in Sections 4.2 and 4.3, respectively.

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(5) The Cadmus Group. 2011. *Consumers Energy Annual Evaluation 2010 Report*. Available at: http://efile.mpsc.state.mi.us/efile/docs/16670/0027.pdf

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Table 3-1. Primary Data Collection Activities

Data Collection Type	Targeted Population	Sample Frame	Sample Target	Sample Size	Timing
In-depth Telephone Interviews	AEP Ohio Program Staff	Contacts from AEP Ohio	Program Manager	1	January 2013
	JACO Environmental Program Staff	Contacts from AEP Ohio	Program Development Manager Retail Program Manager	2	January 2013
	Appliance Distribution Program Staff	Contacts from AEP Ohio and Appliance Distribution	Facility Manager President	2	January 2013
Telephone Surveys	Program Participants	Tracking Database Provided by AEP Ohio	Stratified sample of program participants	378 Total 296 Refrigerators; 82 Freezers	December 2012 - January 2013
General Population Survey Analysis	AEP Ohio Residential Customers	Sample of 3,500 contacts extracted by AEP Ohio from Billing Data	General population survey of residential customers conducted for the Efficient Products Program evaluation	385 Total, including 227 eligible customers with a standalone freezer or secondary refrigerator	February 2013

3.7.1 Population and Sampling

This section discusses the methods used to select the sample for the participant telephone survey and the general population telephone survey. Staff and interviewees were selected by identifying those responsible for key program operations as well as those with insight into customer experiences.

3.7.1.1 Participant Survey Sampling Strategy

The 2012 Appliance Recycling Program participant population was stratified by appliance type: refrigerator or freezer. Room air conditioners were not included in the evaluation because AEP Ohio does not claim savings for these units. Telephone surveys were conducted with a random sample of the participants.

3.7.1.2 General Population Sampling Strategy

The general population survey was conducted with a random sample of the AEP Ohio residential customer population in early 2013. Because the general population survey was conducted specifically for the Efficient Products Program evaluation, the sampling strategy and sampling error/expected precision are not discussed in detail in this document. Please refer to the Efficient Products Program evaluation

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report for more details. In total, 385 AEP Ohio residential customers were administered the survey, 227 of which were eligible to participate in the Appliance Recycling Program. Of these, 116 were aware of the program but had not previously participated.

3.7.2 Sampling Error/ Expected Precision

The evaluation team constructed the sample design before the final end-of-year program data were available. Thus, the sample design for the participant survey was based on program data as of September 25, 2012. The evaluation team estimated required sample sizes needed to support the analysis and reporting of impact results at a 95 percent level of confidence +/- 5 percent precision (95/5) at the program level, while simultaneously attaining a minimum of 90/10 for customers recycling refrigerators and customers recycling freezers, based on recycling rates for January 1, 2012 through September 25, 2012. Based on this goal, a minimum of 375 target completes (294 customers with refrigerators; 81 customers with freezers) was computed for the participant phone survey.

Table 3-2 shows the actual population of appliances collected in 2012, the number of participant surveys completed, and the resulting sampling error. Overall, at the program level, sampling efforts resulted in +/- 4.98 percent precision at a 95 percent level of confidence. For refrigerators, +/- 5.63 percent precision was attained and for freezers 10.69 percent precision was attained at the 95 percent level of confidence. Note that the sample sizes for both customers recycling refrigerators and customers recycling freezers exceed the 90/10 confidence/precision threshold.

Table 3-2. 2012 Survey Completes and Population-Level Sampling Error

Appliances Collected	2012 Population Size (N)	Survey Completes (n)	Sampling Error (95% CI)
Refrigerators	12,139	296	5.63%[a]
Freezers	3,381	82	10.69%[b]
Total	**15,520**	**378**	**4.98%**

[a] At 90% confidence, sampling error = 4.72%.
[b] At 90% confidence, sampling error = 8.97%.

A sample of 1,875 participant contacts was randomly drawn from the population of participants and supplied to the telephone survey house. Of the sample of 1,875 contacts, 1,799 program participants were contacted at least once to participate in the survey. Table 3-3 shows the final dispositions for these 1,799 program participants. As shown, the evaluation team completed surveys with 378 participants, reflecting an overall response rate of 21 percent. About one-quarter (24.7 percent) of participants contacted refused to participate in the survey.

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Table 3-3. Participant Survey Sample Disposition

Contact Disposition	Customers	Percent
Completes	378	21.0%
Unable to reach	695	38.6%
Refusal	463	25.7%
Telephone number issue	108	6.0%
Non-specific callback/Appointment scheduled	79	4.4%
Quota met	27	1.5%
Electric company not AEP Ohio	15	0.8%
Appliance not picked up from primary residence/Respondent not primary user	13	0.7%
Appliance not picked up	8	0.4%
Language barrier	7	0.4%
Unknown	6	0.3%
Total Participants Attempted to Contact	1,799	100.0%

Note. Total sums to less than 100 percent due to rounding.

3.8 Methods Used to Analyze Impact Data

The primary goal of the impact analysis was to determine the overall, energy and peak demand savings of the AEP Ohio Appliance Recycling Program. The evaluation team used a new method for Program Year 2012 that is based on in-situ metering studies published in the past three years. In previous evaluations, the method used to calculate impacts came from a 2005 and 2008 study that was based on lab metering rather than in-situ metering, and the results of this method appear to be increasingly inaccurate over time due to changing characteristics of the population of recycled units (e.g., appliance age). After reviewing the five metering studies discussed in Section 3.6, the evaluation team decided to employ an average of the results from the five equations used by the studies reviewed, applied to the AEP Ohio program data. This mean of the results was calculated to determine *ex-post* savings. This method was determined to be the best approach because no one study was clearly more applicable to the AEP Ohio program.

The evaluation team utilized a modeling approach to calculate the basic unit energy consumption (UEC) and unit demand consumption (UDC) for each unit collected through the program.[2] These results were then aggregated, and relevant adjustments were made to develop estimates of the program-wide *ex-post* energy and demand savings. The outputs of these calculations were then compared to the ex-ante savings claimed by the program to calculate the program realization rates. The remainder of this section outlines these calculations in detail.

[2] Energy and demand savings were only calculated for refrigerators and freezers. Savings were not calculated for RACs because AEP Ohio does not claim savings for these units.

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3.8.1 *Ex-post* Energy Savings Calculation

The *ex-post* energy savings were calculated by modeling the UEC of each unit in the program tracking database using regression equations published in five recent evaluations based on metering studies and then making an adjustment with a part-use factor (PUF) to account for the effect of customers who only use secondary appliances for part of the year. Equation 3-1 gives the full calculation of the *ex-post* energy savings including the PUF adjustment. In the equations, *i* represents a recycled unit, and *k* represents the five regression equations. An explanation of the calculation for the UEC and the part-use adjustment factor follows.

Equation 3-1. *Ex-post* Energy Savings

$$Ex - Post\ Gross\ Energy\ Savings = PUF\ \times \frac{1}{5} \times \sum_{k=1}^{5} UEC_i$$

3.8.1.1 UEC Calculation

UECs were estimated using five regression models derived from separate metering studies. Included in these models as continuous data are unit age, size in cubic feet, and cooling degree days (CDD); included as categorical data are indicator variables describing the unit configuration (e.g., freezer, side-by-side, single-door, manual defrost). The modeled equations with coefficients are shown in Table 3-4. The variables used in these equations are defined in Table 3-5. The models were applied to each unit in the AEP Ohio Appliance Recycling Program tracking data, and then an average across the five methods was computed for each unit, resulting in an estimated UEC for each appliance recycled through the program. The evaluation team used this approach, taking the average of results using the equations from all five recent metering studies, because choosing one particular methodology over another would have required more detailed information about the samples used to complete the metering studies to determine which is most applicable to the AEP Ohio population of recycled units.

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Table 3-4. Equations for Annual UEC for Recycled Appliances

Refrigerators	
1	-103.39 + 433.40(freezer) + 614.91(side by side) - 490.78(chest) - 797.90(single) + 23.93(age) + 289.82(before93) + 13.52(size) -381.23(manual defrost)
2	365.25{0.662 + 0.005(age) + 1.372(before80) + 0.960(80s) + 0.199(90s) + 0.081(size) - 1.172(single) + 0.823(side by side) + 0.633(primary) + 0.031(CDD x unconditioned space)}
3	365.25{-1.608 + 0.045(age) + 1.399(before93) + 0.115(size) -1.803(single) + 1.571(side by side) + 0.830(primary) + 0.007(CDD)}
4	(1-ISD)(491.83 + 98.96(side by side) + 35.3(size) + 25.25(age) + 19.98(side by side x age) - 413.99)
5	57.66 + 35.14(size) + 270.69(before90) + 200.44(primary) - 469.77(single) + 690.20(side by side)
Freezers	
1	Same as #1 under "Refrigerator" (combined equation for both appliance types)
2	365.25{-0.590 + 0.040(age) + 0.566(before90) + 0.109(size) - 0.265(chest) + 0.059(CDD x unconditioned space)}
3	365.25{-2.297 + 0.067(age) + 0.401(before93) + 0.150(size) + 0.854(chest) + 0.046(CDD)}
4	(1 - ISD)(0.85)(Refrigerator savings)
5	-233.63 + 43.90(size) + 19.53(age)

Note. ISD = in-situ delta, CDD = cooling degree days.

Equation sources are as follows:

(1) Memo from Opinion Dynamics to ComEd (dated Aug 10, 2012).

(2) The Cadmus Group. 2012. *Rocky Mountain Power Utah See ya later, refrigerator® 2009-2010 Evaluation Ex-post Report.* Available at http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/UT_SYLR_Evaluation_Report.pdf.

(3) Memo from Cadmus and Opinion Dynamics to Michigan Evaluation Working Group (dated August 20, 2012).

(4) ADM. 2012. Appendix C to *Portfolio Status Report on the status of the Companies Energy Efficiency and Peak Demand Reduction Ex-post for the year ended December 31, 2011: Impact and Process Evaluation of 2011 Appliance Turn In Program*. Available under Dockets 12-1533-EL-EEC, 12-1534-EL-EEC, and 12-1535-EL-EEC at http:// http://dis.puc.state.oh.us.

(5) The Cadmus Group. 2011. *Consumers Energy Annual Evaluation 2010 Report*. Available at: http://efile.mpsc.state.mi.us/efile/docs/16670/0027.pdf

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Table 3-5. Variables Used in Savings Equations

Variable	Definition	Type	Source
80s	indicates manufactured between 1980 and 1989	binary	program tracking data
90s	indicates manufactured between 1990 and 1999	binary	program tracking data
age	age (years)	continuous	program tracking data
before 80	indicates manufactured before 1980	binary	program tracking data
before 90	indicates manufactured before 1990	binary	program tracking data
before 93	indicates manufactured before 1993	binary	program tracking data
CDD	cooling degree days	continuous	NOAA[a]
chest	indicates chest freezer unit	binary	program tracking data
freezer	indicates freezer unit	binary	program tracking data
ISD	in situ delta - adjustment variable based on primary use, household size, and climate	constant	calculated[b]
manual defrost	indicates manual defrost unit	binary	program tracking data
primary	indicates primary unit	binary	program tracking data
side by side	indicates side by side unit	binary	program tracking data
single	indicates single door unit	binary	program tracking data
size	size (cubic feet)	continuous	program tracking data
unconditioned space	indicates unit operated in unconditioned space	binary	program tracking data

a. Based on Climate normal data for Columbus International Airport Weather Station. Available from NOAA at http://hurricane.ncdc.noaa.gov/climatenormals/clim20/oh/331786.pdf.

b. Calculated for Ohio, assuming a cool climate based on California climate zones 1-8 and 16, as opposed to a warm climate based on California climate zones 9–15. The Department of Energy climate zone map (http://www.eia.gov/emeu/recs/climate_zone.html) shows that Ohio's climate is even cooler than most of the "cool" zones in California, suggesting that this approach should not underestimate the cooling requirements of appliances in Ohio. Primary use was taken from the program tracking data. Household size was taken from the participant telephone survey; 65.1% of survey respondents reported less than three household members.

3.8.1.2 Part-Use Adjustment for Energy Savings

An adjustment was also needed to account for the fact that secondary appliances often are not used during portions of the year. For example, appliances may not be used during the winter months or may only be used for special occasions. The evaluation team therefore determined a part-use factor to adjust the annualized UEC estimates to better reflect the number of months the recycled unit would have operated had it not been removed by the program. The adjustment is particularly important for the AEP Ohio program, because the refrigerators and freezers located in garages may be shut down during the winter months, when cold weather reduces or eliminates the need to run the unit.

The evaluation team calculated separate part-use factors for both refrigerators and freezers. The part-use factor is based on the average of self-reported program participant survey data for the number of

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months over the year that the appliance would have been plugged in and running in the absence of the program (i.e., if the appliance had not been removed) divided by 12 months, as shown in Equation 3-2.

Equation 3-2. Part-Use Adjustment

$$PUF = \frac{Months_{Part-Use}}{12}$$

For refrigerators, the program participant survey asked whether appliances were used as primary (i.e., always in use) or secondary/spare units. This evaluation assumes that all units would have been used as a secondary refrigerator if not recycled by the program. Therefore, in calculating what energy these units would have used in the absence of the program, the part-use factor for all refrigerators recycled through the program is set at the average part-use reported by participants who disposed of a secondary refrigerator. For freezers, the survey did not distinguish between primary and secondary units (all units were assumed to be secondary to a primary refrigerator that also includes a small freezer as part of the unit).

3.8.2 *Ex-Post* Demand Savings Calculation

The *ex-post* demand savings were calculated by first calculating the unit demand consumption (UDC) for each unit recycled through the program, then aggregating these savings to the program level and applying a summer use adjustment factor (SUAF) based on how many units were reported to be operational in the summer, when peak demand occurs. Equation 3-3 shows the full calculation of the *ex-post* demand savings from the UDC and the SUAF. More information follows on the calculation of the UDC and the SUAF.

Equation 3-3. *Ex-post* Demand Savings

$$Ex - Post\ Gross\ Demand\ Savings = SUAF * \sum UDC_i$$

3.8.2.1 UDC Calculation

The evaluation team calculated demand savings using energy consumption values from the same five metering studies' regressions described under the UEC Calculation section. Additionally, the evaluation team used these metering studies' approaches to develop a method of accounting for the impacts of weather on peak summer demand. Two of these approaches include weather (CDD) as a term in the UEC calculation (equations two and three shown in Table 3-4). The other three approaches do not consider weather in the demand calculation or did not include weather as a parameter in the energy consumption and savings regression. Because secondary appliances may be kept in unconditioned spaces, it is important to account for weather impacts on demand. To do this, the evaluation team determined the average weather effects for the two metering study methods that accounted for weather. The evaluation team then applied these averaged effects (*PPF* in Equation 3-4) to the average hourly demand resulting from each of the five UEC equations. The evaluation team determined the average hourly demand for each of these equations by dividing annual unadjusted unit energy consumption (UEC) by 8,760 (the number of hours in the year).

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As the first step to determine average weather effects, the in situ *ex-post* UEC for equations two and three shown in Table 3-4 are recalculated for the summer using the average CDD during the summer peak period from June 1 through August 31, 2012.[3] The peak period is defined as the average of 3-6 pm EDT of summer weekdays from June 1 through August 31, as defined by the PUCO in Docket 08-888. Then, for each of the two equations shown in Table 3-4 that consider weather in the demand calculation, the summer UEC (CDD = 8.23) is divided by the average UEC (CDD = 2.60, also shown later in Table 4-4), as shown in Equation 3-4. Then the average of these two resulting values is taken to arrive at a performance period factor, which accounts for higher energy consumption during hotter weather.

Equation 3-4. Performance Period Factor

$$PPF = \frac{1}{2} \times \left[\left(\frac{UEC_{eq.2,CDD=8.23}}{UEC_{eq.2,CDD=2.60}} \right) + \left(\frac{UEC_{eq.3,CDD=8.23}}{UEC_{eq.3,CDD=2.60}} \right) \right]$$

As shown in Equation 3-5, this performance period factor (*PPF*) is then applied to the average energy demand for each appliance for the five UEC equations described in Table 3-4. This performance period factor accounts for the greater energy that is required to cool refrigerator and freezer contents during hotter weather.

Equation 3-5. Unit Demand Savings (UDC)

$$Ex - Post\ Unit\ Demand\ Savings = PPF \times \frac{1}{5} \times \sum_{k=1}^{5} \frac{UEC_i}{8{,}760}$$

3.8.2.2 *SUAF Calculation*

To account for the fact that not all AEP Ohio customers use their appliances during the summer peak periods, participant survey data was used to calculate the summer use adjustment factor based on the fraction of respondents who reported using their appliance during the summer, as indicated in Equation 3-6. All primary refrigerators are assumed to be in use during the summer peak, so respondents were not asked about their summer use. Survey respondents who report that their secondary refrigerator or freezer is not always in use are asked if the appliance is used during the summer.

Equation 3-6. Summer Use Adjustment Factor

$$SUAF = \frac{Survey\ Respondents\ Using\ Appliance\ During\ the\ Summer}{Total\ Survey\ Respondents}$$

[3] Climate normal data for Columbus International Airport Weather Station. Available from NOAA at http://hurricane.ncdc.noaa.gov/climatenormals/clim20/oh/331786.pdf. Average CDD for summer performance period calculated as 757 CDD (198 in June + 305 in July + 254 in August) over 92 days is 8.23 CDD/Day.

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3.8.3 Realization Rates Calculation Method

Realization rates (RR) for the *ex-post* energy and demand savings were determined by dividing the *ex-post* program impacts ($Impacts_{ex\text{-}post}$) by the reported impacts for 2012 ($Impacts_{ex\text{-}ante}$), as shown in Equation 3-7.

Equation 3-7. Realization Rates

$$RR = \frac{Impacts_{Ex-Post}}{Impacts_{Ex-Ante}}$$

3.9 Methods Used to Analyze Process Data

Following is a description of the qualitative and quantitative analyses undertaken to inform the process evaluation. Findings from the process analysis were then organized into themes and key takeaways, discussed in Section 4.3.

» **Review of New Program Documentation.** The review of program documents that were new for 2012 included retail promotional materials and marketing reports prepared by JACO detailing program marketing efforts for 2012. According to the JACO Development Program Manager and the JACO Retail Program Manager, there were no significant changes in the retailer training strategies or training materials for the 2012 program. As a result, the evaluation team did not review these materials for the 2012 program.

» **Appointment Cancellation Data.** Appointment cancellation data were first reviewed to determine completeness of key fields such as utility account number and cancellation date. Cancellation data were then merged with participation data to determine the percentage of customers that cancel a pickup appointment but then re-enroll, as well as determine the overall program dropout rate after enrollment. Additional analyses included tabulating the number of times each customer cancelled.

» **In-depth Interviews with Program Staff (n = 5).** Qualitative interview data were analyzed with respect to significant program changes from 2011, the retailer partnership component of the 2012 program, and notable program successes or challenges identified by program staff. These data were then used to inform the results of the participant telephone survey in areas such as participant satisfaction and program marketing and awareness among AEP Ohio customers.

» **Participant Telephone Survey (n = 378).** Quantitative survey data were first reviewed for missing or erroneous data. Data were re-coded in some instances to disaggregate "other" responses or to combine similar responses into one category. Frequencies of quantitative responses were then tabulated with respect to program awareness, motivations for participating, satisfaction with various aspects of the program, and the condition of the appliances that were picked up. Qualitative, open-ended responses to questions about reasoning for customer dissatisfaction with program components and opportunities for program improvement were also coded and reviewed for consistent themes.

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4 Detailed Evaluation Findings

In 2012, the AEP Ohio Appliance Recycling Program collected a total of 15,643 appliances, which is a 7 percent increase from 2011 and the most appliances collected in one year since the program began in 2009. This included 12,139 refrigerators, 3,381 freezers, and 123 RACs, which resulted in an *ex-post* energy savings of 14,783 MWh and *ex-post* demand savings of 1.86 MW. While the program has exceeded goals in previous years, in 2012, the program achieved 78 percent of the energy savings goal of 18,962 MWh and achieved 51 percent of the peak demand goal of 3.67 MW. This result occurred because AEP Ohio set goals based on the impact calculation methodology used in previous years; however, for 2012, the evaluation team used a more recent method based on in-situ metering studies to estimate *ex-post* savings.

From a program process perspective, the program is functioning very smoothly. Participant satisfaction is very high, and has increased compared to last year. The field data collection process has improved, and the program dropout rate has decreased. The overwhelming majority of surveyed participants reported that their appliance was working when it was picked up, indicating that the program is predominantly picking up operational appliances as intended. Furthermore, awareness of the program among the general population of residential customers has increased compared to 2011, suggesting that marketing efforts are paying off. The only potential challenge from a process perspective is that there continue to be few enrollments through the retail partnership, despite the fact that an additional retail partner was added in 2012. Below, the Program Year 2012 program activity is discussed in detail, and this is followed by detailed results of the impact evaluation, the process evaluation, and the cost effectiveness review.

4.1 Program Activity

This section provides a summary of program activity, as well as a detailed description of characteristics of appliances collected through the 2012 AEP Ohio Appliance Recycling Program. It is important to understand the characteristics of appliances collected, because this information feeds directly into the calculations for determining program savings and impacts and explains changes in per-unit savings year over year. Alongside the discussion of appliance characteristics is a description of any invalid information discovered in the program tracking data and how these data were treated in order to carry out the subsequent impact analyses. When describing some appliance characteristics in this section (e.g., appliance type, configuration, amperage, etc.) details on room air conditioners have been omitted because a relatively small number of room air conditioners were recycled through this program, and savings were not claimed for these units in the program.

The AEP Ohio Appliance Recycling Program collected 15,643 appliances in 2012, 78 percent of which were refrigerators. Collections in 2012 represent a 7 percent increase over 2011, when 14,603 appliances were collected. Table 4-1 shows the breakdown of appliance types collected for the AEP Ohio Appliance Recycling Program in 2012.

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Table 4-1. Number of Appliances Recycled, by Type

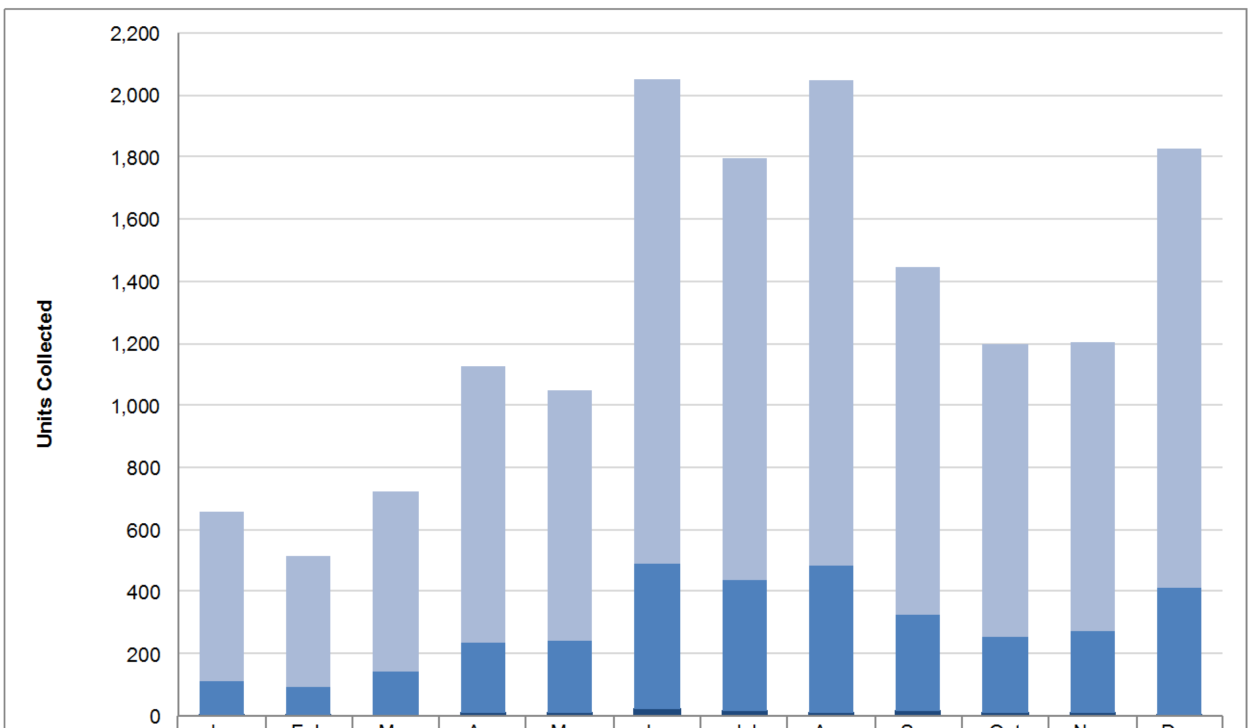
Appliance Type	Count of Units Recycled
Refrigerators	12,139
Freezers	3,381
Room Air Conditioners	123
Total	**15,643**

The remainder of this section provides more detail on the appliances collected by the program.

4.1.1 Appliances Recycled by Month

The total units collected by month in 2012 are shown in Figure 4-1. June and August were the busiest months for the program for all appliances. Compared to previous years, the program had more consistent month-to-month collection volume in 2012. Additionally, the program notably witnessed increased collections in the month of December, which may be due to the increased incentive amount offered in the last two months of the year.

Figure 4-1. Appliances Recycled by Month in 2012



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Refrigerator	546	424	582	894	810	1556	1359	1563	1122	943	928	1412
Freezer	107	90	141	224	231	469	420	472	311	240	265	411
Room AC	7	4	0	11	9	25	16	12	16	12	10	1

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4.1.2 Appliances Recycled per Participant

The program had 14,507 participants in 2012,[4] and more than 92 percent of these turned in only one appliance. Most participants who turned in multiple units turned in just two appliances; less than 1 percent of participants turned in three or more appliances. Only three customers turned in more than the two-appliance limit for refrigerators and freezers, indicating that customers exceeding the two appliance limit is not a systemic issue for the program. These participants included two customers who turned in three refrigerators and one customer who turned in two refrigerators and two freezers.

4.1.3 Appliances Recycled by Primary or Secondary Units

The program tracking data included information on whether the recycled refrigerators and freezers were primary, secondary or unused appliances. Tracking data on primary or secondary usage was missing or unknown for 72 refrigerators (0.4%) and 14 freezers (0.6%). Most of the appliances in the tracking data (99 percent of refrigerators and 62 percent of freezers) were labeled as secondary appliances.

4.1.4 Appliances Recycled by Age

Appliance age (in years) is a key characteristic for determining energy savings of the program, as older and larger units use more electricity for two reasons:

1. Because of a change in Federal minimum energy efficiency standards in 1993, units built since that time are much more energy-efficient and generally smaller than units made prior to the standards change.
2. As units age, efficiency typically decreases due to degradation.

[4] The number of participants was determined by aggregating the "Unit" file provided by AEP Ohio (n = 15,643) by the unique customer identifier variable "UTCustID."

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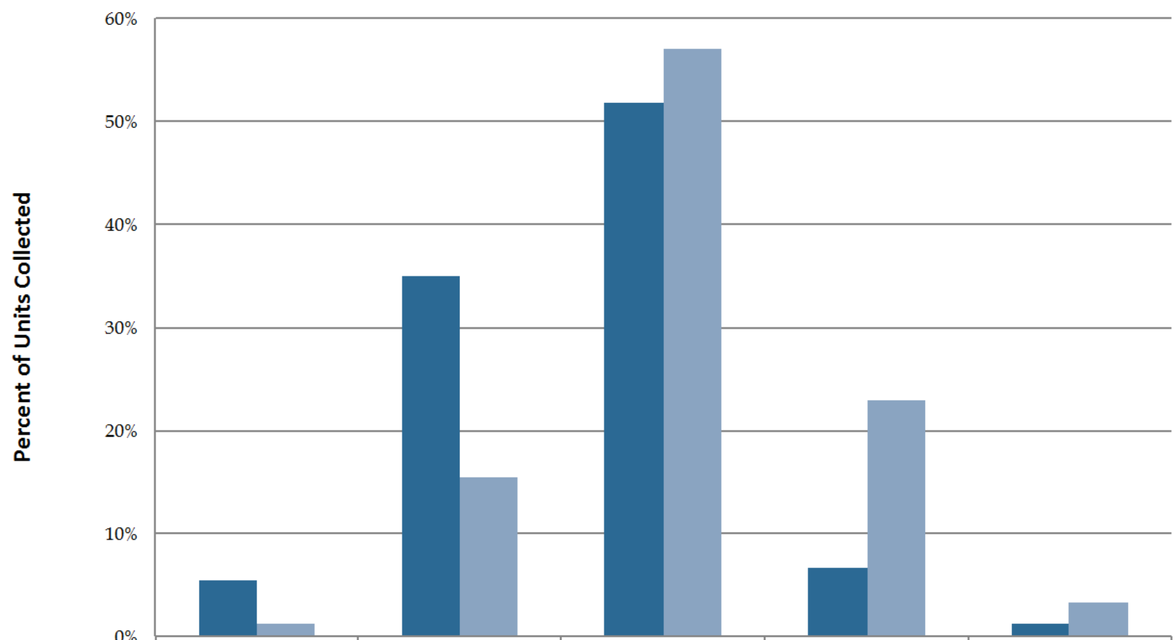
Figure 4-2 shows the breakdown of ages for both refrigerators and freezers collected by the program. There were no missing data on appliance age in the tracking data. Two refrigerators had a year of manufacture listed as "195" in the tracking data; these two refrigerators were assumed to be manufactured in "1995" for this analysis.[5] The freezers collected tend to be older than the refrigerators; the average ages for refrigerators and freezers were 23 and 30 years, respectively.

Figure 4-2. Age in Years of Recycled Appliance



	10 cubic feet	11 to 15 cubic feet	16 to 20 cubic feet	21 to 24 cubic feet	25 cubic feet or larger
Freezer	5.4%	35.0%	51.8%	6.7%	1.2%
Refrigerator	1.3%	15.3%	57.1%	22.9%	3.4%

Size of Unit in Cubic Feet

Note. Total for freezers sums to greater than 100 percent due to rounding.

[5] One of these was a General Electric refrigerator, and the other was a Gibson refrigerator. Both brands were available in 1995. Although the model numbers do not match any current refrigerator databases, at least one model number appeared to be truncated and was consistent with the first several digits of model numbers available in 1995.

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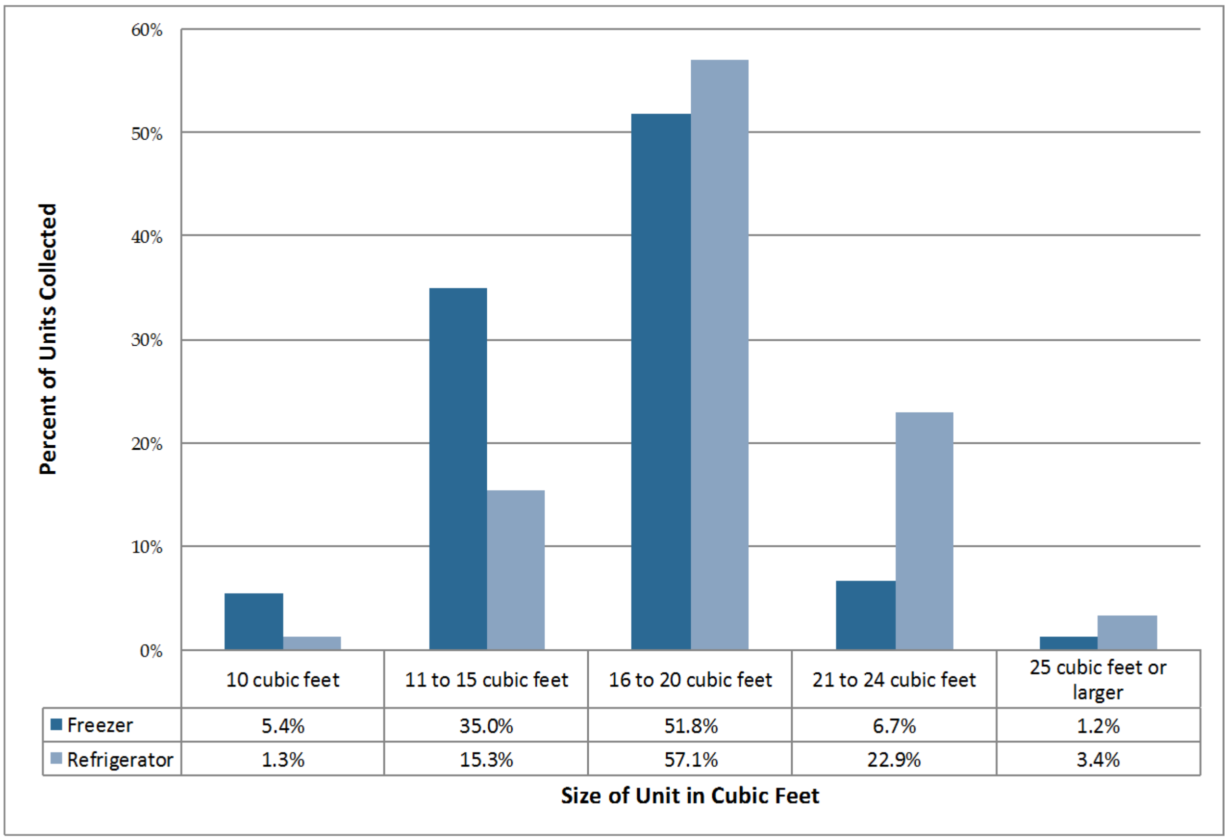
4.1.5 Appliances Recycled by Size

The size of the refrigerator or freezer is also a key determinant of the appliance UEC, as larger units tend to use more energy. As shown in Figure 4-3, the vast majority of appliances picked up for recycling were between 11 cubic feet and 24 cubic feet in size. Recycled refrigerators (mean of 18 cubic feet) were somewhat larger than freezers (mean of 16 cubic feet). There were no missing data on appliance size in the tracking data.

Figure 4-3. Size Characteristics of Recycled Appliances



	10 cubic feet	11 to 15 cubic feet	16 to 20 cubic feet	21 to 24 cubic feet	25 cubic feet or larger
Freezer	5.4%	35.0%	51.8%	6.7%	1.2%
Refrigerator	1.3%	15.3%	57.1%	22.9%	3.4%

4.1.6 Refrigerators and Freezers Recycled by Configuration

As indicated in Section 3.8.1, the appliance configuration is another important determinant of the UEC for an individual appliance. In the energy consumption regression calculation, coefficients are applied to configurations, which add or detract from the estimated UEC value. In a small number of instances, the program tracking data did not label the units consistently with how these labels are specified in the regression analysis. These data included 4 refrigerators labeled as being "upright" or "chest," as well as 24 freezers that were labeled as being "single door," "top freezer," or "bottom freezer" freezers, even though these labels should only apply to refrigerators. For the regression analyses, invalid freezer configurations were assumed to be "upright" because this was the most common freezer configuration. Similarly, the evaluation team recoded the invalid refrigerator types (e.g., "chest" and "upright") equal to "top freezer" for the analysis, because "top freezer" refrigerators made up the majority of the refrigerators with valid configuration types.

Table 4-2 shows the number of appliances recycled by type, as reported in the program tracking data. Of data entered for configuration, less than 1 percent were invalid entries. This represents a substantial improvement from the configurations in the program tracking data for previous years.

Table 4-2. Appliances Recycled by Configuration in the Program Tracking Data

Appliance Type	Configuration	Units	Percent of Units
Refrigerators	Top Freezer	8,177	67.36%
	Side-by-Side	3,045	25.08%
	Single Door	528	4.35%
	Bottom Freezer	385	3.17%
	Upright	3	0.02%
	Chest	1	0.01%
	Total	12,139	100.00%
Freezers	Upright	2,135	63.15%
	Chest	1,222	36.14%
	Single Door	17	0.50%
	Top Freezer	6	0.18%
	Bottom Freezer	1	0.03%
	Total	3,381	100.0%

Note. Total sums to less than 100 percent due to rounding.

4.1.7 Appliance by Defrost Type

Another important characteristic of appliances for the regression analysis was the defrost type (i.e., whether the unit was "frost-free" or not). A frost-free appliance uses a heating element and forced air to prevent the buildup of frost inside the appliance, which usually results in greater energy use than a comparable manual-defrost appliance.

Table 4-3 summarizes the assumptions the evaluation team used to map the tracking data for frost settings to what is needed for the regression. Data on defrost setting were unknown for 39 units (34 refrigerators and 5 freezers). For refrigerators, this unknown value was changed to "Frost-Free" if the unit was less than 15 years old and "Manual" if the unit was 15 years or older, assumptions based on the likely defrost settings for appliances of a given age. As a conservative estimate, for freezers, this was changed to "Manual" for all units missing the frost setting. The savings calculations for the 5 units, or 0.1

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percent of freezers missing frost setting, will err on the side of being slightly lower rather than being overestimated.

Table 4-3. Frost Setting Assumptions for Regression Analysis

Appliance Type	Defrost Type Coded	Units	Percent of Units	Revised Defrost Type
Refrigerators	Frost Free	11,105	91.5%	Frost Free
	Manual	1,000	8.2%	Manual
	Unknown	34	0.3%	Frost Free or Manual [a]
	Total	12,139	100.0%	-
Freezers	Frost Free	2,227	65.9%	Frost Free
	Manual	1,149	34.0%	Manual
	Unknown	5	0.1%	Manual
	Total	3,381	100.0%	-

[a] For refrigerators, “Unknown” was changed to “Frost-Free” if the unit was less than 15 years old and “Manual” if the unit was 15 years or older.

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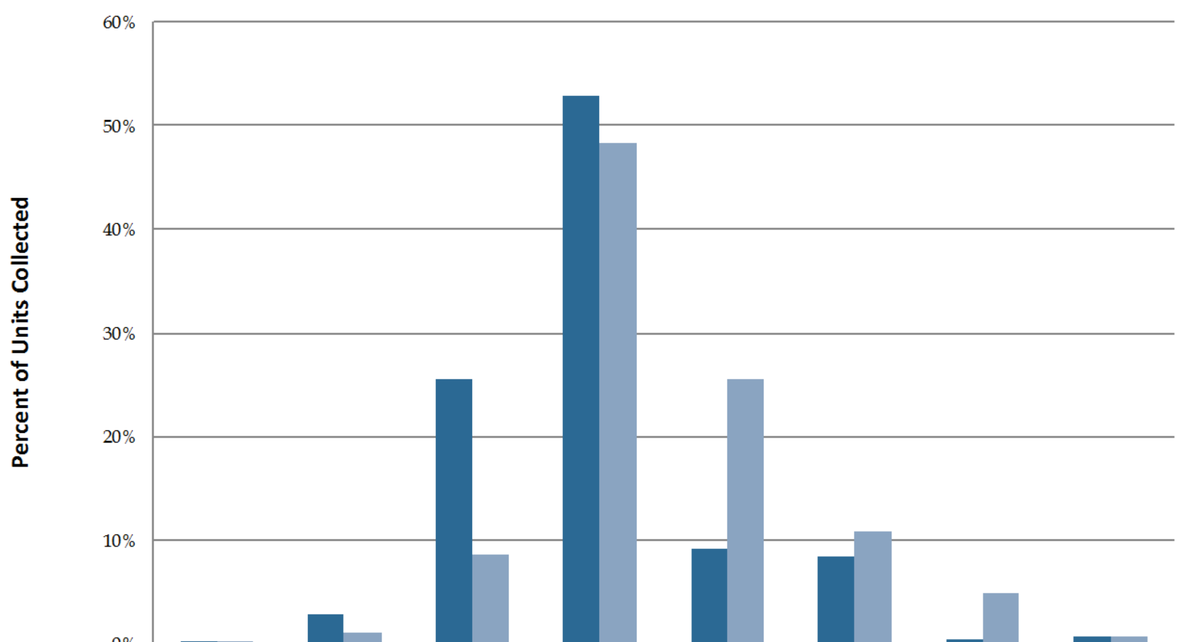
4.1.8 Refrigerators and Freezers Recycled by Labeled Amperage

The program tracking data also included information on the operating amperages listed on the appliances. The distribution of labeled amperage is shown in Figure 4-4. . While this information was not missing for any refrigerator or freezer records, it did equal zero for 31 observations (25 refrigerators and 6 freezers). Because the amperage should not equal zero for any appliances recycled, the average of the labeled amperages for the specific appliance type was applied to these units for the audited savings analysis. The average labeled amperage was for 6.56 for refrigerators and 5.47 for freezers.

Figure 4-4. Labeled Amperage of Recycled Appliances



	0 amps	1 to <3 amps	3 to <5 amps	5 to <7 amps	7 to <9 amps	9 to <11 amps	11 to <13 amps	More than 13 amps
Freezer	0.2%	2.8%	25.6%	52.8%	9.1%	8.5%	0.4%	0.7%
Refrigerator	0.2%	1.1%	8.5%	48.3%	25.5%	10.8%	4.9%	0.7%

Note. Total for freezers sums to greater than 100 percent due to rounding.

4.2 *Impact Findings*

This section begins with a summary of the evaluation-calculated energy and demand savings for 2012. Savings for the Appliance Recycling Program in 2012 are based on refrigerators and freezers recycled through the program and do not include room air conditioners, for which no savings are claimed by AEP Ohio. The remainder of this section contains a discussion of the estimated energy and demand savings. This section ends with an examination of realization rates for the program, which compares the evaluation-calculated *ex-post* impacts with the program-reported ex-ante impacts.

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4.2.1 Summary of Impact Findings

The *ex-post* energy and demand savings for 2012 were 14,783 MWh and 1.86 MW. The program achieved 79 percent of its energy savings goal of 18,962 MWh and 54 percent of the peak demand goal of 3.67 MW.[6]

4.2.2 In Situ Energy Savings

Mean values in the AEP Ohio program tracking data that were used to support the impact calculations are shown in Table 4-4. The means for binary variables are the portion of the population in the program tracking data that indicated the value shown.

Table 4-4. Characteristics of Appliances Picked Up (source: Program Tracking Data)

Variable	Mean Value in Program Tracking Data
80s	38.83%
90s	36.41%
age	24.93 years
before 80	16.78%
before 90	55.63%
before 93	68.83%
CDD	2.60 (annual average per day)
chest	7.87%
freezer	21.78%
ISD [(a)]	Refrigerators: 16.41%; Freezers 12.88%
manual defrost	14.05%
primary	29.69%
side by side	19.62%
single	3.40%
size	17.87 cubic feet
unconditioned space	50.95%

Note. Variable definitions are provided in Table 3-5.
[(a)] Household size is one component of the ISD variable. The participant telephone survey showed that 65.1% of households have one or two people and 34.9% of households have three or more.

Table 4-5 shows the results of the modeling procedures discussed in Section 3.8.1, which are used to compute the UEC estimates for each unit in the program tracking database. The mean value from all five

[6] Program goals are documented in the AEP Ohio 2012-2014 Energy Efficiency/Peak Demand Reduction (EE/PDR) Action Plan dated November 29, 2011.

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equations was extrapolated to the total number of units in the program tracking database after adjusting for part-use.

Table 4-5. Estimated In Situ Annual Unit Energy Savings

Equation	Refrigerators		Freezers	
	Mean UEC (kWh)	Std. Dev.	Mean UEC (kWh)	Std. Dev.
Eq. 1	979	420.88	1,213	397.97
Eq. 2	1,121	249.59	1,023	257.49
Eq. 3	1,132	477.47	1,065	390.82
Eq. 4 (b)	1,159	284.80	825	0.00
Eq. 5	1,065	413.14	1,063	254.70
Mean	1,091	342.93 (a)	1,038	227.03 (a)

(a) The reported standard deviation for the mean across all five equations is based on taking the mean for each appliance and then averaging across all 12,139 appliances.
(b) The standard deviation for freezers is zero for Equation 4 because the calculation for freezers is a constant multiplied by the result for refrigerators. See Table 3-4.

4.2.3 Part-Use Factor

The evaluation team used a part-use factor to provide an adjustment for the number of months of operation for appliances recycled by the program. This part-use factor was calculated for both refrigerators and freezers from survey responses, as detailed in Section 3.8.1. For example, if an appliance only operated three months of the year, then only 25 percent (90 days out of 365 days) of the savings associated with a full-year operation would apply towards program savings. Only the secondary appliances were used when calculating part-use, as it is assumed that participants who recycled primary units did so because they purchased new primary units, and thus the recycled primary unit would have become a secondary unit in the absence of the program. On average, survey participants reported using their secondary refrigerators and freezers 87 percent and 93 percent of the time, respectively. Therefore, the part-use factor for refrigerators is 0.87, and the part-use factor for freezers is 0.93.

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4.2.4 *Ex-Post* Energy Savings

The *ex-post* energy savings were calculated by multiplying the total energy use from the regression analysis by the part-use factor, as indicated in Section 3.8.1. The results are shown in Table 4-6.

Table 4-6. *Ex-Post* Energy Savings

		Refrigerators		Freezers	Total
Average In Situ UEC (kWh)		1,091		1,038	-
Part-Use Factor (PUF)	x	0.87	x	0.93	-
Average Part-Use UEC (kWh)		949		965	-
Number of Units	x	12,139	x	3,381	15,520
Ex-Post Energy Savings (kWh)		11,519,911		3,262,665	14,782,576

4.2.5 Unadjusted Demand Savings

The Unit Demand Consumption values (UDCs) were calculated using the approach referenced and described in Section 3.8. As shown in Equation 3-4, the performance period factor was derived based on an average 8.23 CDD from June 1 to August 31, and the resulting energy use was divided by the value obtained using the average 2.60 CDD across the year, for both equation 2 and equation 3 listed in Table 3-4. The resulting mean performance period factors are 1.02 for refrigerators and 1.09 for freezers, as shown in Table 4-7.

Table 4-7. Performance Period Factors for Refrigerators and Freezers

Equation	Refrigerators	Freezers
Eq. 2	1.03	1.07
Eq. 3	1.02	1.11
Mean	1.02	1.09

The evaluation team used this performance period factor along with the in situ *ex-post* UEC values to determine the average unit UDCs as indicated in Section 3.8.2. The average unit UDC for refrigerators was 0.12 kW and for freezers was 0.13 kW in 2012, as shown in Table 4-8.

Table 4-8. Unadjusted Per-Unit Demand Savings

		Refrigerators		Freezers
Average Demand (kW)		0.12		0.12
Performance Period Factor	x	1.02	x	1.09
Summer Demand (kW)		0.12		0.13

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4.2.6 Summer Use Adjustment Factor

The evaluation team then computed the summer use adjustment factor from the percentage of AEP Ohio customers who use their appliances during the summer, as indicated in Section 3.8.2. Using the participant survey data, the summer use adjustment factor was calculated to be 0.98 for refrigerators and 0.93 for freezers. As with the part-use factor, the summer use factor for refrigerators is calculated using only secondary units, because it is assumed that all primary refrigerators that are recycled would have become secondary units in the absence of the program; all freezers are considered to be secondary for the analysis.

4.2.7 *Ex-Post* Demand Savings

Finally, the evaluation team used the summer use factor to adjust the results of Unit Demand Consumption regression analysis as indicated in Section 3.8.2. Table 4-9 summarizes the results of this adjustment.

Table 4-9. Demand Savings Adjusted for Summer Use

	Refrigerators	Freezers	Total
Summer Demand (kW)	0.12	0.13	-
Summer Use Adjustment Factor	x 0.98	x 0.93	-
Average Adjusted UDC (kW)	0.12	0.12	-
Number of Units	x 12,139	x 3,381	15,520
Ex-post Adjusted Demand Savings (kW)	1,457	406	1,862

4.2.8 Realization Rates

Table 4-10 shows that *ex-post* kWh savings for 2012 did not meet the goal set by AEP Ohio.

Table 4-10. Program Year 2012 Goals Versus Actual

Energy Savings (MWh)			Demand Savings (MW)		
Goal	Actual	Difference	Goal	Actual	Difference
18,962	14,783	- 4,179	3.67	1.86	- 1.81

AEP Ohio Appliance Recycling Program reports ex-ante values in the tracking data. Table 4-11 shows the realization rates for the Program Year 2012 AEP Ohio Appliance Recycling Program. For energy savings, the realization rate is 0.54. For demand savings, the realization rate is 0.49. Put another way, the *ex-post* energy savings were 54 percent of the ex-ante claimed savings, and *ex-post* demand savings were 49 percent of the estimated ex-ante values. These discrepancies are due to fact that the *ex-post* evaluated savings were based on more recent metering studies than those used to estimate the ex-ante values, while the impact calculation method used in previous evaluation years was utilized by AEP Ohio to calculate ex-ante savings.

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Table 4-11. Program Year 2012 Realization Rates

Ex-Ante Claimed Savings		2012 *Ex-post* Savings		Realization Rates	
MWh	MW	MWh	MW	Energy	Demand
27,254	3.81	14,783	1.86	0.54	0.49

4.3 *Process Findings*

From a program process perspective, the Appliance Recycling Program is operating effectively. Over the course of the 2012 evaluation, the evaluation team observed the following program operation trends:

» Very high participant satisfaction; compared to 2011, participants reported moderate, statistically significant, increases in satisfaction for both the incentive amount and the time between enrollment and appliance pickup.
» Consistent month-to-month collection volume throughout the 2012 program year, which enabled consistent staffing on the JACO collection team.
» Improved field data collection processes that resulted in substantially decreased rates of missing or inaccurate information.
» Decreased program dropout rates.
» An overwhelming majority of participants who reported their appliances were working when picked up, indicating the program is only picking up operational appliances.

In addition to these operational program trends, awareness of the program among the general population of residential customers (55 percent) has significantly increased over 2011 (43 percent), suggesting that marketing efforts are paying off. The program is being cross-promoted with the Efficient Products Program, meaning that retailers partnering with the Efficient Products Program are also made aware of the Appliance Recycling Program so they can promote it to their customers purchasing a new refrigerator or freezer. Surveyed participants reported hearing of the program through retailers that partner with the Appliance Recycling Program but also through retailers that partner with the Efficient Products Program.

The only potential challenge from a process perspective is the low enrollment rate achieved through the retail partnership. There continue to be few enrollments through the retail partnership, despite the fact that the retail partnership began in 2010 and an additional retail partner was added in 2012. At the same time, participants reported increased awareness of the program through sales associates and store advertisements compared to last year. In-depth interviews with program staff noted that it can be challenging for sales associates at one of the retail partners to enroll customers in the program because enrollments can only take place on traditional checkout registers, whereas sales associates are being encouraged to complete transactions using iPads. In fact, only 14 percent of the survey respondents who first learned of the program from either in-store sales associates or in-store displays ($n = 40$) reported that they signed up in-store. The remaining respondents signed up over the phone (60 percent) or online (24 percent), with 1 percent reporting that they signed up through the mail. According to the retail program

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manager at JACO, the iPad software is scheduled to be updated in 2013 to enable enrollment into the program.

Detailed findings of the process evaluation of the 2012 Appliance Recycling Program are discussed below, and include the following topics:

- Participant satisfaction
- Marketing and program awareness
- Motivations for appliance disposal
- Customer enrollment process
- Cancelled appointments
- Appliance collection process
- Functionality of collected appliances
- Incentive payment process
- Actions absent the program
- Barriers to participation
- Program tracking data review

4.3.1 Participant Satisfaction

An important metric of program success is the satisfaction of program participants. As in past years, participants in the 2012 Appliance Recycling Program reported a high level of satisfaction with both the program overall and its individual components. The average reported satisfaction with the overall program was 4.84 on a scale of 1 to 5 (where 1 was "very dissatisfied" and 5 was "very satisfied"). As shown in Table 4-12, satisfaction with the individual program processes was also high. The collection team and the sign-up process received the highest satisfaction ratings from participating customers. These components of the program also had the highest satisfaction ratings in the 2011 evaluation. Compared to 2011, participants reported a statistically significant increase in satisfaction with two components of the 2012 program (noted by asterisks in the table), the incentive payment amount and the time between enrollment and appliance pickup. According to the Appliance Distribution staff interviewed by the evaluation team as part of the 2012 evaluation, the appliance collection teams responsible for picking up appliances from customer homes have two goals that they strive to meet for each program participant:

- A maximum period of 10 to 14 days between scheduling and pickup
- A pickup within the four-hour timeframe that customers schedule

For the 2012 program year, Appliance Distribution staff reported that they were able to meet their goals for "98 to 99 percent" of the appliance pickups. Appliance Distribution staff also reported that there was less turnover among collection personnel due to the more consistent demand experienced by the 2012 program compared to the 2011 program. These two factors may have contributed to the increase in participant satisfaction with the time between enrollment and appliance pickup component of the 2012 program.

The increase in customer satisfaction with the incentive payment amount may be due to the increased incentive payment amounts for the 2012 program compared to the 2011 program. The 2012 program

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offered an incentive amount of $50 from January through October and a $60 incentive amount in November and December. The 2011 program offered a $35 incentive amount from January through May, September, and October. For the months of June through August as well as November and December, the 2011 program offered a $50 incentive.

Table 4-12. Mean Satisfaction Scores

Program Aspect	Satisfaction Rating Scale of 1 to 5		
	Mean	n [a]	Standard Deviation
Collection team	4.91	364	0.42
Sign-up experience	4.88	334	0.46
Program overall	4.84	377	0.44
Program communications [b]	4.78	107	0.72
Payment amount	4.74*	373	0.56
Time between enrollment and pickup	4.65*	378	0.78
Realized savings [c]	4.55	138	0.67
Time between pickup and payment [d]	4.49	277	0.85

* There was a statistically significant increase in satisfaction ratings in 2012, compared to 2011, for payment amount (2011 mean = 4.61, $t(750) = -2.678$; $p = 0.008$) and time between enrollment and pickup (2011 mean = 4.52, ($t(755) = -2.277$; $p = 0.023$).
(a) The number of respondents excludes those who responded "Don't know" or refused to answer the question.
(b) Only the respondents who reported that they spoke with program staff (29% of total respondents) were asked to report their satisfaction with this communication.
(c) Only the respondents who reported noticing energy savings (37% of all respondents) were asked to report their satisfaction with the savings.
(d) Only the respondents who reported that they knew how long it took to receive their check (73% of all respondents) were asked about their satisfaction with the time it took.

Respondents who noticed savings on their bill (37 percent of respondents) reported high satisfaction levels with the savings. The remaining 63 percent of respondents did not report noticing any savings. Responses varied somewhat by appliance type, with 53% of those who recycled a freezer reporting no noticeable savings, and 61% of those recycling a refrigerator reporting no noticeable savings. One reason why respondents may not have noticed savings is due to rate increases.

As shown in Table 4-13, a majority of respondents were very satisfied with AEP Ohio as their electric company. When asked to report how satisfied they were with having AEP Ohio as their utility, based on their overall experience with the service of AEP Ohio, respondents stated that they were generally satisfied with AEP Ohio. Only 8.3 percent stated that they were either somewhat dissatisfied or very

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dissatisfied. The level of dissatisfaction among respondents is higher than what was reported from the 2011 program evaluation, which had only 3.8 percent of participants report dissatisfaction. This decrease in satisfaction with AEP Ohio as a service provider was statistically significant.[7]

Table 4-13. Satisfaction with AEP Ohio

Satisfaction Rating	Frequency	Percent
Very satisfied	204	54.7%
Somewhat satisfied	108	29.0%
Neither satisfied nor dissatisfied	30	8.0%
Somewhat dissatisfied	22	5.9%
Very dissatisfied	9	2.4%
Total	373	100%

Note. Five responses are not shown in the table: three respondents answered "Don't Know" to this question, and there were two refusals.

Twenty-nine (out of 31) participants provided reasons for their dissatisfaction with having AEP Ohio as their electric company. The most frequently mentioned reasons were related to electricity prices ($n = 11$) and power outages ($n = 5$).

Respondents were also asked to report whether participating in the program had changed their opinion of AEP Ohio in terms of being more favorable, less favorable, or no different. As shown in Table 4-14, more than half of respondents reported that participating in the program had improved their opinion of AEP Ohio, while less than 1 percent said participating in the program contributed to a less favorable opinion of AEP Ohio.

Table 4-14. Effect of Program Participation on Attitude toward AEP Ohio

Response	Frequency	Percent
More favorable toward AEP Ohio	205	54.2%
Less favorable toward AEP Ohio	2	0.5%
No different about AEP Ohio	167	44.2%
Don't know	1	0.3%
Refused	3	0.8%
Total	378	100%

[7] $t(749) = 2.408$; $p < 0.05$

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All participants were asked if they had suggestions for improving the program. In total, 81 participants offered specific suggestions. The most frequently mentioned suggestions are listed below. The relatively few respondents who offered each suggestion underscores the fact that overall satisfaction with the program is very high.

- Offer a larger incentive for recycling appliances (15 participants)
- Improve marketing efforts (13 participants)
  - Specifically, 2 participants mentioned the need for more TV and radio advertisements, while another 2 mentioned the need for more bill inserts
- Expand the program to more stores and a wider variety of appliance types (8 participants)
- Shorten the wait time between pickup and receiving the incentive (8 participants)
- Shorten the wait time between enrollment and pickup (6 participants)

4.3.2 Marketing and Program Awareness

In 2012, the Appliance Recycling Program was advertised through a number of marketing channels including television, newspaper, and radio advertisements, web banner ads, bill inserts, the AEP Ohio website, community outreach events, flyers placed in partnering retail stores, and direct mail to targeted customers. In addition, the program offered an increased incentive ($60, increased from $50) for refrigerators and freezers in November and December. To generate awareness of this increased incentive offering, marketing efforts for the program were also increased during the final two months of the year. According to the JACO Manager of Consumer Programs, the November and December marketing efforts for the program and the increased incentive amount were primarily conducted using television and radio advertising.

The 2012 evaluation of the Efficient Products Program included a general population survey (n = 385) that asked a random sample of AEP Ohio residential customers about their awareness of the Appliance Recycling Program. Of the 385 customers surveyed, 55 percent of the residential population was aware of the program, compared to 43 percent in 2011. This represents a statistically significant increase in program awareness from 2011 to 2012.[8]

Table 4-15 shows the sources of program awareness among participant survey respondents. Respondents were first asked to report where they initially heard of the program. Respondents were next prompted to indicate if they had heard about the program from any additional sources since first learning about the program.

As Table 4-15 illustrates, bill inserts and television ads were the most frequently cited sources of program knowledge among participants. When asked where they had first heard of the program, 27 percent of the participant respondents recalled receiving a bill insert from AEP Ohio, and almost a fifth (18 percent) first learned through a television ad. In total, 52 percent of respondents recalled seeing references to the program in a bill insert and 38 percent recalled television ads. In addition, word-of-

[8] $X^2(1, 769) = 11.260$; $p = 0.001$

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mouth was frequently mentioned; 32 percent of respondents recalled hearing of the program from friends, neighbors, and relatives.

Table 4-15. Where Participants Heard of the Program: Survey Respondents

Source	First Heard of Program [a]	Percent	All Places Where Heard [b]	Percent
Bill insert	102	27.0%	198	52.4%
Television ad	69	18.3%	145	38.4%
Friend/relative/neighbor	63	16.7%	120	31.7%
In-store sales associate or advertising	40	10.6%	95	25.1%
Newspaper	34	9.0%	92	24.3%
AEP Ohio website	17	4.5%	76	20.1%
Direct Mail	16	4.2%	18	4.8%
Don't know	12	3.2%	12	3.2%
Other	25	6.6%	45	11.9%
Total	378	100%	N/A	N/A

Note. Total sums to greater than 100 percent due to rounding.

[a] Open-ended question.

[b] Closed-ended, prompted question. Multiple responses accepted.

The participant survey responses also suggest that a sizable portion (22 percent) of participants heard about the program from retail sales associates at some point. Figure 4-5 shows that 48 percent of respondents who heard about the program from a retail sales associate reported hearing about the program at one of the retailer partners in the Appliance Recycling Program, while 43 percent said that they had heard about the program from a retailer partnering with the Efficient Products Program. A similar pattern was found for in-store displays. Of those participants who had seen an in-store display for the program (n = 46), 50 percent had seen it at one of the participating retailers' locations, while the 46 percent had seen it at a retailer participating in Efficient Products but not Appliance Recycling.

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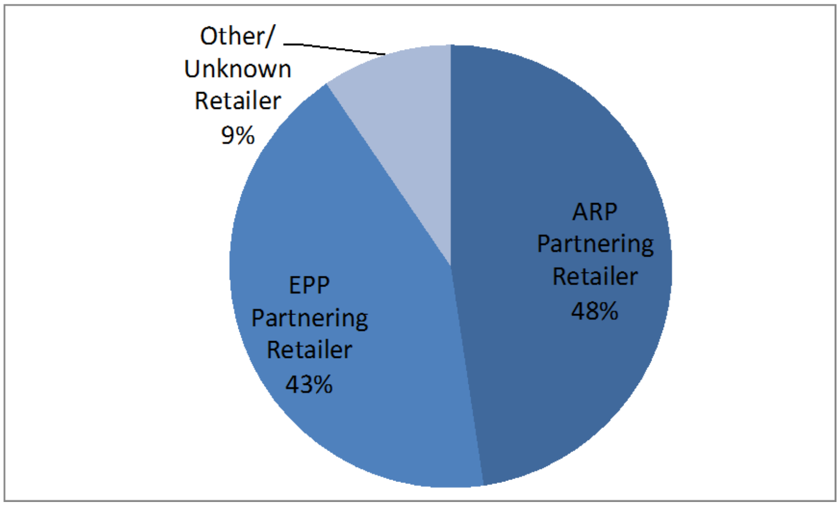
Figure 4-5. Stores Where Respondents Spoke with Sales Associates about the Appliance Recycling Program



Note. EPP = Efficient Products Program, ARP = Appliance Recycling Program. The "Other/Unknown Retailer" category includes refusals, cases where the respondent could not recall the retailer name, ambiguous responses, and retailers that the evaluation team was unable to match to either partnering retailer list.

Overall, 95 of 378 participant respondents (25 percent) reported hearing about the program through sales staff and/or in-store promotional materials.[9] This represents a large increase in customer awareness of the program from store staff and in-store promotional materials compared to 2011, when only 10 percent of participants heard of the program from either of those sources. There were statistically significant increases in participant awareness from in-store sales associates (from 8 percent in 2011 to 22 percent in 2012)[10] and from in-store advertising (from 5 percent in 2011 to 12 percent in 2012)[11] over the two program years. This finding suggests that in-store sales associates are playing a larger role in increasing initial and overall awareness of the program. The JACO Retail Program Manager reported that during the course of the 2012 program, JACO staff conducted two trainings at each store location of the two retailer partners in the program. The APT (the Efficient Products Program implementer) Program Manager confirmed that APT representatives also delivered Appliance Recycling Program training to retail sales associates at retailers participating in the appliance rebate component of the Efficient Products Program. Additionally, the APT Program Manager said that APT mentions the Appliance Recycling Program to customers who call the Efficient Products Program toll-free number.

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[9] Some customers had heard about the program through multiple retail channels; among 2012 program participants, 35 had heard from both store associates and in-store displays, 49 had heard from sales associates but not in-store displays, and 11 had heard from in-store displays but not store associates. In total, this represented 95 unique customers who had heard of the program through retail staff and/or promotional materials.
[10] $X^2(1, 761) = 29.602$; $p < 0.001$
[11] $X^2(1, 761) = 13.780$; $p < 0.001$

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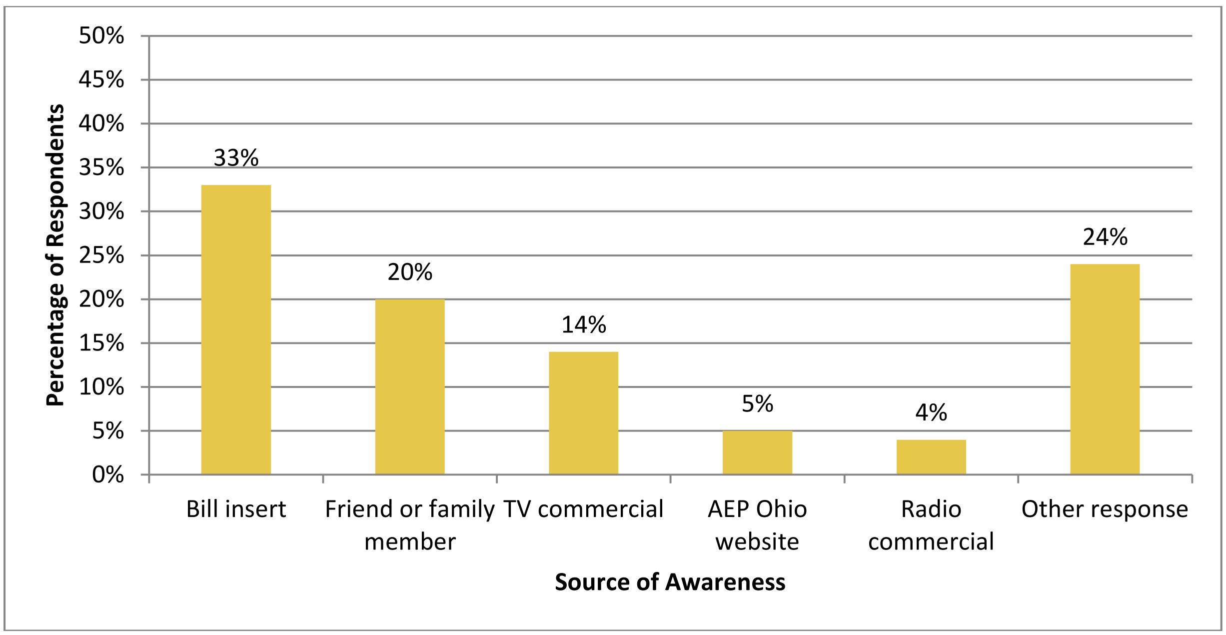
Figure 4-6 show the most frequently mentioned sources of program awareness among the general population of residential AEP Ohio customers. Sources of awareness among the general population were generally quite similar to those of participants. Of those 211 general population respondents who were aware of the program and answered the question, the most frequently mentioned sources of initial awareness of the program were bill insert, word of mouth, and television commercial.

Figure 4-6. Initial Source of Awareness among General Population Respondents Who Were Aware of Appliance Recycling Program (*n* = 211)



A notable difference between the general population and program participants is that only three percent of the general population respondents attributed initial awareness to in-store demonstrations (1 percent) or in-store signage (1 percent), the two least frequently mentioned sources of awareness among the general population. This is compared with 11 percent of participants who said they first heard of the program through an in-store sales associate or in-store advertising, as shown in Table 4-15. This difference between the general population and participating customers in the rate of initial awareness from in-store sources is statistically significant.[12] Because program participants were disproportionately more likely to have first heard of the program in retail stores compared to the general population of AEP Ohio customers, it is likely that in-store contact is motivating customers to participate in the program. Figure 4-7 illustrates the most cited ways in which respondents first heard about the program in 2011 and 2012. As shown, the major changes in sources of awareness between 2011 and 2012 were from newspapers and in-store sales associates: while fewer people first heard about the program from a newspaper in 2012, more first heard about it from a sales associate. Awareness from newspapers appears to be consistently decreasing, as indicated by the decline from 39 percent of respondents in 2010 to 9 percent in 2012. One potential factor in this decrease in initial awareness from newspaper

[12] X^2 (1, 564) = 10.701; $p < 0.01$

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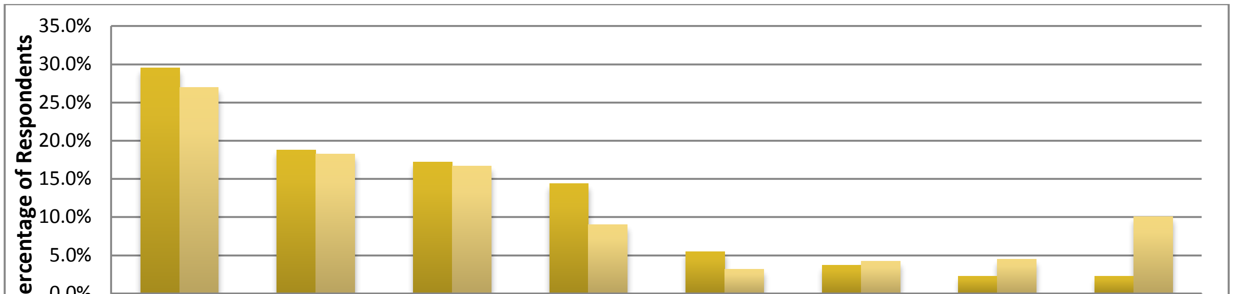
advertisements is the decrease in the number of newspapers that the program advertised with between 2011 (ten) and 2012 (seven). Although newspapers have declined significantly as the *first* source of program awareness from 2010 to 2012, it should be noted that when all sources of awareness are taken into account, not just the first source, 24 percent of respondents indicated they had seen the program advertised in a newspaper (as shown earlier in Table 4-15), so newspapers may still be contributing to overall awareness of the program.

Figure 4-7. Where Surveyed Participants Most Commonly Reported First Learning of the Program



	Bill insert	Television ad	Friend/relative/neighbor	Newspaper	Don't know	Direct mail	AEP Ohio website	In-store sales associate
2011	29.5%	18.8%	17.2%	14.4%	5.5%	3.7%	2.3%	2.3%
2012	27.0%	18.3%	16.7%	9.0%	3.2%	4.2%	4.5%	10.1%

Note. For comparison purposes, only categories with the highest percentages of responses are included. Thus, responses do not add up to 100%.

In addition to asking survey respondents how they heard about the program, the evaluation team also examined data regarding program awareness that is collected by JACO, the program implementer. When customers enroll in the program, they are asked to report how they heard about the program, and the response to this question is recorded in the program tracking data. As shown in Table 4-16, the program tracking data capture a variety of sources of program awareness across numerous channels, including program-specific marketing campaigns, word of mouth, and through non-program-specific contact with AEP Ohio.

At enrollment, customers reported hearing about the program in similar ways to how customers reported first hearing about the program during the participant telephone survey. As shown in the right-most column of the table, bill inserts (33 percent), friends/neighbors (17 percent), television ads (14 percent), and appliance retailers (8 percent) were the most frequently recorded sources of program awareness in the program tracking data. A notable difference between the results from the program tracking data and participant phone survey is that the tracking data reveals that a fair number of customers heard about the program through contact with AEP Ohio outside of traditional marketing channels at higher rates than what was recorded in the participant telephone survey. For example, 5 percent of the participants heard about the program through an AEP Ohio Home Energy Report. In the participant telephone survey, no customers mentioned this source, and the survey did not directly ask about this source.

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Table 4-16. Where Participants Reported Hearing of the Program at Enrollment, by Sign-Up Method

Source of Awareness	Sign-Up Method		
	Phone (n = 10,659)	Web (n = 3,764)	All Participants (N = 14,507) [a]
Utility bill insert *	**39.9%**	13.1%	32.7%
Friend/neighbor *	15.9%	**20.4%**	17.0%
Television advertising/news *	12.9%	**17.6%**	14.1%
Appliance retailer*	**10.5%**	0.1%	8.3%
Newspaper advertising	6.0%	6.5%	6.1%
AEP Ohio Home Energy Report *	1.4%	**15.3%**	5.0%
Other	13.4%	27.0%	16.8%
Total	100%	100%	100%

Note. Total sums to less than 100 percent due to rounding.
*Asterisks indicate a statistically significant difference between the phone and web sign-up groups for that particular source of awareness ($p < 0.05$). Boldface type indicates the enrollment method with the highest percentage, where there are significant differences. Although collapsed under the "Other" category, there were also statistically significant differences (with those who signed up via web having a larger proportion of responses) for those who first heard from: being a repeat customer, the utility company website, a web advertisement/search, radio advertising, an AEP Ohio employee referral, a utility newsletter, and ValPak.
[a] This column represents the percentage of all customers (n = 14,507) captured in the tracking data by source of awareness, including the 84 customers who signed up at a retailer. Because program data indicated that all 84 respondents who signed up at a partnering retailer first heard about the program from a retailer, these participants are not shown as a separate column in the table.

Additional analysis of the program tracking data was conducted to determine if participants' sources of awareness varied by enrollment method (i.e., telephone, online, or through a partnering retailer). In addition to showing source of awareness across all participants, Table 4-16 shows source of awareness separately for those who enrolled via telephone and those who enrolled online. The program data indicated that all respondents who signed up at a partnering retailer (n = 84) first heard about the program from a retailer; thus, these respondents are not shown separately in the table.

As Table 4-16 highlights, those customers who signed up online—compared to those who signed up over the telephone—were more likely to have first heard about the program through a friend/neighbor, TV ad, AEP Ohio Home Energy Report, by being a repeat customer, from the utility company website, from a web ad or search, radio ads, utility newsletters, ValPak,[13] or from a AEP Ohio employee. Those customers who signed up over the telephone were more likely to have heard about the program from a bill insert or appliance retailer than those who signed up on the AEP Ohio website.

[13] ValPak provides coupons and local offers to consumers through direct mail packets and online.

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One reason for undertaking the analysis of tracking data was to address AEP Ohio's concern that customers signing up online might be choosing responses randomly if their true source of awareness is not represented in the online list, because there is no "other" response option. In this situation, one might expect to see the responses of those who signed up online somewhat more equally or randomly distributed among the existing response options, compared to those who sign up via telephone, which is not reflected in the response data. Thus, there is no clear evidence that online enrollees are choosing responses at random due to the lack of an "other" option.

4.3.3 Motivations for Appliance Disposal

Respondents were asked an open-ended question about their reasons for wanting to dispose of their appliance. Those responses were coded into the most frequently mentioned categories listed in Table 4-17 below. It is worth noting that 13 percent of respondents cited the desire to take advantage of the program as a key motivating factor for disposing of their appliance.

Table 4-17. Participants' Most Frequently Mentioned Motivations for Disposing of Appliance

Reason for Disposing of Appliance	Refrigerator (n = 294)		Freezer (n = 81)		Total (n = 375)	
	Count	%	Count	%	Count	%
The appliance was not working properly	108	36.7%	16	19.8%	124	33.1%
The customer wanted a new appliance	84	28.6%	17	21.0%	101	26.9%
The appliance was expensive to run	40	13.6%	32	39.5%	72	19.2%
The appliance was not used very much	49	16.7%	21	25.9%	70	18.7%
The appliance was old, and the customer wanted something with more modern features	58	19.7%	11	13.6%	69	18.4%
The customer wanted to take advantage of the program	38	12.9%	11	13.6%	49	13.1%

Note. Responses do not sum to 100% because multiple responses were accepted. Percentages for this table were calculated by considering the 294 refrigerator customers and 81 freezer customers that provided a reason for disposing of their appliance (and thus 375 total respondents for this question). The three respondents who did not provide a reason are not shown in the table.

4.3.4 Customer Enrollment Process

As noted earlier in Table 4-16, most participating customers enrolled via telephone (*n* = 10,659, 74 percent), followed by online enrollments (*n* = 3,764, 26 percent) and enrollments through one of the two retail partners (*n* = 84, less than 1 percent). Most respondents reported that the enrollment process for the 2012 Appliance Recycling Program presented few barriers to program participation. Respondents who signed up over the telephone (71 percent of those included in the survey) frequently reported that the representative was polite and able to answer all of their questions. When asked to rate the politeness of the telephone representative on a scale of 1 to 5 (where "1" is not at all" and "5" is "very much"), 97 percent reported a "4" or "5". Likewise, 97 percent of respondents reported that the representatives were able to answer all of their questions.

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Of those that signed up online (25 percent), most reported that it was an easy process (99 percent), that the website answered all of their questions (97 percent), and that they received confirmation that their enrollment was successful (99 percent). Finally, when asked, 99 percent of the respondents reported that they were able to schedule a collection time that was convenient for them. As in 2011, there was no statistically significant difference in the reported overall program satisfaction or reported satisfaction with the enrollment process between those that enrolled online and those that enrolled over the telephone.

4.3.5 Cancelled Appointments

The Appliance Recycling Program appointment cancellation data contains all of the customers who signed up for the Appliance Recycling Program and then cancelled or changed their pick-up appointment at least once. The evaluation team reviewed these data with the following objectives:

- Determine how many customers enroll in the program but then cancel.
- Determine how many of those who cancel re-enroll and participate in the program at a later date.
- Determine how many customers cancel and never re-enroll in the program.

To determine how many cancellations represent true dropouts and how many go on to eventually participate in the program, the evaluation team compared the cancellation data with the program tracking data, using the same approach as in 2011. A detailed explanation of the method for analyzing the cancellation data can be found in Section 4.3.7 of the Program Year 2011 evaluation report.

4.3.5.1 Customer Cancellations and Drop-Out Rate

Of the 3,349 customers contained in the cancellation data, 2,967 cancelled their appointment for the program only once, 322 customers cancelled their appointment twice, and 60 customers cancelled their appointment three or more times.

Of customers who cancelled an appointment one or more times, 43.4 percent eventually participated in the program, while the remaining 56.6 percent never participated in the program. As shown in Table 4-18, the overall dropout rate for the 2012 program was 12 percent[14]

[14] X^2 (1, 31,871) = 140.949; $p < 0.01$

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Table 4-18. Participation vs. Drop-Out after Initial Enrollment in the Program

Behavior After Initial Enrollment	Number of Customers	Percent of Customers
Kept Original Appointment and Never Cancelled	12,894	79.4%
Cancelled At Least Once And Eventually Participated	1,454	9.0%
Cancelled At Least Once And Never Participated (e.g., "Near-Participants" or "Drop-Outs")	1,895	11.7%
Total Number of Customers Who Initially Enrolled in the Program	16,243	100%

Note: Total percentage adds to 100.1% due to rounding.

4.3.6 Appliance Collection Process

Eighty-seven percent of survey respondents reported that they received a confirmation telephone call from the collection team just before the pick-up took place, and only two percent reported that they did not receive a telephone call; the remaining eleven percent of respondents could not recall. Ninety-seven percent reported that the collection team arrived on time. Participants gave the collection team an average satisfaction score of 4.91 on a 1 to 5 scale, which was the highest average rating across all of the program components.

4.3.7 Functionality of Collected Appliances

The Appliance Recycling Program requires that appliances be in working order to qualify for the program. Table 4-19 illustrates the condition of the appliances as reported by survey respondents. The vast majority of surveyed participants reported that their appliances were in working condition prior to the appliance being picked up through the program, although the participants who recycled refrigerators were somewhat more likely to report having recycled an appliance that was not fully functional. Because these responses are based on self-reporting, and the reported condition of the appliance is somewhat subjective, it is difficult to know exactly how many, if any, non-operational appliances were picked up for the program. However, all in all, these results suggest that the incidence of non-operational appliances being picked up for the program is likely quite low.

Table 4-19. The Condition of Appliances Picked Up by Appliance Recycling Program

Condition of Appliance	Refrigerators	Freezers
It effectively cooled its contents	65.2%	90.1%
It partially cooled its contents	31.4%	9.9%
It did not cool its contents	3.4%	0.0%

4.3.8 Incentive Payment Process

According to JACO, customers can expect to receive their incentive checks within four to six weeks of appliance pickup. Only six percent of survey respondents reported that either their check arrived later

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than six weeks or they had not yet received it at the time if the survey, although 26 percent could not recall when the check arrived. The average satisfaction rating survey respondents provided for the time it took to receive their check was 4.49 on a 1 to 5 scale.

The evaluation team also examined the amount of time between appliance pickup and the incentive payment date tracked by JACO in the program tracking data. The tracking data indicate that the time between when the appliance was picked up and when the payment was sent had a range of 1 to 37 days, with an mean value of 22 days. While the participant survey asked about length of time it took to *receive the payment check* after pickup, the tracking data captures length of time for the *payment check to be sent* from JACO after pickup; even so, the participant survey and tracking data largely aligned in terms of the time between appliance pickup and incentive payment. Of those survey respondents who could remember how long it took to receive their incentive check in the mail ($n = 279$), 70 percent reported receiving their checks between 1 and 4 weeks after having their appliance picked up, while the tracking data indicate that 72 percent of checks were sent in that same time frame. The only major discrepancy in the two data sets is that the tracking data indicate that no checks were sent after 37 days (about 5.3 weeks), yet four percent of survey respondents reported that they did not receive their checks until at least 49 days (7 weeks) after pickup, and an additional 1 percent of survey participants reported that they never received their checks (even though calls for the telephone survey took place at least 8 weeks after pickup). However, given the low rate of these discrepancies, any systemic issue with the timing of incentive payments is unlikely; rather, these discrepancies can more likely be attributed to other sources, such as postal delivery delays, postal delivery failures, or poor survey respondent recall.

4.3.9 Actions Absent the Program

The participant survey provides evidence that the program is effective at influencing customer decisions to remove appliances from service that may have otherwise continued to contribute to residential electrical consumption and demand. As shown in Table 4-20, respondents reported that, without the program, 72 percent of the appliances would have either been kept in service at some level or disposed of such that the appliance would likely remain in service at another household (e.g., sold, given away for free). These findings imply that the program is influencing customers to remove unwanted appliances from service, thus reducing electrical consumption and peak electric demand.

Respondents were asked a series of questions about what they would have done without any assistance from the program (i.e., the rebate, the free pick-up). When asked, 25 percent of respondents who recycled a refrigerator and 27 percent of those who recycled a freezer reported they would have kept the appliance in use. In addition, 47 percent of those who recycled a refrigerator and 44 percent of those who recycled a freezer reported that they would have removed it from their home, but either 1) sold it to someone else, 2) given it away for free, or 3) had it removed by a dealer (who may then resell the appliance). These removal methods are likely to result in the appliance continuing to be in service at another household.

The most frequently reported method of disposal absent the program was giving it away for free (23 percent), followed by removing the appliance to a dump or recycling center (20 percent). Of the 24.9 percent who would have kept appliances as secondary units without the program, most would have

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kept the appliance plugged in and in use all the time. These findings are very similar to those identified during the 2011 program evaluation and suggest that the program is continuing to influence the removal of less-efficient appliances.

Table 4-20. What Participants Would Have Done with the Appliance Without the Program

Status	Action Absent the Program	Refrigerator		Freezer		Total	
		Count	%	Count	%	Count	%
Off Grid	Dump/Recycling Center	55	19.9%	14	17.7%	69	19.4%
	Stored unplugged	23	8.3%	9	11.4%	32	9.0%
Total Off Grid		78	28.2%	23	29.1%	101	28.4%
Potentially On Grid	Sold it	20	7.2%	10	12.7%	30	8.4%
	Gave it away for free	61	22.0%	19	24.1%	80	22.5%
	Removed by dealer	50	18.1%	6	7.6%	56	15.7%
	Secondary, used all the time	50	18.1%	21	26.6%	71	19.9%
	Secondary, special occasions	8	2.9%	0	0.0%	8	2.2%
	Secondary, certain months	10	3.6%	0	0.0%	10	2.8%
Total Potentially On Grid		199	71.8%	56	70.9%	255	71.6%
Total		277	100%	79	100%	356	100%

Note. Twenty-two respondents replied "Don't Know" to this question and are not included in the table.

4.3.10 Barriers to Participation

In a general population survey of 385 AEP Ohio residential customers, respondents were asked a series of questions to determine their eligibility, awareness, and participation in the Appliance Recycling Program.[15] Eligible customers included those who reported having more than one refrigerator and/or having a stand-alone freezer in their home. As shown in Figure 4-8, survey responses suggest that eligible customers account for roughly 59 percent of the residential general population. Overall, 92 percent of the 227 customers surveyed who were eligible for the program had not yet participated.

[15] This general population survey was conducted primarily to inform the Efficient Products Program, but included some questions to examine barriers to participation in other residential energy efficiency programs such as Appliance Recycling.

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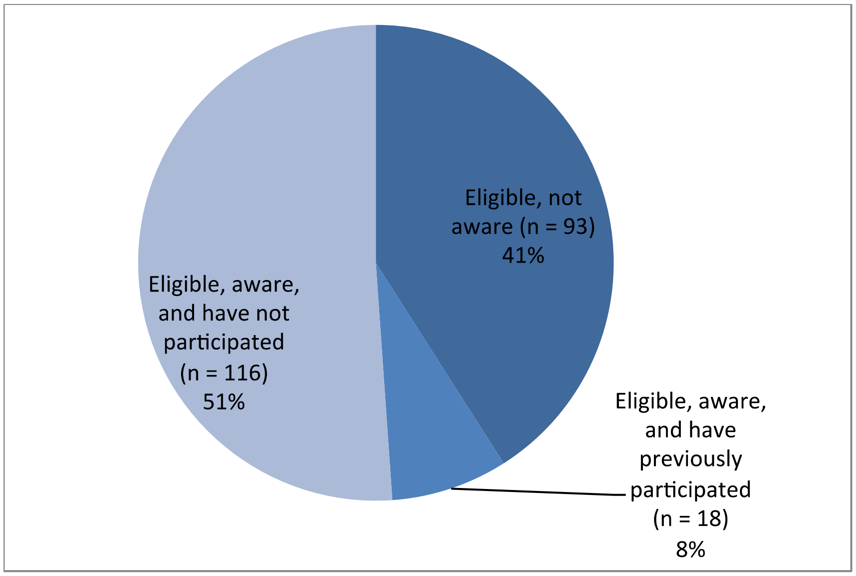
Figure 4-8. General Population Respondents' Eligibility for and Interaction with the Appliance Recycling Program



Eligible non-participant respondents who were at least somewhat familiar with the program (n = 116) were then asked about barriers to participation in the program. The most common reasons for not participating were:

- Existing equipment still works (35 percent, n = 41)
- Don't have an extra appliance to recycle (20 percent, n = 23)

The fact that 35 percent of eligible respondents who reported that they were familiar with the program mentioned that they had not participated in the Appliance Recycling Program because their appliance still works indicates that these customers may not be aware that appliances *must* be operational in order to participate in the program. Of those eligible respondents who stated that they do not have an extra appliance to recycle (n = 23), 57 percent reported having at least two refrigerators, and 22 percent reported having a stand-alone freezer, with 22 percent having at least two refrigerators and a stand-alone freezer. These customers apparently do not consider these appliances to be "extra," but rather as indispensable to their household. These findings indicate that there is opportunity to raise general awareness of the Appliance Recycling Program among the 24 percent who are eligible but not aware of the program, and to increase the awareness, of program requirements among those respondents who were aware of the program, eligible to participate, and had not done so already (n = 116), 62 percent reported that they were at least somewhat interested in participating.

Although the retailer partnership component of the Appliance Recycling Program comprises a relatively minor proportion of the total units recycled through the program, it should be noted that the JACO Retail Program Manager interviewed as part of the 2012 evaluation communicated a potential barrier to enrollment for customers who purchase new refrigerators or freezers at one of the participating retailers. According to the retail program manager, sales staff at this retailer are strongly encouraged to complete sales transactions on iPads instead of at traditional registers. According to the retail program manager, from an enrollment standpoint, this is a potential barrier because the iPad software used by the sales associates does not have the capability to enroll customers in the Appliance Recycling Program. According to the retail program manager at JACO, the iPad software is scheduled to be updated in 2013 to enable enrollment into the program.

4.3.11 Program Tracking Data Review

The evaluation team conducted a review of the program participation tracking data and documented any issues that were discovered. All of the issues identified were generally associated with incomplete records for a number of tracked fields. Most fields were well populated, particularly the most important fields for the evaluation and the regression-based impacts determination (age, size, configuration, defrost mode, and labeled amperage). However, a small percentage of the tracked fields were missing, or the entry was designated "unknown" or "N/A." Furthermore, some data were entered incorrectly, or in a way that makes accurate tracking of participants across time very difficult. For example, when stand-alone freezers are described as "top freezer" or "bottom freezer;" these units are re-coded by the evaluation team for analysis, but the actual characteristics are not known. Without knowing the actual characteristics, the extent that the population of appliances picked up by the program may be changing is unclear. However, the evaluation team notes that the program tracking data is more complete this year than in the past.

In both the initial data sent in October of 2012 and in the initial final program year data sent in January of 2013, there was a batch of appliances that were not properly read into the tracking database. The evaluation team found the following issues in the initial program tracking data files:

- In the initial data, one file was read in twice, showing repeat participation.
- In the initial final data, one batch of files contained no information about the appliances other than the appliance type and date of scheduled pickup.

The quality issues in both iterations of data suggest that care must be taken in interpreting initial analyses based on pulls from the third-party implementer data because errors may be introduced in the act of pulling the data.

4.3.11.1 Variables Used in Impact Calculations

After the initial data issues were rectified, the evaluation team found the final data set to be more complete and valid than in previous years. Invalid entries for variables from the program tracking data that are used in the impact calculations for auditing ex-ante savings or calculating *ex-post* savings are shown in Table 4-21. As shown, less than 1 percent of the data for each field were invalid.

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Table 4-21. Invalid Entries in Program Tracking Data

Variable	Invalid Entries	Percent Invalid
Location Prior to Pick up (Loc Prior)	84	0.54%
Usage (Primary vs. Secondary)	72	0.46%
Defrost Type	35	0.23%
Labeled Amperage	31	0.20%
Configuration (Type Detail)	28	0.18%
Age (Year of Manufacture)	2	0.01%
Size (Appliance Capacity)	0	0.00%

4.4 *Cost Effectiveness Review*

This section addresses the cost effectiveness of the Appliance Recycling Program. Cost effectiveness is assessed through the use of the Total Resource Cost (TRC) test. Table 4-22 summarizes the unique inputs used in the TRC test.

Table 4-22. Inputs to Cost-Effectiveness Model for Appliance Recycling Program

Item	
Average Measure Life	8.0
Units Recycled	15,520
Annual Energy Savings (kWh)	14,783,000
Coincident Peak Savings (kW)	1,860
Third Party Implementation Costs	$606,512
Utility Administration Costs	$44,659
Utility Incentive Costs	$2,018,746
Participant Contribution to Incremental Measure Costs	$0

Based on these inputs, the TRC ratio is 1.8. Therefore, the program passes the TRC test. Table 4-23 summarizes the results of the cost-effectiveness tests. Results are presented for the Total Resource Cost test, the Ratepayer Impact Measure Test, and the Utility Cost Test. Because the participants did not contribute to costs, the Participant Cost Test is not applicable for this program.

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Table 4-23. Cost Effectiveness Results for the Appliance Recycling Program

Test Results for Appliance Recycling	
Total Resource Cost	1.8
Participant Cost Test	N/A
Ratepayer Impact Measure	0.4
Utility Cost Test	1.8

At this time, additional benefits related to reduction of greenhouse gas emissions have not been quantified in the calculation of the TRC. These additional benefits would increase the given TRC benefit/cost ratio.

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5 Conclusions and Recommendations

5.1 *Conclusions from Program Year 2012*

Detailed conclusions with respect to each of the evaluation questions for the 2012 Appliance Recycling Program follow.

5.1.1 Collected Appliances

The AEP Ohio Appliance Recycling Program collected 15,643 appliances in 2012, including 12,139 refrigerators, 3,381 freezers, and 123 room air conditioners. Most of the refrigerators and freezers picked up were secondary appliances. The freezers collected tend to be older than the refrigerators; the average ages for refrigerators and freezers were 23 and 30 years, respectively.

5.1.2 Per-Unit Savings

The *ex-post* per-unit energy savings were 949 kWh for refrigerators and 965 kWh for freezers. Per-unit savings are lower than those calculated for the 2011 evaluation. This result is because in 2012, the evaluation team used a different calculation method based on in-situ metering studies to estimate *ex-post* savings; the previous impact calculation methodology was based on an older lab metering study. The methodology was changed because a 2012 in-situ metering study conducted by Navigant for another utility showed substantially lower savings, and this prompted a review of other recent in-situ metering studies, which also showed lower savings.

Per-unit demand savings adjusted for summer use were 0.12 for both refrigerators and freezers. Again, these savings are lower than they were in 2011 due to the revised calculation methodology.

5.1.3 Program Impacts

Ex-post energy savings for the program were 14,783 MWh, and *ex-post* demand savings were 1.86 MW. The program achieved 78 percent of its energy savings goal of 18,962 MWh and 51 percent of the peak demand goal of 3.67 MW. This result occurred because AEP Ohio set goals based on the impact calculation methodology used in previous years; however, this method has become outdated, and thus for 2012, the evaluation team used a more conservative method based on recent in-situ metering studies to estimate *ex-post* savings.

5.1.4 Realization Rates

The realization rates for the 2012 Appliance Recycling Program are 0.54 for energy and 0.49 for demand savings. This result occurred because the impact calculation method used in previous evaluations was utilized by AEP Ohio to calculate ex-ante savings for 2012.

5.1.5 Cost Effectiveness

The program is cost-effective under the TRC and UTC tests.

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5.1.6 Marketing and Program Awareness

5.1.6.1 General Population Awareness

In 2012, 55 percent of the residential population were aware of the program, compared to only 43 percent in 2011. This represents a statistically significant increase in program awareness from 2011 to 2012.

5.1.6.2 Participant Awareness

Bill inserts, television ads, and word-of-mouth were the most frequently cited sources of program awareness among participants. A significantly lower percentage of respondents indicated they had first heard of the program through the newspaper in 2012 (9 percent) compared to 2011 (14 percent), which reflects decreased newspaper advertising in 2012. However, when all sources are taken into account, not just the source where participants first heard of the program, 24 percent indicated they had seen the program advertised in the newspaper. Participant awareness from in-store sales associates increased from 8 percent in 2011 to 22 percent in 2012, and awareness from in-store advertising increased from 5 percent in 2011 to 12 percent in 2012. In 2012, 43 percent of those who had heard of the program through a retailer reported hearing about it from a retailer that partners with the Efficient Products Program. This finding suggests that cross-promotion of the Appliance Recycling Program by retailers participating in other programs, such as the Efficient Products Program, is effective.

5.1.7 Program Participation and Barriers

5.1.7.1 Barriers to Participation

When asked why they had not participated in the program, eligible nonparticipating customers reported that their existing appliance still worked or that they did not have an extra appliance to recycle as (even though they reported at least one standalone freezer or at least two refrigerators), suggesting that customers do not fully understand the eligibility requirements of the program or that they simply do not want to give up their secondary appliances. Despite the reported reasons for not participating, of those respondents who were aware of the program, and were eligible to participate but had not done so already (n = 116), 62 percent reported that they were at least somewhat interested in participating.

5.1.7.2 Participant Satisfaction

As in past years, participants in the 2012 Appliance Recycling Program reported a high level of satisfaction with both the program overall and its individual components. The average reported satisfaction with the overall program was 4.84 on a scale of 1 to 5 (where 1 was “very dissatisfied” and 5 was “very satisfied”). The collection team and the sign-up process received the highest satisfaction ratings from participating customers. Compared to 2011, participants reported a statistically significant increase in satisfaction with two components of the 2012 program, the incentive payment amount and the time between enrollment and appliance pickup. The increase in customer satisfaction with the incentive payment amount is likely due to the increased incentive payment amounts for the 2012 program compared to the 2011 program. Appliance Distribution staff also reported that there was less

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turnover among collection personnel due to the more consistent demand experienced by the 2012 program compared to the 2011 program.

5.1.7.3 Timing of Incentive Payments

Only six percent of survey respondents reported that either their check arrived later than six weeks or they had not yet received it at the time of the survey, suggesting that participants generally receive their incentive checks within the promised four-to-six week timeframe. The evaluation team also examined the amount of time between appliance pickup and the incentive payment date tracked by JACO in the program tracking data. The participant survey and tracking data largely aligned in terms of the time between appliance pickup and incentive payment.

5.1.7.4 Behavior in Absence of the Program

The participant survey provides evidence that the program's interventions are effective at influencing customers' decision to remove appliances from service that may have otherwise continued to contribute to residential electrical consumption and demand. Respondents reported that, without the program, 72 percent of the appliances would have either been kept in service at some level or disposed of such that the appliance would likely remain in service at another household (e.g., sold, given away for free). In absence of the program, 24 percent reported they would have kept it as a secondary appliance and used it at least part of the time, 23 percent reported that they would have given away their appliance for free, and 20 percent would have taken it to a dump or recycling center.

5.1.7.5 Cancelled Appointments

Of all customers who initially enrolled in the program in 2012, 21 percent cancelled their appointment at least once; 9 percent cancelled at least once but eventually participated, and 12 percent dropped out of the program and never participated. The overall dropout rate for the 2012 program was a statistically significant decrease from 2011, when it was 14 percent.

5.1.8 Overall Program Design and Administration

5.1.8.1 Program Changes

The program as implemented has not changed from the original plan. However, there were two minor changes in 2012: a second retail partner was added in September, and the standard incentive amount was increased from $35 to $50. A promotional incentive of $60 was offered in November and December. Despite the addition of a second retailer, only 84 customers enrolled through the retail partners. The increased incentive and associated marketing appears to have increased participation in the last two months of the year; December pickups exceeded those in July, although June and August showed the greatest number of pickups.

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5.1.8.2 *Tracking Data*

Once initial data issues were rectified, the evaluation team found the final data set to be more complete and valid than in previous years. In past evaluations, unit configuration was incorrectly coded to a much greater extent. In the 2012 data entered for configuration, less than one percent were invalid entries; only 4 out of 12,139 refrigerators were incorrectly coded with freezer configurations, and only 24 of 3,381 freezers were incorrectly coded with refrigerator configurations.

5.1.8.3 *Condition of Picked-Up Appliances*

The vast majority of surveyed participants reported that their appliances were in working condition prior to the appliance being picked up through the program, although the participants that recycled refrigerators were somewhat more likely to report having recycled an appliance that was not fully functional. No respondents indicated that their freezer was completely non-operational at time of pickup, and only 3 percent of respondents indicated that their refrigerator did not cool its contents at all at the time of pickup. Because this is based on self-report, and the reported condition of the appliance is somewhat subjective, it is difficult to know exactly how many, if any, non-operational appliances were picked up for the program. However, all in all, these results suggest that the incidence of non-operational appliances being picked up for the program is likely quite low.

5.1.8.4 *Retailer Training*

There were no significant changes in the retailer training strategies or training materials for the 2012 program. The JACO Retail Program Manager reported that during the course of the 2012 program, JACO staff conducted two trainings at each store location of the two retailer partners in the program. The APT Program Manager confirmed that APT representatives also delivered Appliance Recycling Program training to retail sales associates at retailers participating in the appliance rebate component of the Efficient Products Program.

5.1.9 Current Program Challenges

5.1.9.1 *Low enrollment through the retail partnership*

Compared to 2011, there continue to be few enrollments through the retail partnership despite the fact that an additional retail partner was added in 2012. Only 14 percent of the survey respondents who first learned of the program from either in-store sales associates or in-store displays (n = 40) reported that they signed up in-store.

5.1.9.2 *Decreased per-unit savings*

From an impact perspective, the program will need to consider either adjusting savings goals or taking measures to increase collection volume in order to meet savings goals in the future. Appliance metering is being conducted in the AEP Ohio service territory in 2013, and thus per-unit savings estimates are expected to be similar to that found in the current evaluation by applying the regression models from recent in-situ metering studies, and therefore much lower than they have been in the past.

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5.2 Recommendations for Program Improvements

1. **Adjust how AEP Ohio calculates ex-ante claimed savings.** The evaluation team recommends that AEP Ohio reach out to utilities for which the metering studies used to calculate 2012 *ex-post* savings were conducted. AEP Ohio can then choose a method for calculating 2013 ex-ante savings based on the sample of metered appliances that most closely represents the population of recycled units in the AEP Ohio service territory. Metering is being conducted in 2013 in the AEP Ohio service territory, and the resulting regression model will be used to calculate 2013 *ex-post* savings.
2. **Revise savings goals.** The methodology used to set energy savings goals assumed higher per-unit savings than what was found in this evaluation. Goals for the program should be revised to take into account the decreased per-unit savings.
3. **Continue cross-promotions with retailers participating in other programs such as the Efficient Products Program.** In-store sales associates are playing a larger role in increasing initial and overall awareness of the program, and 43 percent of those who had heard of the program through a retailer reported hearing about it from a retailer that partners with the Efficient Products Program, This suggests that cross-promotions are effective.

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Appendix A AEP Ohio Appliance Recycling Participant Survey

This Appendix contains the participant telephone survey instrument used for data collection for the Program Year 2012 evaluation of the AEP Ohio Appliance Recycling Program.

INTRODUCTION AND SCREENER

Hello, this is [SURVEYOR NAME] from DataPrompt International calling on behalf of AEP Ohio, your electric utility. This is not a sales call. We are contacting customers who had refrigerators or freezers removed through an appliance pick-up and recycling program offered by AEP Ohio. May I please speak with [CUSTOMER_NAME]?

Are you the person who was most involved and familiar with the refrigerator or freezer removal? (IF NOT: May I please speak with the person who was most involved with the removal?)

IF NO REFRIGERATOR OR FREEZER PICKED UP: **RECORD AS SPECIAL DISPOSITION CODE**, THANK, AND TERMINATE

CONTINUE WITH RIGHT PERSON: We are conducting a study to evaluate AEP Ohio's appliance pick up and recycling program and would like to include your opinions. This is required by the Public Utilities Commission of Ohio and will be used to verify the effectiveness of the program and to make improvements. Is this a good time for you? **[IF NO, SCHEDULE A TIME]**

(IF NEEDED: It will take about 15 minutes.)
This call may be monitored or recorded for quality purposes.

SCREENING QUESTIONS

S0. Is your electric company AEP Ohio, Ohio Power (OP), Columbus Southern Power (CSP) or another company?

1. AEP OHIO, OHIO POWER COMPANY (OPC) OR COLUMBUS SOUTHERN POWER (CSP)
04. ANOTHER COMPANY (SPECIFY) **[TERMINATE]**
98. DON'T KNOW [TERMINATE]
99. REFUSED **[TERMINATE]**

S1. Our records show that you had a refrigerator or freezer picked up by AEP Ohio or its subcontractor JACO. Is this correct?

1. YES, CORRECT
2. NO, IT WAS_________**[RECORD VERBATIM AND TERMINATE; RECORD AS SPECIAL DISPOSITION CODE]**
98. DON'T KNOW **[TERMINATE]**
99. REFUSED **[TERMINATE]**

NAVIGANT

S2. Was the appliance that was picked up used at your primary residence?

1. YES
2. NO, IT WAS __________**[RECORD VERBATIM AND TERMINATE; RECORD AS SPECIAL DISPOSITION CODE]**
98. DON'T KNOW **[TERMINATE]**
99. REFUSED **[TERMINATE]**

[IF STRATA = 1 READ SECTIONS A <u>AND</u> B. If STRATA = 2, SKIP TO SECTION C.]

<u>**SECTION A: REFRIGERATOR CHARACTERISTICS**</u>

A1.*Now I'm going to ask you some specific questions about the refrigerator that was picked up by AEP Ohio.*

Was the refrigerator that was picked up being used as your main refrigerator OR was it a spare/secondary unit?
[READ IF NEEDED: A main refrigerator is typically in the kitchen, a spare/secondary unit is usually kept someplace else, and might or might not be running all the time]
[CLARIFICATION: If customer had recently bought a new refrigerator to use as main refrigerator and were just waiting for the old main refrigerator to be picked up, it should be classified as "main."]
[DO NOT READ RESPONSE LIST; RECORD ONLY ONE RESPONSE]

1. MAIN
2. SPARE/SECONDARY
3. N/A - RESPONDENT IS NOT PRIMARY USER OF FRIDGE (LANDLORD, ETC.) **[TERMINATE]**
98. DON'T KNOW **[TERMINATE]**
99. REFUSED **[TERMINATE]**

A2. How old was the refrigerator when AEP Ohio removed it?

- ## **[NUMERIC RANGE 1-50; RECORD IN YEARS]**
- 00. LESS THAN ONE YEAR
- 98. DON'T KNOW
- 99. REFUSED

NAVIGANT

A3. What was the condition of the refrigerator? Would you say … **[READ RESPONSE LIST; RECORD ONLY ONE RESPONSE]**

1. It effectively cooled its contents,
2. It partially cooled its contents, or
3. It did not cool its contents at all

98. DON'T KNOW **[DO NOT READ]**
99. REFUSED **[DO NOT READ]**

A4. What was the **MAIN** reason you chose to dispose of the old refrigerator? **[DO NOT READ RESPONSE LIST; RECORD ONLY ONE RESPONSE]**

1. THE REFRIGERATOR WAS EXPENSIVE TO RUN
2. THE REFRIGERATOR WAS NOT WORKING PROPERLY
3. THE REFRIGERATOR WAS A SPARE THAT I DID NOT USE VERY MUCH
4. THE REFRIGERATOR WAS OLD AND I WANTED SOMETHING WITH MORE MODERN FEATURES
5. I WANTED A BIGGER REFRIGERATOR
6. I WANTED A NEW REFRIGERATOR
7. I WANTED TO TAKE ADVANTAGE OF AEP OHIO'S OFFER TO REMOVE IT FOR FREE

97. OTHER (SPECIFY:___)
98. DON'T KNOW
99. REFUSED

A4b. Were there any other reasons you chose to dispose of the refrigerator? **[DO NOT READ RESPONSE LIST; ALLOW FOR MULTIPLE RESPONSES]**

1. THE REFRIGERATOR WAS EXPENSIVE TO RUN
2. THE REFRIGERATOR WAS NOT WORKING PROPERLY
3. THE REFRIGERATOR WAS A SPARE THAT I DID NOT USE VERY MUCH
4. THE REFRIGERATOR WAS OLD AND I WANTED SOMETHING WITH MORE MODERN FEATURES
5. I WANTED A BIGGER REFRIGERATOR
6. I WANTED A NEW REFRIGERATOR
7. I WANTED TO TAKE ADVANTAGE OF AEP OHIO'S OFFER TO REMOVE IT FOR FREE

96. OTHER (SPECIFY:___)
97. NO OTHER REASON
98. DON'T KNOW
99. REFUSED

[IF A1=1 SKIP TO B1; IF A1=2 THEN CONTINUE WITH A5]

NAVIGANT

SPARE/SECONDARY REFRIDGERATOR BATTERY:
A5. How long had you been using this refrigerator as a spare/secondary unit when you decided to dispose of it?

[NUMERIC, RANGE 1-50; RECORD IN YEARS]
00. LESS THAN ONE YEAR
98. DON'T KNOW
99. REFUSED

A6. Thinking just about the past year, before you decided to have the refrigerator removed, was the spare/secondary refrigerator plugged in and running…? **[READ RESPONSE LIST]**

1. All the time, **[SKIP TO A9]**
2. For special occasions only,
3. During certain months of the year only, or
4. Was it never plugged in and running? **[SKIP TO A9]**
98. DON'T KNOW **[DO NOT READ] [SKIP TO A9]**
99. REFUSED **[DO NOT READ] [SKIP TO A9]**

A7. [ASK IF A6 =2 OR 3] In the past year, how often would you estimate your refrigerator was plugged in and running, in days, weeks, or months?

[DAYS; NUMERIC, RANGE 1 TO 365]
[WEEKS; NUMERIC, RANGE 1 TO 52]
[MONTHS; NUMERIC, RANGE 1 TO 12]
00. LESS THAN 1 DAY
988. DON'T KNOW
999. REFUSED

A8. [ASK IF A6=2 OR 3] Was the refrigerator running…? **[READ RESPONSE LIST]**

1. Only during the summer,
2. Mainly other times of the year, or
3. A mix of both summer and other times of the year
98. DON'T KNOW **[DO NOT READ]**
99. REFUSED [**DO NOT READ]**

NAVIGANT

A9. In what location did the refrigerator operate before it was removed by AEP Ohio? **[CLARIFICATION: If they moved the refrigerator while they waited to have it picked up, we are interested in where it was located before they decided to have it removed, not where it was located while they were waiting for it be picked up.]**
[DO NOT READ LIST; RECORD ONLY ONE RESPONSE]
1. KITCHEN
2. GARAGE
3. PORCH/PATIO
4. BASEMENT
97. OTHER **[SPECIFY]**
98. DON'T KNOW
99. REFUSED

A10. Was the refrigerator that was picked up replaced with another one?
1. YES
2. NO
98. DON'T KNOW
99. REFUSED

SECTION B: REFRIGERATOR CONSIDERATION OF ALTERNATIVES

B1. Before hearing about AEP Ohio's Appliance Recycling Program, were you already considering disposing of this refrigerator? This could have been by selling it, giving it away, having someone pick it up, or taking it to the dump or a recycling center. **[DO NOT READ RESPONSE LIST]**
1. YES, ALREADY CONSIDERING DISPOSING OF IT
2. NO, HAD NOT CONSIDERED DISPOSING OF IT **[SKIP TO B5]**
98. DON'T KNOW **[SKIP TO B5]**
99. REFUSED [**SKIP TO B5]**

B2. [ASK IF B1 = 1] Now suppose that the AEP Ohio Appliance Recycling program hadn't been available. Would you have still disposed of the refrigerator or would you have kept it?
1. DISPOSED OF IT
2. KEPT IT **[SKIP TO B5]**
98. DON'T KNOW **[SKIP TO G1-INTRO]**
99.REFUSED [**SKIP TO G1-INTRO]**

"DISPOSED OF" REFRIGERATOR BATTERY:

B3. If you had been unable to dispose of your refrigerator through the AEP Ohio Appliance Recycling Program, do you think you would you have disposed of the refrigerator…? **[READ RESPONSE LIST]**
1. Within 6 months of when you did,
2. More than 6 months, but within a year of when you did, or

NAVIGANT

3. More than a year later?
98. DON'T KNOW
99. REFUSED

B4. Please tell me which of the following ways you would have most likely used to dispose of this refrigerator if the program hadn't been available. Would you have…? **[READ RESPONSE LIST; RANDOMIZE; RECORD ONLY ONE RESPONSE]**

1. Sold it
2. Given it away for free
3. Had it removed by the dealer you got your new or replacement refrigerator from
4. Taken it to a dump or recycling center
5. Hired someone to take it to a dump or recycling center
6. Kept it

98. DON'T KNOW **[DO NOT READ]**
99. REFUSED [**DO NOT READ]**

[SKIP TO G1-INTRO]

"KEPT IT" REFRIGERATOR BATTERY:

B5. If you had kept the refrigerator, would it have been…? **[READ RESPONSE LIST]**

1. Stored unplugged, or **[SKIP TO G1-INTRO]**
2. Used as a secondary refrigerator at least some of the time

98. DON'T KNOW **[DO NOT READ; SKIP TO G1-INTRO]**
99. REFUSED **[DO NOT READ; SKIP TO G1-INTRO]**

B6. If you had kept the refrigerator would you have had it plugged in and running…? **[READ RESPONSE LIST]**

1. All the time **[SKIP TO B8]**
2. For special occasions only
3. During certain months of the year only, or
4. Would it never have been plugged in and running? **[SKIP TO B8]**

98. DON'T KNOW **[DO NOT READ]**
99. REFUSED [**DO NOT READ] [SKIP TO B8]**

B7. [ASK IF B6=2 OR 3 OR 98] Over the past year, how often would you estimate that the refrigerator would have been plugged in and running, in days, weeks, or months?

\## **[DAYS; NUMERIC, RANGE 0-365]**
\## **[WEEKS; NUMERIC, RANGE 1 TO 52]**
\## **[MONTHS; NUMERIC, RANGE 1 TO 12]**
00. LESS THAN 1 DAY
98. DON'T KNOW
999. REFUSED

NAVIGANT

B8. For how many years would you have continued using this refrigerator as a spare? **[**IF NEEDED: Your best estimate is fine.]

[YEARS; NUMERIC, RANGE 0-50]
00. LESS THAN 1 YEAR
66. UNTIL IT BROKE, INDEFINITELY
98. DON'T KNOW **[DO NOT READ]**
99. REFUSED [**DO NOT READ]**

[SKIP TO G1-INTRO]

[READ SECTIONS C AND D IF STRATA = 2]

SECTION C: FREEZER CHARACTERISTICS

Next, I'm going to ask you some specific questions about the freezer that was picked up by AEP Ohio.

C1. How old was the freezer when AEP Ohio removed it?

[YEARS; NUMERIC OPEN END, RANGE 1-75]
00. LESS THAN ONE YEAR
98. DON'T KNOW
99. REFUSED

C2. How long had you been using this freezer when you decided to dispose of it?

[YEARS; NUMERIC OPEN END]
00. LESS THAN ONE YEAR
96. N/A – RESPONDENT NOT PRIMARY USER (LANDLORD, ETC.) **[TERMINATE]**
98. DON'T KNOW
99. REFUSED

C3. What was the condition of the freezer? Would you say? …[**READ RESPONSE LIST]**
1. It effectively cooled its contents,
2. It partially cooled its contents, or
3. It did not cool its contents at all
98. DON'T KNOW **[DO NOT READ]**
99. REFUSED **[DO NOT READ]**

NAVIGANT

C4. What was the <u>**MAIN**</u> reason you chose to dispose of the old freezer that was picked up by AEP Ohio? **[DO NOT READ RESPONSE LIST; RECORD ONLY ONE RESPONSE]**

1.THE FREEZER WAS EXPENSIVE TO RUN
2. THE FREEZER WAS NOT WORKING PROPERLY
3. I DID NOT USE THE FREEZER VERY MUCH
4. THE FREEZER WAS OLD AND I WANTED SOMETHING WITH MORE MODERN FEATURES
5. I WANTED A BIGGER FREEZER
6. I WANTED A NEW FREEZER
7. I WANTED TO TAKE ADVANTAGE OF AEP OHIO'S OFFER TO REMOVE IT FOR FREE
97. OTHER **[SPECIFY]**
98. DON'T KNOW
99. REFUSED

C4b. Were there any other reasons you chose to dispose of the freezer? **[DO NOT READ RESPONSE LIST; REMOVE C4 ANSWER AND ALLOW FOR MULTIPLE RESPONSES]**

1. THE FREEZER WAS EXPENSIVE TO RUN
2. THE FREEZER WAS NOT WORKING PROPERLY
3. I DID NOT USE THE FREEZER VERY MUCH
4. THE FREEZER WAS OLD AND I WANTED SOMETHING WITH MORE MODERN FEATURES
5. I WANTED A BIGGER FREEZER
6. I WANTED A NEW FREEZER
7. I WANTED TO TAKE ADVANTAGE OF AEP OHIO'S OFFER TO REMOVE IT FOR FREE
96. OTHER **[SPECIFY]**
97. NO OTHER REASON
98. DON'T KNOW
99. REFUSED

C5. Thinking just about the past year, before you decided to have the freezer removed, was the freezer plugged in and running …?**[READ RESPONSE LIST; RECORD ONLY ONE RESPONSE]**

1. All the time, **[SKIP TO C8]**
2. For special occasions only,
3. During certain months of the year only, or
4. Was it never plugged in and running **[SKIP TO C9]**
98. DON'T KNOW [DO NOT READ] **[SKIP TO C8]**
99.REFUSED [DO NOT READ] **[SKIP TO C8]**

C6. Over the past year, how often would you estimate your freezer was plugged in and running, in days, weeks, or months?

[DAYS; NUMERIC, RANGE 0-365]
[WEEKS; NUMERIC, RANGE 1 TO 52]
[MONTHS; NUMERIC, RANGE 1 TO 12]
00. LESS THAN 1 MONTH
988. DON'T KNOW
999. REFUSED

NAVIGANT

C7. Was the freezer running during the summer or was it mainly running during other times of the year? **[DO NOT READ RESPONSE LIST]**

1. RUNNING DURING THE SUMMER
2. MAINLY RUNNING OTHER TIMES OF THE YEAR
3. A MIX OF BOTH SUMMER AND OTHER TIMES OF THE YEAR
98. DON'T KNOW
99. REFUSED

C8. In what location did the freezer operate before it was removed by AEP Ohio?
[CLARIFICATION: If they moved the freezer while they waited to have it picked up, we are interested in where it was located before they decided to have it removed, not where it was located while they were waiting for it be picked up.]
[DO NOT READ LIST; RECORD ONLY ONE RESPONSE]

1. KITCHEN
2. GARAGE
3. PORCH/PATIO
4. BASEMENT
97. OTHER **[SPECIFY]**
98. DON'T KNOW
99. REFUSED

C9. [ASK ALL] Did you replace the freezer with another one?

1. YES
2. NO
98. DON'T KNOW
99. REFUSED

REPLACEMENT FREEZER BATTERY not there

<u>SECTION D: FREEZER CONSIDERATION OF ALTERNATIVES</u>

D1. Before hearing about AEP Ohio's Appliance Recycling Program, were you already considering disposing of this freezer? This could have been by selling it, giving it away, having someone pick it up, or taking it to the dump or a recycling center.

1. YES, HAD ALREADY CONSIDERED DISPOSING OF IT
2. NO, HAD NOT CONSIDERED DISPOSING OF IT **[SKIP TO D5]**
98. DON'T KNOW **[SKIP TO D5]**

NAVIGANT

99.REFUSED **[SKIP TO G1-INTRO]**

D2. [ASK IF D1 = 1] Now suppose that the AEP Ohio Appliance Recycling program hadn't been available. Would you have still disposed of the freezer or would you have kept it? **[RECORD ONLY ONE RESPONSE]**

1. DISPOSED OF IT
2. KEPT IT **[SKIP TO D5]**
98. DON'T KNOW **[SKIP TO G1-INTRO]**
99. REFUSED **[SKIP TO G1-INTRO]**

"DISPOSED OF"FREEZER BATTERY:

D3. [ASK IF D2 = 1] If you had been unable to dispose of your freezer through the AEP Ohio Appliance Recycling Program, do you think you would you have disposed of the freezer…**[RECORD ONLY ONE RESPONSE]**

1. Within 6 months of when you did,
2. Between 6 months, and a year of when you did, or
3. More than a year of when you did
98. DON'T KNOW **[DO NOT READ]**
99. REFUSED **[DO NOT READ]**

D4. [ASK IF D2 = 1] Please tell me which of the following ways you would have most likely used to dispose of this freezer if the program hadn't been available. Would you have…? **[READ RESPONSE LIST; RANDOMIZE; RECORD ONLY ONE RESPONSE]**

1. Sold it
2. Given it away for free
3. Have it removed by the dealer you got your new or replacement freezer from
4. Taken it to a dump or recycling center
5. Hired someone to take it to a dump or recycling center
6. (Kept it)
98. DON'T KNOW
99. REFUSED

[SKIP TO G1-INTRO]

"KEPT IT" FREEZER BATTERY:

NAVIGANT

D5. If you had kept the freezer, would it have been stored unplugged or would you have continued using it?

1. STORED IT UNPLUGGED **[SKIP TO G1-INTRO]**
2. CONTINUED USING IT AT LEAST SOME OF THE TIME

98. DON'T KNOW **[DO NOT READ] [SKIP TO G1-INTRO]**
99. REFUSED **[DO NOT READ] [SKIP TO G1-INTRO]**

D6. Would the freezer have been used…? **[READ RESPONSE LIST]**

1. All the time, **[SKIP TO D8]**
2. For special occasions only,
3. During certain months of the year only, or
4. Would it never have been plugged in and running? **[SKIP TO D8]**

98. DON'T KNOW **[DO NOT READ]**
99. REFUSED **[DO NOT READ]**

D7. [ASK IF D6=2 OR 3] Over the past year, how many days would you estimate the freezer would have been plugged in and running?

[DAYS; NUMERIC, RANGE 1-365]
00. LESS THAN 1 DAY
998. DON'T KNOW
999. REFUSED

D8. [ASK IF D5=2] For how many years would you have continued using this additional freezer? **[IF NEEDED:]** Your best estimate is fine.

[YEARS; NUMERIC OPEN END] RANGE [1-50]
00. LESS THAN 1 YEAR
76. UNTIL IT BROKE, INDEFINITELY
98. DON'T KNOW
99. REFUSED

<u>SECTION G: PROCESS QUESTIONS</u>

G1-INTRO: ***Next I have some questions about your experiences with the AEP Ohio Appliance Recycling Program.***

G1. How did you <u>first</u> learn about the Appliance Recycling Program? **[DO NOT READ LIST; RECORD ONLY ONE RESPONSE]**

1. BILL INSERT
2. TV AD
3. FRIEND/RELATIVE/NEIGHBOR
4. AEP OHIO WEBSITE
5. AEP OHIO CUSTOMER SERVICE REPRESENTATIVE
6. NEWSPAPER

NAVIGANT

7. COMMUNITY EVENT
8. FROM A STORE SALES ASSOCIATE WHERE BOUGHT NEW APPLIANCE, E.G. SEARS **[SPECIFY RETAILER]**
9. STORE POSTINGS ADVERTISING THE APPLIANCE RECYCLING PROGRAM **[SPECIFY RETAILER]**
97. OTHER**[SPECIFY]**
98. DON'T KNOW
99. REFUSED

G2. Since you first learned about the program, did you hear about the program from any OTHER [these other sources? **[READ RESPONSE LIST; DO NOT READ RESPONSE SELECTED IN G1. ALLOW FOR MULTIPLE RESPONSES]**

		Yes	No	DON'T KNOW	REFUSED
G2a.	BILL INSERT	1	2	98	99
G2b.	TV AD	1	2	98	99
G2c.	FRIEND/RELATIVE/NEIGHBOR	1	2	98	99
G2d.	AEP OHIO WEBSITE	1	2	98	99
G2e.	AEP OHIO CUSTOMER SERVICE REPRESENTATIVE	1	2	98	99
G2f.	NEWSPAPER	1	2	98	99
G2g.	COMMUNITY EVENT	1	2	98	99
G2h.	FROM A STORE SALES ASSOCIATE WHERE YOU BOUGHT A NEW REFRIGERATOR/FREEZER **[SPECIFY RETAILER]**	1	2	98	99
G2i.	STORE POSTINGS ADVERTISING THE APPLIANCE RECYCLING PROGRAM **[SPECIFY RETAILER]**	1	2	98	99
G2j.	ANY OTHER WAY? **[SPECIFY]**	1	2	98	99

NAVIGANT

G3. There are a number of ways you could have disposed of your appliance(s). What is the MAIN reason you chose the AEP Ohio Appliance Recycling Program instead of some other way? **[DO NOT READ RESPONSE LIST]**

1. THE CASH INCENTIVE
2. THE CONVENIENCE OF THE HOME PICK-UP/DON'T HAVE TO TAKE IT SOMEPLACE MYSELF
3. PICK UP WAS FREE
4. APPLIANCE WAS RECYCLED/WAS DISPOSED OF IN A WAY THAT WAS GOOD FOR ENVIRONMENT
5. WAS RECOMMENDED BY FRIEND/FAMILY
6. WAS RECOMMENDED BY RETAILER
7. DID NOT KNOW OF ANY OTHER WAY/NO OTHER OPTION

97. OTHER **[SPECIFY]**
98. DON'T KNOW
99. REFUSED

G4. Were there any other reasons? **[DO NOT READ RESPONSE LIST; DO NOT SHOW ANSWER SELECTED IN G3; ALLOW FOR MULTIPLE RESPONSES]**

1. THE CASH INCENTIVE/INCENTIVE CHECK
2. THE CONVENIENCE OF THE HOME PICK-UP/DON'T HAVE TO TAKE IT SOMEPLACE MYSELF
3. PICK UP WAS FREE
4. APPLIANCE WAS RECYCLED/WAS DISPOSED OF IN A WAY THAT WAS GOOD FOR ENVIRONMENT
5. WAS RECOMMENDED BY FRIEND/FAMILY
6. WAS RECOMMENDED BY RETAILER
7. DID NOT KNOW OF ANY OTHER WAY/NO OTHER OPTION

97. OTHER **[SPECIFY]**

96. NO OTHER REASON

98. DON'T KNOW
99. REFUSED

G4b. On a scale of 1 to 5, where 1is "not at all" and 5 is "very much", how much did the rebate motivate you to participate in Appliance Recycling program?

1. 1**[NOT AT ALL]**
2. 2
3. 3
4. 4
5. 5**[VERY MUCH]**

98. DON'T KNOW
99. REFUSED

NAVIGANT

G5. Are you the one that signed up for the program, or did someone else in your household sign up?

1. I SIGNED UP
2. SOMEONE ELSE SIGNED UP **[SKIP TO G16]**
98. DON'T KNOW **[SKIP TO G16]**
99. REFUSED **[SKIP TO G16]**

G6. Did you sign up online or on the phone? **[NOTE: IF AN "OTHER" TYPE RESPONSE CAN BE PLACED INTO EITHER 1 OR 2, DO SO AND PROCEED ACCORDINGLY]**

1. TELEPHONE **[SKIP TO G10]**
2. ONLINE
97. OTHER _____________**[SPECIFY; SKIP TO G14]**
98. DON'T KNOW **[SKIP TO G14]**
99. REFUSED **[SKIP TO G14]**

ONLINE SIGNUP BATTERY:

G7. Was it easy to find the sign up screen on the website?

1. YES
2. NO
98. DON'T KNOW
99. REFUSED

G8. Did the website answer all your questions about the program?

1. YES
2. NO [**PROBE AND CLARIFY: Which questions did you have that were unanswered?]**
96. NOT APPLICABLE
98. DON'T KNOW
99. REFUSED

G9. Did you receive confirmation that your sign up had been successful?

1. YES
2. NO
96. NOT APPLICABLE
98. DON'T KNOW
99. REFUSED

[SKIP TO G14]

NAVIGANT

PHONE SIGNUP BATTERY:

[IF G6=1]

G10. On a scale of 1 to 5, where 1 is "not at all" and 5 is "very much", how would you rate the phone representative in terms of being polite and courteous?

1. 1 **[NOT AT ALL POLITE/COURTEOUS]**
2. 2
3. 3
4. 4
5. 5 **[VERY POLITE/COURTEOUS]**

98. DON'T KNOW
99. REFUSED

G11. Did the representative answer all your questions about the program?

1. YES
2. NO **[PROBE AND CLARIFY: Which questions did you have that were unanswered?]**

96. NOT APPLICABLE
98. DON'T KNOW
99. REFUSED

FOR ALL PARTICIPANTS:

G14. On a scale of 1 to 5, where 1 is "very dissatisfied" and 5 is "very satisfied, "how satisfied were you with the sign-up experience?

☐1. 1 [VERY DISSATISFIED]
☐2. 2
☐3. 3
☐4. 4**[SKIP TO G16]**
☐5. 5 [VERY SATISFIED]**[SKIP TO G16]**
☐98. DON'T KNOW **[SKIP TO G16]**
☐99. REFUSED **[SKIP TO G16]**

G15. [ASK IF G14<4] Why did you rate it that way? **[PROBE TO CLARIFY]**
[OPEN END; RECORD VERBATIM]
98. DON'T KNOW
99. REFUSED

G16. Were you able to schedule a pick-up date and time that was convenient for you?

1. YES
2. NO

98. DON'T KNOW

NAVIGANT

99. REFUSED

G17. How much time passed between when you scheduled the appointment and when your appliance(s) was/were picked up? **[NOTE TO INTERVIEWER: IF RESPONDENT SAYS "ABOUT A WEEK", RECORD AS 1 WEEK, ETC.] [Range 0-7] for Days and for Week Range [1-52]**

[ENTER DAYS AND/OR WEEKS; NUMERIC OPEN END]
98. DON'T KNOW
99. REFUSED

G18. On a scale of 1 to 5 were 1 is "very dissatisfied" and 5 is "very satisfied," how satisfied are you with the time it took between when you scheduled the appliance pickup and when it actually was picked up?

☐1. 1 [VERY DISSATISFIED]
☐2. 2
☐3. 3
☐4. 4**[SKIP TO G19]**
☐5. 5 [VERY SATISFIED]**[SKIP TO G19]**
☐98. DON'T KNOW **[SKIP TO G19]**
☐99. REFUSED **[SKIP TO G19]**

G18b. [ASK IF G18<4] Why did you rate it that way?

[RECORD OPEN END]
98. DON'T KNOW
99. REFUSED

G19. Just before the pick-up took place, did you or anyone in your household receive a call in advance to confirm the appointment or to let you know the collection team was coming?

1. YES
2. NO
96. NOT APPLICABLE
98. DON'T KNOW
99. REFUSED

G20. Did the collection team arrive during the scheduled appointment window?

1. YES
2. NO
96. NOT APPLICABLE
98. DON'T KNOW
99. REFUSED

G21. On a scale of 1 to 5 were 1 is "very dissatisfied" and 5 is "very satisfied", how satisfied were you with the collection team who picked up your appliance(s)?

☐1. 1 [VERY DISSATISFIED]
☐2. 2
☐3. 3

☐4. 4**[SKIP TO G23]**
☐5. 5 [VERY SATISFIED]**[SKIP TO G23]**
☐11. (WASN'T AT HOME)**[SKIP TO G23]**
☐98. DON'T KNOW **[SKIP TO G23]**
☐99. REFUSED **[SKIP TO G23]**

G22. **[ASK IF G21<4]** Why did you rate it that way?
[RECORD OPEN END]
98. DON'T KNOW
99. REFUSED

G23. How much was the payment that AEP Ohio offered for recycling your appliance? If you recycled more than one appliance, we are interested in knowing the amount of the payment you received (or will receive) for the single appliance we've been discussing today. **[DO NOT READ RESPONSE LIST.]**

1. $50
2. $60
97. OTHER **[SPECIFY]**
98. DON'T KNOW
99. REFUSED

G23b. How satisfied were you with the payment amount? Would you say you were: **[READ LIST]**
☐1. Very satisfied **[SKIP TO G25]**
☐2. Somewhat satisfied **[SKIP TO G25]**
☐3. Neither satisfied nor dissatisfied **[SKIP TO G25]**
☐4. Somewhat dissatisfied
☐5. Very dissatisfied
☐98. DON'T KNOW **[SKIP TO G25]**
☐99. REFUSED **[SKIP TO G25]**

G24. **[ASK IF G23b>3]** What size payment would you have been satisfied with? **[PROBE TO CLARIFY]**
[MAKE CLOSED-ENDED – $0 - $100 IN $5 INCREMENTS]
97. OTHER [SPECIFY]
98. DON'T KNOW
99. REFUSED

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G25. From the time you had your appliance picked up, about how many weeks did it take to receive your check? **[DO NOT READ RESPONSE LIST]**

1. 1 WEEK OR LESS
2. MORE THAN ONE WEEK TO 2 WEEKS
3. MORE THAN 2 WEEKS TO 3 WEEKS
4. MORE THAN 3 WEEKS TO 4 WEEKS
5. MORE THAN 4 WEEKS TO 5 WEEKS
6. MORE THAN 5 WEEKS TO 6 WEEKS
7. MORE THAN 6 WEEKS TO 7 WEEKS
8. LONGER THAN 7 WEEKS **[SPECIFY NUMBER OF WEEKS]** ______________
9. HAVE NOT RECEIVED MY CHECK YET **[SPECIFY HOW LONG THEY'VE BEEN WAITING IN WEEKS]** _______________ **[SKIP TO G28A]**

98. DON'T KNOW **[SKIP TO G28A]**
99. REFUSED **[SKIP TO G28A]**

G26. How satisfied were you with how long it took to receive the payment? Would you say you were: **[READ LIST]**

☐1. VERY SATISFIED **[SKIP TO G28A]**
☐2. SOMEWHAT SATISFIED **[SKIP TO G28A]**
☐3. NEITHER SATISFIED NOR DISSATISFIED **[SKIP TO G28A]**
☐4. SOMEWHAT DISSATISFIED
☐5. VERY DISSATISFIED
☐98. DON'T KNOW **[SKIP TO G28A]**
☐99. REFUSED **[SKIP TO G28A]**

G27. **[ASK IF G26>3]** What amount of time would be reasonable to receive the payment? **[PROBE TO CLARIFY; RECORD OPEN END DAYS AND WEEKS] Range [1-50]**

98. DON'T KNOW
99. REFUSED

G28a. In the course of participating in the AEP Ohio program, how often did you contact AEP Ohio or program staff with questions? [If G6=1: Please keep in mind that we mean the time period **after** the initial scheduling call]

☐1. NEVER **[SKIP TO G29A]**
☐2. ONCE
☐3. 2 OR 3 TIMES
☐4. 4 TIMES OR MORE
☐98. DON'T KNOW **[SKIP TO G29A]**

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☐99. REFUSED **[SKIP TO G29A]**

G28b. How did you contact them? **[ALLOW MULTIPLE RESPONSES]**

☐1. PHONE
☐2. EMAIL OR FAX
☐3. LETTER
☐4.IN PERSON
☐98. DON'T KNOW
☐99. REFUSED

G28c. And how satisfied are you with your communications with AEP Ohio and program staff? Would you say you were: **[READ LIST]**

☐1. Very satisfied **[SKIP TO G29A]**
☐2. Somewhat satisfied **[SKIP TO G29A]**
☐3. Neither satisfied nor dissatisfied **[SKIP TO G29A]**
☐4. Somewhat dissatisfied
☐5. Very dissatisfied
☐98. DON'T KNOW **[SKIP TO G29A]**
☐99. REFUSED **[SKIP TO G29A]**

G28d. Why were you dissatisfied?

☐**[RECORD VERBATIM]**
☐98. DON'T KNOW
☐99. REFUSED

G29a. Have you noticed any savings on your electric bill since removing your old [IF STRATA 1 OR 3: refrigerator / IF STRATA 2: freezer]?

☐1. YES
☐2. NO **[SKIP TO G30]**
☐98. DON'T KNOW **[SKIP TO G30]**
☐99. REFUSED **[SKIP TO G30]**

G29b. How satisfied are you with any savings you noticed on your electric bill since removing your old [IF STRATA 1 OR 3: refrigerator / IF STRATA 2: freezer]? Would you say you were: **[READ LIST]**

☐1. Very satisfied
☐2. Somewhat satisfied
☐3. Neither satisfied nor dissatisfied
☐4. Somewhat dissatisfied
☐5. Very dissatisfied
☐98. DON'T KNOW
☐99. REFUSED

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G30. If you were rating your overall satisfaction with the AEP Ohio Appliance Recycling Program, would you say you were: **[READ LIST]**

- ☐1. Very satisfied **[SKIP TO G31]**
- ☐2. Somewhat satisfied **[SKIP TO G31]**
- ☐3. Neither satisfied nor dissatisfied **[SKIP TO G31]**
- ☐4. Somewhat dissatisfied
- ☐5. Very dissatisfied
- ☐98. DON'T KNOW **[SKIP TO G31]**
- 99. REFUSED **[SKIP TO G31]**

G30b. Why do you give it that rating?

- ☐**[RECORD VERBATIM]**
- ☐98. DON'T KNOW
- ☐99. REFUSED

G31. Do you have any suggestions to improve the program?

- ☐**[RECORD VERBATIM]**
- ☐97. NO SUGGESTIONS
- ☐98. DON'T KNOW
- ☐99. REFUSED

G32a. Based on your overall experience with AEP Ohio's service, how satisfied are you with having them as your electric company? Would you say you are: **[READLIST]?**

- ☐1. Very satisfied **[SKIP TO G33]**
- ☐2. Somewhat satisfied **[SKIP TO G33]**
- ☐3. Neither satisfied nor dissatisfied **[SKIP TO G33]**
- ☐4. Somewhat dissatisfied
- ☐5. Very dissatisfied
- ☐98. DON'T KNOW **[SKIP TO G33]**
- 99. REFUSED **[SKIP TO G33]**

G32b. Why did you rate it that way**? [PROBE FOR CLARITY AND SPECIFICITY IF NEEDED:** ***Was there something in particular you had in mind when you chose a rating of [RATING]?*****]**

[OPEN END]
98. DON'T KNOW
99. REFUSED

G33. Would you say participating in this program has made you feel more favorable, less favorable, or no different about AEP Ohio?

1. MORE FAVORABLE ABOUT AEP OHIO
2. LESS FAVORABLE ABOUT AEP OHIO
3. NO DIFFERENT ABOUT AEP OHIO
98. DON'T KNOW
99. REFUSED

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G34. For how many years have you been an AEP Ohio customer at any location? This can include any time you had Ohio Power or Columbus Southern Power as a service provider as well.
[RECORD NUMERIC OPEN END]
00. LESS THAN ONE YEAR
98. DON'T KNOW
99. REFUSED

SECTION H: DEMOGRAPHICS

I have just a few questions left for background purposes only.

H1. Which of the following best describes your home/residence? **[READ LIST]**
1. Single-family home, detached construction [not a duplex, townhome, or apartment; attached garage is ok]
2. Factory manufactured/modular [single family home],
3. Mobile home [single family],
4. Row house
5. Two or three family attached residence
6. Apartment (4 + families)
7. Condominium
97.OTHER: (SPECIFY________________________________)
98. DON'T KNOW
99. Refused

H1b. Do you own or rent this residence?
1. OWN [**SKIP TO H3]**
2. RENT
98. DON'T KNOW **[SKIP TO H3]**
99. REFUSED **[SKIP TO H3]**

H2. Do you pay your own electric bill or is it included in your rent?
1. PAY BILL
2. INCLUDED IN RENT
98. DON'T KNOW **[DO NOT READ]**
99. REFUSED **[DO NOT READ]**

H3. Approximately when was your home constructed? [**DO NOT READ]**
1. Before 1960
2. 1960-1969
3. 1970-1979
4. 1980-1989
5. 1990-1999
6. 2000-2005
7. 2006 OR LATER

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98. DON'T KNOW
99. REFUSED

H3b. How many people live in your household year-round? Range [1-50]
[NUMERIC OPEN END]
98. DON'T KNOW
99. REFUSED

H4. Which range does your age fall into? Are you…? **[READ LIST]**
1. Under 18
2. 18-24
3. 25-34
4. 35-44
5. 45-54
6. 55-64
7. 65-74
8. 75-84
9. 85 or older
98. DON'T KNOW
99. REFUSED

H5a. How many square feet is the above-ground living space [IF NECESSARY: This excludes walk-out basements.]?
NUMERICAL OPEN END [RANGE 0-99,997] **[SKIP TO H6A]**
99998. REFUSED
99999. DON'T KNOW

H5b. Would you estimate the above-ground living space is about: **[READ LIST]**
1. Less than 1,000 sqft
2. Between 1,000 and 2,000 sqft
3. Between 2,000 and 3,000 sqft
4. Between 3,000 and 4,000 sqft
5. Between 4,000 and 5,000 sqft
6. Greater than 5,000 sqft
98. DON'T KNOW
99. REFUSED

H6a. How many square feet of conditioned living space is below-ground [IF NECESSARY: This includes walk-out basements.]?
NUMERICAL OPEN END [RANGE 0-99,997] **[SKIP TO H7]**
99998. REFUSED
99999. DON'T KNOW

H6b. Would you estimate the below-ground living space is about: **[READ LIST]**
1. Less than 1,000 sqft

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2. Between 1,000 and 2,000 sqft
3. Between 2,000 and 3,000 sqft
4. Between 3,000 and 4,000 sqft
5. Between 4,000 and 5,000 sqft
6. Greater than 5,000 sqft
98. DON'T KNOW
99. REFUSED

H7. How long have you lived at your current residence?
[RECORD YEARS] RANGE [1-97]
00. LESS THAN 1 YEAR
98. DON'T KNOW
99. REFUSED

H8. What is the highest level of education you have completed? **[READ RESPONSE LIST]**
1. Less than high school
2. High school graduate or equivalent (e.g., GED)
3. Attended some college (includes junior/community college)
4. Bachelor's degree
5. Advanced degree **[SPECIFY]**
6. Technical or trade school
97. OTHER [**SPECIFY]**
98. DON'T KNOW
99. REFUSED

H9. Was your total family income in 2010 before taxes UNDER OR OVER $50,000?
1. UNDER $50,000
2. OVER $50,000**[SKIP TO H11]**
3. EXACTLY $50,000**[SKIP TO END]**
98. DON'T KNOW **[SKIP TO END]**
99. REFUSED **[SKIP TO END]**

H10. Was it under $15,000, between $15,000 and $30,000 or between $30,000 and $50,000?
[INTERVIEWER NOTE: IF EXACTLY $30,000 ENTER AS '3. $30,000-$50,000']
1. UNDER $15,000**[SKIP TO END]**
2. $15,000-$30,000**[SKIP TO END]**
3. $30,000-$50,000**[SKIP TO END]**
98. DON'T KNOW **[SKIP TO END]**
99. REFUSED **[SKIP TO END]**

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H11. [ASK IF H9=2] Was it between $50,000 and $75,000, or between $75,000 and $100,000, or was it over $100,000? **[INTERVIEWER NOTE: IF EXACTLY $75,000 ENTER AS '2. $75,000-$100,000'. IF EXACTLY $100,000, ENTER AS '3. OVER $100,000']**

1. $50,000-$75,000
2. $75,000-$100,000
3. OVER $100,000
98. DON'T KNOW
99. REFUSED

END. Those are all the questions I have. Thank you so much for your participation!

APPENDIX D

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e3smart[SM] PROGRAM

Program Year 2012 Evaluation Report

Prepared for:
AEP Ohio

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Executive Summary

The goal of this report is to present a summary of the findings and results from the evaluation of AEP Ohio's *e³smart*^{SM} Program. The objectives of the evaluation are to quantify the energy and demand savings impacts of the program and to provide valuable feedback to AEP Ohio on program effectiveness.

This report examines the program impacts for the 2011-2012 school year. The process section discusses the 2012-2013 school year program activities, which incorporates many changes made to improve the program from the 2011-2012 school year, along with suggestions on how to continue to improve the program.

Program Summary

The *e³smart*^{SM} program is designed to teach 5th through 12th grade students and their families about the benefits of energy efficiency. With parental or guardian approval a home energy kit is provided to each participating student with energy efficiency measures to install in his/her home.

AEP Ohio contracted with the non-profit Ohio Energy Project (OEP) to administer the program. OEP is Ohio's National Energy Education Day (NEED) affiliate and has been implementing energy education programs in schools throughout Ohio for over 25 years.

The program creates a curriculum for teachers that focus on energy sources, transformation of energy, and energy uses. These lessons were created to teach the fundamentals of energy and energy efficiency, as well as to instruct students on how to properly install the measures included in the home energy kit. The lessons fulfill several components of the Ohio teaching requirements. OEP trains teachers at a one-day professional development workshop. During the professional development workshop teachers are taught the key points of the different lessons. Each student takes a home energy kit home and with the help of his/her parent or guardian installs the measures appropriate for the home. Each student then fills out a survey reporting the measures installed.

The 2011-2012 school year home energy kit contained the following energy efficiency measures:

- Two 23 W Bright White CFLs
- Two 13 W Soft White CFLs
- Earth Massage Showerhead
- LED Nightlight
- Combination pack of Outlet/Switch Gaskets
- Closed Cell Foam Weather-Strip (17" roll)
- Self-adhesive Door Sweep
- Hot Water Temperature Gauge Card
- Small Roll of Teflon Tape
- Flow Meter Bag
- Furnace Filter Alert Whistle

- Refrigerator/Freezer Thermometer
- Energy Use Gauge Thermometer
- DOE Energy Savers Booklet

Evaluation Objectives

The objective of the evaluation report is to provide verification of electrical energy savings impacts during the 2011-2012 school years.

The evaluation team examined the program's impact calculations and tracking data to answer the following impact evaluation questions:

1. What are the electrical energy and peak demand savings impacts from the program?

2. What are reasonable saving estimates for each of the home energy kit measures?

The objectives of the process evaluation were to develop an understanding of the final program design and implementation strategies, as well as to document program processes and tracking efforts, and to identify and recommend potential program improvements.

Evaluation Methods

Impact Methods

The evaluation methods for the 2011-2012 school years included an algorithm review to verify that reasonable assumptions and methods were used for assigning kWh and kW savings per measure. The program tracking data were analyzed to determine the quantity of each measure installed. The student installation surveys allowed the evaluation team to establish program installation rates per measure. The evaluation team conducted a parent/guardian phone survey to verify that the student installation rates were reasonable.

Process Methods

The data collection approach for the process evaluation was in-depth interviews with AEP Ohio program staff, the program administrator, and program implementers. The evaluation team also conducted interviews with teachers during a visit to a new teacher training workshop and returning teacher dinner meeting. Teacher surveys conducted by OEP were also examined for program process suggestions. The parent/guardian telephone survey also included process related questions.

Key Impact Evaluation Findings

The *e³smart℠* program enrolled 31,698 students who received energy efficiency kits during the 2011-2012 school years. 401 teachers participated in the program from 259 different schools. OEP recruited 282 new teachers. The program was delivered to public and private school in urban and rural locations.

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The saving estimates for *the* e^3*smart*^{SM} Program were developed using a student/parent self-report approach. This approach relied on responses provided by the student installation survey. Using secondary research and our industry experience, the evaluation team established *per measure* savings estimates, which were then converted into program savings estimates. The evaluation team used the installation rates gathered from the student installation survey and applied it to all the distributed kits. A previous study conducted by Navigant[1] [2]found that applying the student installation survey was appropriate and accurate. The evaluation team also conducted a parent/guardian telephone survey to verify installation rates. Table ES-1 shows the 2012 program goals, *ex-ante* savings claimed by the program, and the *ex-post* gross savings. The *ex-post* gross energy and demand savings for the 2011-2012 school years were 10,946 MWh and 0.85 MW, respectively. The reason for the increase is due to the application of the student survey installation rate to the entire population of students who received energy efficiency kits.

Table ES-1. Overall Evaluation Results from the 2011-2012 school year

2012 Program Goals		2012 *Ex-Ante* Claimed Savings		2012 *Ex-Post* Savings	
MWh	MW	MWh	MW	MWh	MW
7,064	1.46	6,084	0. 82	10,946	0.85

Table ES-2 shows the realization rates for the 2011- 2012 school year. The realization rate increase is due to the application of the student survey installation rate to the entire population of students who received energy efficiency kits.

Table ES-2. Program Savings and Adjustments

Ex-ante Savings (a)	Verified Savings	*Ex post* Savings (b)	Realization Rate RR = (b) / (a)
Energy Savings (MWh)			
6,084	6,245	10,946	1.80
Demand Savings (MW)			
0.82	0.49	0.85	1..04

[1] Nicor/ComEd Evaluation Report: Elementary Education Energy Education Program. January 24, 2013.
[2] http://nef1.org/

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Table ES-3 presents the program saving estimates and the number of measures installed by the program.

Table ES-3. 2011-2012 School Year *Ex-Post* Savings Estimates

Measure	Number of installed measures (a)	kWh Savings per measure (b)	kWh (c) = (a) * (b)	* kW Savings per measure (d)	kW (e) = (a) * (d)
CFL (4 Bulbs)	97,085	61.1[1]	5,931,996	0.0054	523.7
Kitchen and Bathroom Aerators	25,157	24.5	616,343	0.0031	76.9
LED Nightlight	25,774	20.59	530,579	0	0
Lower Hot Water Heater Temperature	9,589	146	1,400,016	0.0167	159.8
Earth Massage Showerhead	9,943	128	1,275,869	0.009	93.3
Weatherstripping	18,044	3.80	68,478	0	0
Door sweep	18,698	57.09	1,067,472	0	0
Gasket	18,530	2.97	55,033	0	0
Total	-	-	10,945,786	-	853.7

[1] The savings per measure for CFLs is a combination of the 13-Watt and 23-Watt bulbs.

* *Note: The numbers in this table are the actual numbers from the evaluation analysis. The values may not sum due to rounding.*

Table ES-4 presents the installation rates per measure based on 18,085 completed student installation surveys. Also displayed are installation rates based on 70 complete parent/guardian telephone surveys that were conducted by Navigant for this evaluation. The student installation surveys were used for program installation rates in the evaluation due to the student survey likely providing more reliable results than the parent/guardian survey. The student installation survey is likely more reliable due to the much larger sample size and due to the parent/guardian telephone survey having selection bias. The student installation surveys were completed by the students either during the installation process or shortly after, this timing was confirmed in the tracking data. The student installation survey has a much shorter time period between installation and recording of the installation than the parent/guardian telephone survey. The shorter time period between installation and recording would suggest more accurate results from the student installation survey than the parent/guardian telephone survey, which could be administered months after the installation.

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Table ES-4. 2011-2012 School Year Measures Installed

Measure	Number of installed measures	Installation Rate based on student installation survey	Installation Rate based on parent/guardian phone survey
CFLs (4 Bulbs)	55,391	77%	92%
Aerators	14353	40%	59%
LED Nightlight	14,705	81%	87%
Lower Hot Water Heater Temperature	5,471	30%	50%
Earth Massage Showerhead	5,673	31%	56%
Combination Weather-stripping, Door Sweep, Gaskets	10512	58%	82%

Program Recommendations

Recommendation #1 – Revise the student survey to gather an accurate number of weatherization measures units installed.

Currently the number of weatherization measures installed is gathered but not the amount of each measure. Such as, "how many feet of weatherstripping did you install?" This will allow for a more accurate savings estimate.

Recommendation #2 – Revise the teacher evaluation survey to emphasize that they will not be eligible to participate in the program in the following year if their students do not return their surveys.

An additional reminder to the teachers about the importance of students submitting their installation surveys could improve student response rate which also may increase the number of eligible teachers for the following program year.

Recommendation #3 - Monitor the number of participants in other AEP Ohio Energy Efficiency/Peak Demand Reduction (EE/PDR) programs that learn about the other program(s) as a result of their child's participation in the e3smart Program.

Children engaging their parent/guardians may be an effective marketing method. It could be useful for AEP Ohio to understand the outreach capacity of the e3smart Program.

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1 Introduction

1.1 Program Overview and Description

The *e³smart*^{SM} Program has multiple goals. One goal is to educate teachers, students and the community about household steps that lead to greater energy efficiency. Another goal is to determine the energy and demand savings impacts of the home energy kits that students install in their homes.

The *e³smart*^{SM} Program is designed to teach 5th through 12th grade students and their families the benefits of energy efficiency. A home energy kit is provided to each participating student with energy efficiency measures to install in their home.

AEP Ohio contracted with the Ohio Energy Project (OEP) to administer this program. OEP has been implementing energy education programs in schools throughout Ohio for over 25 years.

The program begins with creating a curriculum for teachers that focuses on energy sources, transformation of energy, and energy uses. These lessons were created to teach the fundamentals of energy and energy efficiency, as well as to instruct students on how to properly install the measures included in the home energy kit. The lessons fulfill several components of the State of Ohio teaching requirements. OEP trains teachers at a one-day professional development class. During the professional development class, teachers are taught the key points of the different lessons. Each student takes an energy kit home and with the help of their parent or guardian, and installs the measures appropriate for the home. Each student then fills out a survey reporting the measures installed.

1.1.1 Implementation Strategy

The *e³smart*^{SM} Program is targeted to 5th through 12th grade classes in the AEP Ohio region. Each participating teacher registers the number of home energy kits needed for the school year during the professional development training session. Teachers returning to the program register the number of home energy kits needed at the annual dinner meeting, or contact OEP and inform them about the number of needed kits. OEP has created a detailed curriculum divided into seven lesson plans. Each lesson has a classroom and at home component. Teachers are provided with a $100 stipend once their students return the surveys. The teachers also receive continuing education credits for the professional development training session and a reduced rate for graduate credit at Ashland University.

1.1.2 Measures

Home Energy Kits may contain a combination of the following measures:

- Two 23 W Bright White CFLs
- Two 13 W Soft White CFLs
- Earth Massage Showerhead
- LED Nightlight
- Combination pack of Outlet/Switch Gaskets

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- Closed Cell Foam Weather-Strip (17" roll)
- Self-adhesive Door Sweep
- Hot Water Temperature Gauge Card
- Small Roll of Teflon Tape
- Flow Meter Bag
- Furnace Filter Alert Whistle
- Refrigerator/Freezer Thermometer
- Energy Use Gauge Thermometer
- US DOE Energy Savers Booklet

1.2 Evaluation Objectives

The evaluation objectives will assess the energy and demand saving impacts of the home energy kits and the program processes. The energy and demand savings estimates are determined by the number of home energy kits distributed and the self-reporting survey the parents and students fill out.

The objectives of the evaluation are to: (1) report energy and peak demand savings estimates from the home energy kits; (2) assess process performance, satisfaction, program operational conditions, and ways to improve the program.

1.2.1 Research Questions

The evaluation will seek to answer the following key research questions.

1.2.1.1 Program Characteristics and Barriers

- How effective is the teacher recruitment process?
- What is the parent/guardian perception of the program?

1.2.1.2 Administration and Delivery

- Is the program administration running as expected?
- Are there any problems with delivery?
- Are program tracking systems adequate? Do they contain all data required to support program tracking and evaluation?

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2 Evaluation Methods

2.1 *Impact Evaluation*

For the *e³smart℠* Program, the evaluation team estimated savings for each of the program measures. This activity involved analyzing program tracking data, and industry best practice savings algorithms and assumptions. This technical review forms the basis of the evaluation team's recommended program savings estimates.

2.1.1 Verification and Due Diligence

Under this task, the evaluation team reviewed quality assurance/quality control (QA/QC) activities already in place to determine whether student and teacher participation information was entered in an accurate manner in the tracking system.

The savings estimates are based on the measures reported in the student survey, so the evaluation team closely examined OEP's tracking data. To organize survey results, and to tabulate program savings, this effort involved interviewing OEP staff and reviewing databases and files that OEP used to track the distribution of program kits and surveys. The team also assessed the program documentation and tracking with respect to the Best Practices Self-Benchmarking Tool from the National Energy Efficiency Best Practices Study.[3]

2.1.2 Tracking Systems

The evaluation team performed an independent verification of the program tracking database to determine the appropriate level of input and the existence of outliers, missing values, and potentially missing variables. The purpose of the tracking system review was to ensure these systems gather the data required to support future evaluations and to allow program managers to monitor key aspects of program performance at regular intervals.

2.1.3 Program Savings Evaluation

The evaluation team used secondary research and our industry experience to arrive at the per unit measure savings.

2.2 *Process Evaluation*

The purpose of the process evaluation is to identify possible program improvements in the administration of the program by AEP Ohio, OEP, teachers, and students.

[3] See the Best Practices Self-Benchmarking Tool developed for the Energy Efficiency Best Practices Project: http://www.eebestpractices.com/benchmarking.asp

2.2.1 Data Collection Methods

The evaluation team conducted in-depth interviews with AEP Ohio program staff and program implementers to clarify program processes, administration, marketing, delivery, and tracking system procedures. The evaluation team also conducted interviews with teachers during a visit to a teacher training session and dinner meeting. Teacher surveys conducted by OEP were also examined for program process suggestions. The parent/guardian phone survey also gathered process related questions.

2.2.2 Documents Reviewed

Data Collection Methods and Material

1. Student Surveys
   a. OEP survey for each student who received an energy efficiency kit
2. Parent/Guardian CATI telephone survey
   a. Navigant employed a survey group to obtain 70 completed surveys of parent/guardians
3. In-depth interviews
   a. AEP Ohio staff
   b. Implementation contractor
4. Attending a teacher training event to meet with
   a. Implementation contractor
   b. Teachers
5. Review of Teaching materials
   a. Energy efficiency awareness pre-poll
   b. Energy efficiency teaching material: home audits and energy efficiency quizzes
6. Review of Program Tracking system
   a. Student survey's obtained from the 2011-2012 school year

Table 2-1 provides a summary of the principal data sources contributing to the evaluation of the AEP Ohio *e³smart*^{SM} Program.

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Table 2-1. Principal Data Sources

Data Collection Type	Targeted Population	Documentation Format	Sample Size
Literature Review	*e³smart*℠ Measures	Program Documents and Secondary Literature	-
In-Depth Interviews	AEP Ohio Program Staff	2	2
	Program Administrator and Implementer	3	3
Student online installation survey	*e³smart*℠ student participants	Tracking Spreadsheets	Census
Parent/Guardian telephone survey	Parent/Guardians of *e³smart*℠ student participants	Tracking Spreadsheet	70

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3 Program Level Results

This section presents the AEP Ohio *e³smart*SM Program impact and process evaluation results.

3.1 Impact Evaluation Results

3.1.1 Program Impact Results

The saving estimates for the *e³smart*SM Program were estimated using a student/parent self-report approach. This approach relied on responses provided by program participants in an online survey administered to students. Using secondary research and our industry experience, the evaluation team established the per unit measure savings. Table 3-1 and Table 3-4 present the program saving estimates and the number of measures installed by the program.

Table 3-1. 2011-2012 School Year Savings Estimates

Measure	Number of installed measures (a)	kWh Savings per measure (b)	kWh (c) = (a) * (b)	* kW Savings per measure (d)	kW (e) = (a) * (d)
CFL (4 Bulbs)	97,085	61.1[1]	5,931,996	0.0054	523.7
Kitchen and Bathroom Aerators	25,157	24.5	616,343	0.0031	76.9
LED Nightlight	25,774	20.59	530,579	0	0
Lower Hot Water Heater Temperature	9,589	146	1,400,016	0.0167	159.8
Earth Massage Showerhead	9,943	128	1,275,869	0.0090	93.3
Weatherstripping	18,044	3.80	68,478	0	0
Door sweep	18,698	57.09	1,067,472	0	0
Gasket	18,530	2.97	55,033	0	0
Total	-	-	10,945,786	-	853.7

[1] The savings per measure for CFLs is a combination of the 13-watt and 23-watt bulbs.

* *Note: The numbers in this table are the actual numbers from the evaluation analysis. Totals may not sum due to rounding.*

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3.1.2 Energy and Demand Savings Calculations for CFLs

Four CFLs were distributed with each energy efficiency kit. Two of the CFLs were 13-watt bulbs and two were 23-watt bulbs.

Equation 3-1. Unit Energy Savings Impact for CFLs

kWh = Delta Watts / 1000 * HOU * 365

Bulb wattage. Each kit contained two 13-watt and two 23-watt CFLs.

Hours of Use. Recommend using 2.70 hours based on the 2011 Efficient Product Evaluation report.

Saved Watts per 13-watt Bulb. The evaluation team assumed that the average replaced light bulb was a 60-Watt incandescent bulb that was replaced with a 13-watt CFL. It is known that the installed bulbs were 13-watt bulbs for the program.

kWh = Delta Watts / 1000 * HOU * 365

kWh = (60 – 13) / 1000 * 2.70 * 365

kWh = 46.32

Saved Watts per 23-watt Bulb. The evaluation team assumed that the average replaced light bulb was a 75-watt incandescent bulb replaced with a 23-watt CFL. It is known that the installed bulbs were 23-watt bulbs for the program.

kWh = Delta Watts / 1000 * HOU * 365

kWh = (100 – 23) / 1000 * 2.70 * 365

kWh = 75.88

Equation 3-2. Unit Demand Savings for CFLs

kW = Delta Watts / 1000 * Peak Coincidence Factor

Peak Demand Coincidence Factor. Recommend using 0.087 based on the 2011 Efficient Product Evaluation report.

13-Watt bulb kW savings

kW = Delta Watts / 1000 * Peak Coincidence Factor

kW = (60 -13) / 1000 * 0.087

kW = 0.00409

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23-Watt bulb kW savings

kW = Delta Watts/1000 * Peak Coincidence Factor

kW = (100 – 23) / 1000 * 0.087

kW = 0.00670

3.1.3 Energy and Demand Savings Calculations for LED Nightlights

Savings for LED nightlights assume that an existing nightlight using 5 watts[4] is replaced by the LED night light in the kit which consumes 0.3 watts. An incandescent night light consumes from 5 to 7 watts; 5 watts is a conservative value. There are no demand savings, as nightlights are not coincident with the system peak.

Equation 3-3. Unit Energy Savings Impact for LED Nightlight

$$kWh = ((NL_{replaced} - NL_{LED})*(NL_{hours} * 365))/1000$$

$NL_{replaced}$ = 5 watts

NL_{LED} = 0.3 watts

NL_{hours} = 12 hours[5]

kWh = ((5 - 0.3) *(12 * 365))/1000

kWh = 20.586

3.1.4 Energy and Demand Savings Calculations for Low-Flow Showerheads

The energy and demand savings for low-flow showerheads are based on the assumptions from Table 3-2 and determined from the following equations.

Equation 3-4. Unit Energy Savings Impact for Low-Flow Showerhead

kWh = Household * GPD * 365 *(GPM_base - GPM_low) / (GPM_base * SPH) * EPG_electric

Equation 3-5. Unit Demand Savings Impact for Low-Flow Showerhead

kW = kWh / Hours * CF

[4] Source: http://www.hardwareandtools.com/invt/u578995.

[5] Southern California Edison Company, "LED, Electroluminescent & Fluorescent Night Lights", Work Paper WPSCRELG0029 Rev. 1, February 2009, pp. 2 and 3.

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Table 3-2. Key Impact Parameters for Low Flow Showerheads

Parameter Description	Parameter	Mean Value	Source
Household size	Household	2.46	US Census Bureau for Ohio (a)
Gallons of hot water used from showerheads per capita per day	GPD	12.9	Formula from the Illinois Statewide Technical Reference Manual
Gallons per minute baseload	GPM_base	2.5	Federal Minimum Standard
Gallons per minute replaced unit	GPM_low	1.5	Program specification
Showers per household	SPH	1.6	Pacific Northwest Laboratory (b)
Showers per capita per day	SPCD	0.7	LBNL report (c)
Shower length (minutes)	Length	8.2	LBNL report (c)
Average cold water temperature	Supply Temp	58.1	Average mains temperature in Columbus, OH: Building America Benchmark 2010
Average mixed temperature of shower	Shower Temp	105	LBNL report (c)
In-service rate	ISR	31%	2012 student installation surveys
Annual electric DHW recovery hours for showerhead use	Hours	268	Formula from the Illinois Statewide Technical Reference Manual (d)
Peak Demand Coincidence Factor	CF	0.0196	Aquacraft, Inc. Water Engineering and Management (e)
Energy per gallon of hot water supplied by electric	EPG_electric	0.127	Formula from the Illinois Statewide Technical Reference Manual (f)

[a] US Census Bureau for Ohio http://quickfacts.census.gov/qfd/states/39000.html

[b] "Estimate based on Pacific Northwest Laboratory; "Energy Savings from Energy-Efficient Showerheads: REMP Case Study Results, Proposed Evaluation Algorithm, and Program Design Implications"

[c] Biermayer, Peter J., Potential Water and Energy Savings from Showerheads, March 17, 2006, Lawrence Berkeley National Laboratory.

[d] Calculated as follows: (Total annual hot water used for showers = 2.65*10.1*365*0.78 HW% = 7361 gallons) / (27.51GPH recovery of electric water heater) = 268 hours per year. GPH calculated for 65.9F temp rise (120-54.1), 98% recovery efficiency, and typical 4.5kW electric resistance storage tank.

[e] Calculated as follows: Assume 11% showers take place during peak hours (based on: http://www.aquacraft.com/sites/default/files/pub/DeOreo-%282001%29-Disaggregated-Hot-Water-Use-in-Single-Family-Homes-Using-Flow-Trace-Analysis.pdf).
Assuming savings are constant throughout the year, the coincidence factor (or probability that the kW savings occur during peak hours) is 3/12 (months) * 5/7 days * 0.11% during peak hours = 0.0196.

[f] Calculated as follows: Specific weight of water (8.33 lbs/gal) * heat capacity of water (1.0 btu/lb-F) * Shower Temp (105 F) - Supply Temp (58.1F)) / (Water heater recovery efficiency (0.98) * 3412)

3.1.5 Energy and Demand Savings Calculations for Weatherization Measures

Weatherization measures include the package of outlet and switch gaskets, closed cell foam weather-stripping, and a self-adhesive door sweep. There are few studies that gather the savings values of these

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weatherization measures. The savings below are derived from a Connecticut study[6]. The Connecticut study's savings are based on savings from heating. No kW savings are claimed for these measures.

Table 3-3. Unit Demand Savings Impact for Low-Flow Showerhead

Measure	Unit of measure	Annual kWh savings for Electric Heating*
Weatherstripping	Per linear ft	9
Door Sweep	Per Sweep	173
Outlet Gasket	Per Gasket	11.5

**Note: The kWh savings are adjusted for the percentage of homes with electric heating (33%), from the AEP Ohio's 2010 Residential Baseline Study.*

The number of each measure installed was not reported. The evaluation team also did not gather this information. To remain conservative the evaluation will only count one unit of savings per measure until accurate units are obtained.

Equation 3-6. Impact for Weatherization Measures Energy Savings

Average kWh savings per measure = saving estimate for electric heating * (number of measures installed * units of measure installed)* percentage of population primarily using electric heat

3.1.6 Energy and Demand Savings Calculations for Faucet Aerators

Navigant used the draft Ohio TRM for energy and demand savings for this measure. The equation used in the draft Ohio TRM is similar to other reputable sources. Navigant verified the inputs used in the draft Ohio TRM. The inputs were gathered from the most recent reputable source or the changes were insignificant such as number of people per household.

$$\Delta kWh = 24.5$$
$$\Delta kW = 0.003kW$$

[6] KEMA, Evaluation of the Weatherization Residential Assistance Partnership and Helps Programs (WRAP/Helps), September 10, 2010

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Table 3-4. 2011-2012 School Year Measures Installed

Measure	Number of installed measures	Installation Rate based on returned surveys	Installation Rate based on parent survey
CFLs (4 Bulbs)	55,391	77%	92%
Aerators	14353	40%	59%
LED Nightlight	14,705	81%	87%
Lower Hot Water Heater Temperature	5,471	30%	50%
Earth Massage Showerhead	5,673	31%	56%
Combination Weather-stripping, Door Sweep, Gaskets	10,512	58%	82%

3.1.7 Data Collection

Data collection was based on student/parent and teacher surveys. In the 2011-2012 school years, the student surveys were entered into an online form. The evaluation team's review of the data input showed the information was entered accurately. The evaluation team also conducted interviews with teachers during a visit to a teacher training session and dinner meeting. Teacher surveys conducted by OEP were also examined for program process suggestions. The parent/guardian phone survey also gathered process related questions.

Students who receive an energy efficiency kit are instructed by their teachers to fill out the online student survey. Of the 31,698 students who received an energy efficiency kit, 18,085 surveys were filled out. The student survey is user-friendly with clear selection options. Many of the questions have follow-up questions that appear as a drop down after a question is answered. The drop down feature clearly directs attention to the follow up question. Without the drop down follow up question feature, the survey would seem much longer and could affect the percent of surveys returned.

Navigant administered a telephone survey to parents/guardians who indicated on the student installation survey that they would be willing to participate in the survey. The parent/guardian needed to provide their telephone number on the student survey as this was the only place this personal information was available to Navigant. The survey was administered to verify the installation rates of the student survey as well as gather satisfaction and program improvement suggestions. For all measures, the installation rates were higher in the parent/guardian survey than in the student survey. This is not surprising as parent/guardians who volunteered to participate in an additional survey about the program are likely to have been more involved in installing the measures than those who did not volunteer for the additional survey.

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3.2 Process Evaluation Results

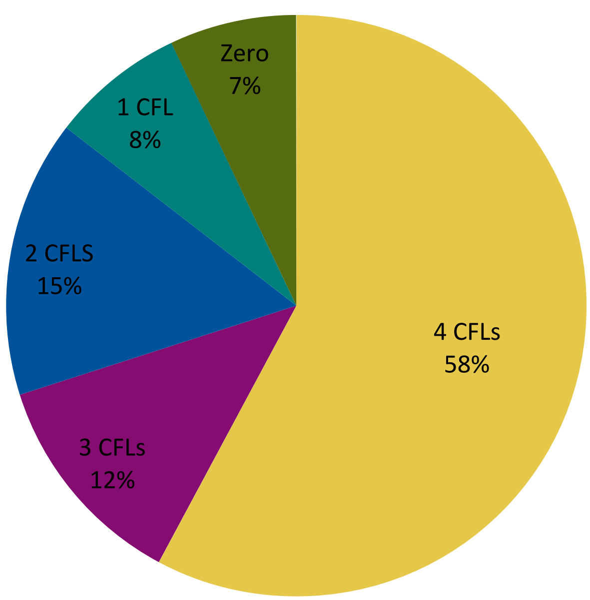
The process component of the program evaluation focused on program design and processes, program implementation, marketing and outreach, and participant satisfaction. The primary data sources for the process component were teacher surveys, and interviews with program administration and implementation contractors. The evaluation team also reviewed the teaching curriculum and attended a professional development teacher training session.

3.2.1 Measures Acceptance

No changes are recommended for the student kits. Following is a summary of the evaluation team's analysis of the reported data. The installation rates are typical or higher than other similar programs which indicates that the appropriate measures are included in the student kits.

Compact fluorescent lamps generate the most overall savings for the *e³smart*℠ Program. About 93 percent of the students who returned a response form stated that they installed at least one of the CFLs, with 58 percent reporting they installed all four CFLs. The parent/guardian survey reported that 89 percent of those surveyed installed at least one CFL with 72 percent reporting they installed all four.

Figure 3-1. Number of CFLs installed per kit based on student response form



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LED nightlights were the most installed measure with the student response form reporting 81 percent were installed. The parent survey reported 87 percent of LED nightlights were installed. . The ease of installation may also contribute to the high installation percentage.

The student response form reported that 31 percent of the showerheads were installed. The parent survey reported 48 percent of the showerheads were installed. The parent survey asked participants who did not install the showerhead what was the reason for not installing it. The most popular response was they did not like the decreased pressure of the showerhead. The next most popular response was they already had a showerhead they liked.

The student response form reported that 50 percent of the respondents installed at least one of the aerators, with 30 percent installing both kitchen and bathroom aerators. The parent survey reported 71 percent of those surveyed installed at least one aerator with 46 percent installing both. The parent survey reported the most popular reason for not installing the aerator was the lower pressure level.

The weatherization measures were installed by an average of 58 percent of the respondents to the student response form. The student response form also showed that if one weatherization measure was installed it was highly likely (over 90%) that all three measures were installed. The parent survey reported that 81 percent of those surveyed installed at least one weatherization measure. Weatherization measures take more effort to install than the other measures.

3.2.2 Program Marketing and Channeling to Other Programs

The *e³smart*℠ Program's marketing and outreach efforts to schools are highly effective. About 187 teachers participated in the first year of the program (2009-2010 school year), 189 teachers participated in the 2010-2011 school year. 401 teachers participated in the 2011-2012 school year, more than double than in each of the preceding two years. For the 2011 – 2012 school years, AEP Ohio's goal was to double the numbers of students and teachers in the program. OEP accomplished the goal of doubling the numbers of students and teachers. OEP only retains teachers from the previous year if their students have submitted their installation surveys. OEP was able to double the amount of participants in the program while continuing to maintain high teacher standards.

OEP sends teacher applications to every school in the AEP Ohio territory. The application can also be obtained from OEP's website. OEP also attends numerous energy conferences in the region and promotes the *e³smart*℠ Program. The evaluation team questioned numerous teachers, several of whom mentioned that word of mouth from other teachers was how they heard about the program.

The *e³smart*℠ Program provides a marketing opportunity for AEP Ohio's other residential energy efficiency programs. The program met this opportunity with materials that include the URL to AEP Ohio's energy efficiency programs web site,[7] and information about AEP Ohio's energy efficiency/peak demand reduction (EE/PDR) programs. The evaluation team recommends that the *e³smart*℠ Program continue to channel its participants to other AEP Ohio programs. If other AEP Ohio programs have a

[7]. https://www.aepohio.com/save/Default.aspx?ctype=h

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survey that asks "how did you hear about the program?" adding "*e³smart℠* (an energy efficiency school program that provides a free energy efficiency take home kit to students)" would provide information on how the *e³smart℠* Program is helping promote AEP Ohio's other energy efficiency programs.

3.2.3 Program Participation and Satisfaction

OEP maintains high standards for their teachers. OEP will not allow a teacher to participate in the following year if their students have not submitted their installation surveys. The evaluation team examined other educational programs similar to this program and found that teachers were partially responsible for students not submitting the installation surveys. OEP's method of not retaining teachers when their students do not submit their installation surveys addresses teachers who do not perform well for the *e³smart℠* Program. The evaluation team recommends that OEP include, on the end of the year teacher survey, the requirement that students turn in their installation surveys in order for the teacher to be eligible to participate in the program the following year.

The evaluation team surveyed teachers and reviewed OEP's reported findings from its teacher surveys and found that teachers are generally satisfied with the *e3smart℠* Program and identified few barriers to the successful implementation of the program. The program is very popular with teachers, and program materials are generally well organized and detailed to increase and evaluate student knowledge of energy and energy efficiency. Following are a few example feedback comments provided by teachers through the survey.

"I think it taught students how small changes could make a difference on the amount of energy used as well as how those changes can affect our environment."

"I will be signing up for it again this summer. This is a great way to connect with parents."

Overall, OEP reports about 87 percent of teachers said they would conduct the program again if they had the opportunity, and 4 percent said they would do part of the program again. On a scale ranging from 1 to 7, the average teacher satisfaction rating with the program was 6.3, indicating very high overall satisfaction with the program.

Based on the findings from Navigant's parent/guardian survey, parents/guardians were pleased with the *e³smart℠* Program. When asked to rank their overall satisfaction with the program on a scale of 0 to 10, with 0 being extremely dissatisfied and 10 being extremely satisfied, 87 percent of parent/guardian survey participants responded with a rating of 8 or higher. More specifically, 56 percent of survey participants ranked their overall satisfaction at a 10, followed by 13 percent of respondents who ranked their satisfaction at a 9, and 19% who ranked their satisfaction at an 8. One parent/guardian respondent commented:

"We absolutely loved it. We learned a lot. I was thrilled that I was able to save on energy cost. I was thrilled that it [the program] didn't cost; and not only did we get a chance to try it, we got to keep it [the measures]."

One popular recommendation for improvement made by parents/guardians was to expand the program to include additional energy-saving measures that can be installed in participants' homes, such as tank

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insulation for water heaters and other insulation measures. When parents/guardians were asked if they had any concerns about their child participating in the *e³smart℠* Program, 94 percent reported not having any concerns.

3.2.4 Curriculum

OEP has created a curriculum that focuses on energy sources, transformation of energy, and energy uses. These lessons were created to teach the fundamentals of energy as well as energy efficiency, and instruct students on how to properly install the home energy kit measures. The student's retention of the lessons is gauged by pre- and post-testing. The average pre-poll score was 9.2 out of 20 (46%). The average post-poll score was 17.2 out of 20 (86%), indicating that students are increasing their understanding of energy and retaining that knowledge.

3.3 Cost-Effectiveness Review

This section addresses the cost effectiveness of the *e³smart℠* Program. Cost effectiveness is assessed through the use of the Total Resource Cost (TRC) test. Table 3-5 summarizes the unique inputs used in the TRC test.

Table 3-5. Inputs to Cost-Effectiveness Model for *e³smart℠* Program

Item	
Average Measure Life	9
Students	31,698
Annual Energy Savings (kWh)	10,945,786
Coincident Peak Savings (kW)	854
Third Party Implementation Costs	$861,893
Utility Administration Costs	$5,434
Utility Incentive Costs	$0
Participant Contribution to Incremental Measure Costs	$0

Based on these inputs, the TRC ratio is 4.4. Therefore, the program passes the TRC test. Table 3-6 summarizes the results of the cost-effectiveness tests. Results are presented for the Total Resource Cost test, the Ratepayer Impact Measure Test, and the Utility Cost Test. Because the participants did not contribute to costs, the Participant Cost Test is not applicable for this program.

Table 3-6: Cost Effectiveness Results for the *e³smart℠* Program

Test Results	
Total Resource Cost	4.4
Participant Cost Test	N/A
Ratepayer Impact Measure	0.5
Utility Cost Test	4.4

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At this time, additional benefits related to reduction of greenhouse gas emissions have not been quantified in the calculation of the TRC. These additional benefits would increase the given TRC benefit/cost ratio.

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4 Conclusions and Recommendations

4.1 *Impact Evaluation Results*

This section summarizes the impact evaluation results.

4.1.1 Impact Results

The *e³smart^{SM}* program enrolled 31,698 students who received energy efficiency kits during the 2011-2012 school years. 401 teachers participated in the program from 259 different schools. OEP recruited 282 new teachers. The program was delivered to public and private school in urban and rural locations.

The saving estimates for the *e³smart^{SM}* Program were estimated using a student/parent self-report approach. This approach relied on responses provided by program participants in the paper survey distributed to students. Using secondary research and our industry experience, the evaluation team established the per unit measure savings. Table 4-1 presents the program saving estimates and the number of measures installed by the program.

Table 4-1. 2011-2012 School Year Savings Estimates

Measure	Number of installed measures (a)	kWh Savings per measure (b)	kWh (c) = (a) * (b)	* kW Savings per measure (d)	kW (e) = (a) * (d)
CFL (4 Bulbs)	97,085	61.1[1]	5,931,996	0.0054	523.7
Kitchen and Bathroom Aerators	25,157	24.5	616,343	0.0031	76.9
LED Nightlight	25,774	20.59	530,579	0	0
Lower Hot Water Heater Temperature	9,589	146	1,400,016	0.0167	159.8
Earth Massage Showerhead	9,943	128	1,275,869	0.009	93.3
Weatherstripping	18,044	3.80	68,478	0	0
Door sweep	18,698	57.09	1,067,472	0	0
Gasket	18,530	2.97	55,033	0	0
Total	-	-	10,945,786	-	853.7

[1] The savings per measure for CFLs is a combination of the 13-Watt and 23-Watt bulbs.

* *Note: The numbers in this table are the actual numbers from the evaluation analysis. Totals may be not sum due to rounding.*

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4.2 *Process Evaluation Results*

This section provides a summary of the process evaluation results.

4.2.1 Marketing and Outreach

4.2.1.1 Program Marketing and Channeling to Other Programs

The *e³smart*℠ Program's marketing and outreach efforts to schools are highly effective. The goal for students in the 2011-2012 school years was to double the number of participants from the previous year. OEP was able to accomplish this goal while maintaining their previous high standards for teachers.

OEP sends applications for the *e³smart*℠ Program to every school in the AEP Ohio territory. OEP's website also has the application along with program details for those teachers who hear about the program.

4.2.2 Program Participation, and Satisfaction

According to the end of the year teacher surveys, teacher report high satisfaction with the *e³smart*℠ Program. The average program satisfaction rating reported by teachers was 6.3 out of 7.

Based on the findings Navigant's parent/guardian survey, parents/guardians were pleased with the e³smart℠ Program with 87 percent giving the program an 8 or higher on a scale of 0 to 10.

4.2.3 Curriculum

OEP has created a curriculum that focuses on energy sources, transformation of energy, and energy uses. These lessons were created to teach the fundamentals of energy and energy efficiency, as well instruct students on how to properly install the home energy kit. Students also demonstrate they have learned and retained the information.

4.3 *Key Recommendations*

Recommendation #1 – Revise the student survey to gather an accurate number of weatherization measures units installed.

Currently the number of weatherization measures installed is gathered but not the amount of each measure. Such as, "how many feet of weatherstripping did you install?" This will allow for a more accurate savings estimate.

Recommendation #2 – Revise the teacher evaluation survey to emphasize that they will not be eligible to participate in the program in the following year if their students do not return their surveys.

An additional reminder to the teachers about the importance of students submitting their installation surveys could improve student response rate which also may increase the number of eligible teachers for the following program year.

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Recommendation #3 - Monitor the number of participants in other AEP Ohio Energy Efficiency/Peak Demand Reduction (EE/PDR) programs that learn about the other program(s) as a result of their child's participation in the *e³smart^SM^* Program.

Children engaging their parent/guardians may be an effective marketing method. It could be useful for AEP Ohio to understand the outreach capacity of the *e³smart^SM^* Program.

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Appendix A Planning Checklist

TEACHER PLANNING CHECKLIST

Date	Task	Done
	Make sure you have all materials and supplies for the lessons.	
	Look over the teacher guides, curriculum, and booklets.	
	Practice experiments and activities.	
	Contact the school and local press to let them know about your unit.	
	Give Pre-poll and collect it. **Grade it and save it for later.** **Make a note of the average grade.**	
	Teach lessons.	
	Give Post-poll and collect it. Grade it. Calculate average grade. Allow students to compare their Pre-poll and Post-poll scores. **Save both average test scores to enter into the teacher evaluation online.**	
	Take lots of pictures for your scrapbook. Send digital copies of photos (Hard copies of pictures can be mailed with any data not submitted online.)	
	Supervise construction of student scrapbook (optional).	
	Submit scrapbook to OEP by April 15 to: 200 E. Wilson Bridge Rd. Suite 320 Worthington, OH 43085	
	Allow students to take home their completed activities, journals, and *ENERGY SAVERS* booklet.	
	Complete unit Teacher Evaluation Form online@ www.ohioenergy.org	
	Family Installation Surveys must be submitted no later than May 15, 2013 **ONLINE: (Preferable)** **www.ohioenergy.org** **Follow Link on Website** **Family Installation Surveys are due no later than May 15, 2013** **BY MAIL:** Ohio Energy Project E3 Education Programs 200 E. Wilson Bridge Rd. Suite 320 Worthington, OH 43085	
	Attend **OEP Youth Energy Awards Celebration** on May 14, 2013 at the Ohio Union on the OSU Campus (optional but REALLY fun!).	
	Pat yourself on the back for a job well done AND for making a difference!	

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Appendix B Program Overview

PROGRAM OVERVIEW 2012-2013

LESSON	PROVIDED ITEMS	AT SCHOOL/ IN THE CLASSROOM	AT HOME	*ENERGY SAVERS* BOOKLET	READ/WRITE and REFLECT
Program Preparation	Letter to Family Table of Contents	Pre-Poll "Top 5" Activity	Family Letter *Energy Savers* Booklet	p. 2-3	Pre-poll
LESSON 1 Introduction to Energy	NEED *Infobooks*	"My Daily Energy Transformations" Activity "Energy Savers Search"	"Home Energy Audit" Home Activity	p. 4-6	NEED *Infobook* Articles Journal Entry #1 "Measuring Electricity" NEED Article
LESSON 2 Light Bulb or Heat Bulb?	4 CFLs LED nightlight Clamp light sockets, radiometers, lamp bases, thermometers "Tic Tac Energy"	"Light Bulb or Heat Bulb" Experiment "Let's Compare" Worksheet CFL vs IL: The Big Picture!	"Light Bulb or Heat Bulb" Home Activity Internet Activity – "Take the Pledge"	p. 23-26	Journal Entry #2 "Amazing Light Bulb Facts" IL, CFL, LED *Basics* Energy Star Articles EISA Backgrounder Article
LESSON 3 Insulation and Air Leaks	Weather Stripping Door Sweep	"Insulation Experiment" "Make a Draft Meter"	"Home Insulation and Air Leaks" Activity	p. 7-11 p. 21-22	Journal Entry #3
LESSON 4 Heating and Cooling	Thermometer/Thermostat Gauge Furnace Filter Whistle Demonstration Furnace Filter	"Measuring the Temperature of my School" Experiment	"Measuring the Temperature of my Home" Activity	p. 12-18	Journal Entry #4
LESSON 5 Saving Water and Energy	Hot Water Gauge Flow Meter Bag Low-flow Showerhead Kitchen Aerator Bathroom Aerator EnergyGuide Labels	"Saving Water and Energy at School" Experiment "Water Heating and EnergyGuide Labels"	"Saving Water and Energy at Home" Activity	p. 19-20	Journal Entry #5
LESSON 6 Appliances and Energy	Kill-a-Watt Meters Refrigerator/Freezer Thermometer	"Testing the Energy Used by Electric Appliances" Experiment	"Checking Appliances at Home" Activity	p. 27-32	Journal Entry #6 "Vampire Power" Article
LESSON 7 Energy Synopsis	"Safety Sort" "Play It Smart" Game "SMART HOUSE" Game Other Review Games, Projects &, Activities	"Play It Smart" Game "SMART GRID" Discussion "SMART HOUSE" Game Final Review Games, Projects, Activities, & Celebrations Post-Poll	"Home Energy Audit: Take 2" **"FAMILY INSTALLATION SURVEY"**	p. 33-38	Post-Poll Journal Entry #7
Resources and Support Materials	Energy 101 Materials Games, Activities Information from Utilities	**See List of Resources & Support Materials**			Smart Grid – An Introduction EPA – Mercury in CFLs Fact Sheet
Correlation to the Ohio Standards	"Correlation to Ohio Science Content Standards Grades 5-12"				

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Appendix C Pre-poll (and post-poll) (the post-poll is identical to the pre-poll)

PRE-POLL **NAME** ______________________________ **SCORE** ______**correct**

*Circle the correct answer AND place your answer on the blank. This is **NOT** for a grade but just to show what you may already know.*

____**1. To find out which parts of your house use the most energy you should conduct a home energy**
A. observation B. ritual C. petition D. audit

____**2. What system in your home uses the most energy?**
A. heating / cooling B. water heating C. refrigeration D. computers/entertainment

____**3. Which energy source produces the most electricity in Ohio?**
A. coal B. nuclear C. solar D. hydropower

____**4. Which appliance would you expect to use the most energy?**
A. fluorescent light bulb B. incandescent light bulb C. hair dryer D. fan

____**5. An incandescent light bulb converts most of its energy into**
A. light energy B. mechanical energy C. thermal energy D. nuclear energy

____**6. The second largest energy expense in your home is:**
A. lighting B. heating water C. heating/cooling D. computers/entertainment

____**7. One of the easiest ways to reduce electricity use at home is to:**
A. change an IL to CFL B. replace windows C. add insulation to attic D. replace old refrigerator

____**8. One of the appliances that uses the most energy in your home is the:**
A. television B. computer C. radio D. refrigerator

____**9. The average cost of a kilowatt-hour of electricity for homes in Ohio is…**
A. 25¢ B. $1 C. 2¢ D. 11¢

____**10. A device that controls temperature is a**
A. thermometer B. transformer C. thermostat D. photocell

____**11. A CFL uses about _______ of the energy used by an incandescent light bulb.**
A. one tenth B. one fourth C. one half D. two thirds

____**12. Electric meters in our homes measure the electricity we use and buy in what units?**
A. volts B. amps C. miles per gallon D. kilowatt-hours

____**13. Which renewable energy source currently generates the most electricity?**
A. wind B. biomass C. solar D. hydropower

____**14. EnergyGuide labels are useful when shopping for new appliances. They are ______ in color.**
A. blue and green B. red C. yellow and black D. orange

____**15. For maximum energy efficiency, the ideal temperature for your water heater is**
A. 100°F B. 120°F C. 200°F D. 180°F

____**16. In many energy transformations, wasted energy is given off in what form?**
A. thermal energy B. chemical energy C. mechanical energy D. electrical energy

____**17. The greatest amount of air leaks in and out of your home through**
A. the fireplace B. doors C. fans and vents D. floors, walls, ceilings

____**18. Changing your behavior in order to use less energy is called energy**
A. conservation B. efficiency C. consumption D. transformation

____**19. Working to invent or improve technology to use less energy is called energy**
A. conservation B. efficiency C. consumption D. transformation

____**20. Which energy source provides most of our transportation needs?**
A. wind B. coal C. petroleum D. propane

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PRE-POLL **NAME** ***ANSWER KEY*** **SCORE ______correct**

*Circle the correct answer AND place your answer on the blank. This is **NOT** for a grade but just to show what you may already know.*

_D__1. To find out which parts of your house use the most energy you should conduct a home energy
A. observation B. ritual C. petition D. audit

_A__2. What system in your home uses the most energy?
A. heating / cooling B. water heating C. refrigeration D. computers/entertainment

_A__3. Which energy source produces the most electricity in Ohio?
A. coal B. nuclear C. solar D. hydropower

_C__4. Which appliance would you expect to use the most energy?
A. fluorescent light bulb B. incandescent light bulb C. hair dryer D. fan

_C__5. An incandescent light bulb converts most of its energy into
A. light energy B. mechanical energy C. thermal energy D. nuclear energy

_B__6. The second largest energy expense in your home is:
A. lighting B. heating water C. heating/cooling D. computers/entertainment

_A__7. One of the easiest ways to reduce electricity use at home is to:
A. change an IL to CFL B. replace windows C. add insulation to attic D. replace old refrigerator

_D__8. One of the appliances that uses the most energy in your home is the:
A. television B. computer C. radio D. refrigerator

_D__9. The average cost of a kilowatt-hour of electricity for homes in Ohio is…
A. 25¢ B. $1 C. 2¢ D. 11¢

_C__10. A device that controls temperature is a
A. thermometer B. transformer C. thermostat D. photocell

_B__11. A CFL uses about _______ of the energy used by an incandescent light bulb.
A. one tenth B. one fourth C. one half D. two thirds

_D__12. Electric meters in our homes measure the electricity we use and buy in what units?
A. volts B. amps C. miles per gallon D. kilowatt-hours

_D__13. Which renewable energy source currently generates the most electricity?
A. wind B. biomass C. solar D. hydropower

_C__14. EnergyGuide labels are useful when shopping for new appliances. They are ______ in color.
A. blue and green B. red C. yellow and black D. orange

_B__15. For maximum energy efficiency, the ideal temperature for your water heater is
A. 100°F B. 120°F C. 200°F D. 180°F

_A__16. In many energy transformations, wasted energy is given off in what form?
A. thermal energy B. chemical energy C. mechanical energy D. electrical energy

_D__17. The greatest amount of air leaks in and out of your home through
A. the fireplace B. doors C. fans and vents D. floors, walls, ceilings

_A__18. Changing your behavior in order to use less energy is called energy
A. conservation B. efficiency C. consumption D. transformation

_B__19. Working to invent or improve technology to use less energy is called energy
A. conservation B. efficiency C. consumption D. transformation

_C__20. Which energy source provides most of our transportation needs?
A. wind B. coal C. petroleum D. propane

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Appendix D 2011-2012 School Year Online Student Survey

2011-2012 School Year Online Student Survey

HOME ACTIVITY FAMILY INSTALLATION SURVEY

Please complete the installation survey below with your family. Fill it out to the best of your ability. If you are unable to answer a question, please skip it and continue with the rest of the survey. When finished, print the last page to return to your teacher. Your answers will be part of the statewide data collection. No individual student's results will be tied back to the student or family.

(Results from incomplete surveys will be saved.)

(THERE WILL BE A BAR AT TOP SHOWING THE PROGRESS OF THE SURVEY BY PERCENTAGE COMPLETE.)

Password
Teacher name

(Pull down menu with school and teacher name-this will be connected off screen to the spreadsheet with school name and utility)

Compact Fluorescent Light bulbs (CFLs)

1. **How many of the CFLs did you install?**
   - O One
   - O Two
   - O Three
   - O Four
   - O None

2. **If you did not install all four, how many of the CFLs do you plan to install?**
   - O One
   - O Two
   - O Three
   - O Four
   - O If you did not install all four, briefly explain why you did not install the CFLs (comment box here)

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3. **The wattage of the incandescent light bulb(s) I replaced with the CFL(s) was (check all that apply):**

   O 40 Watts

   O 60 Watts

   O 75 Watts

   O 100 Watts

   O Other

4. **Did you purchase any additional CFLs to install in your home?**

   O No

   O Yes (comment box for how many)

5. **Did you install the LED nightlight from the energy efficiency items provided in class?**

   O Yes

   O Yes, it replaced another nightlight in our home

   O No

<u>Insulation</u>

6. **Did you install the weather stripping from the energy efficiency items provided in class?**

   O Yes

   O No (*"Briefly explain why not." Same contingency question comment box.)*

7. **Did you install the door sweep from the energy efficiency items provided in class?**

   O Yes

   O No *("Briefly explain why not." Same contingency question comment box.)*

8. **Did you install the outlet and switch gaskets provided?**

   O Yes

   O No *("Briefly explain why not." Same contingency question comment box.)*

Heating and Cooling Systems

9. **What type of primary heating system does your home use?**

   O Gas furnace

   O Electric furnace

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- O Oil furnace
- O Heat pump
- O Baseboard/in-wall unit
- O Propane
- O Wood stove
- O Geothermal
- O Other

10. What type of primary cooling system does your home use?

- O Central AC
- O Window AC
- O Room fans
- O Attic fans
- O Heat pump
- O Swamp cooler
- O Other

11. What is the approximate square footage of your home?

- O 500-1000
- O 1001-1500
- O 1501-2000
- O 2001-2500
- O 2501-3000
- O 3001-3500
- O 3501-4000
- O 4001+

12. Did you install the furnace filter whistle from the energy efficiency items provided in class?

- O Yes
- O No *("Briefly explain why not." Same contingency question comment box.)*

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13. **Did you (or will you) and your family change your thermostat setting for <u>heating</u> to the setting recommended in the energy efficiency education program (68°F)?**

O Yes, we lowered (or will lower) the setting

O No *("Briefly explain why not." Same contingency question comment box.)*

(CONTINGENCY QUESTION FOR YES)

If you answered "yes" to question 16, how much did you (or will you) lower the thermostat setting?

O 1°-2° F

O 3°-4° F

O 5°-6° F

O 7°-8° F

O 9° F or more

14. **Did you (or will you) and your family change your thermostat setting for <u>cooling</u> to the setting recommended energy efficiency education program (78°F)?**

O Yes, we increased (or will increase) the setting

O No *("Briefly explain why not." Same contingency question comment box.)*

(CONTINGENCY QUESTION FOR YES)

If you answered "yes" to question Error! Reference source not found., how much did you (or will you) increase the thermostat setting?

O 1°-2° F

O 3°-4° F

O 5°-6° F

O 7°-8° F

O 9° F or more

<u>Water Heater</u>

15. **What type of water heater does your home use?**

O Natural gas

O Electric

O Propane

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- O Heat pump
- O Other

16. **Did you (or will you) and your family change your thermostat setting for your water heater to the setting recommended in the energy efficiency education program (120°F)?**
    - O Yes, we lowered (or will lower) the setting
    - O No *("Briefly explain why not." Same contingency question comment box.)*

(CONTINGENCY QUESTION FOR YES)

If you answered "yes" to question 21, how much did you (or will you) lower the thermostat setting?

- O 1°-9° F
- O 10°-20° F
- O 21°-29° F
- O 30°-39° F
- O 40° F or more

17. **Did you install the kitchen faucet aerator from the energy efficiency items provided in class?**
    - O Yes
    - O No *("Briefly explain why not." Same contingency question comment box.)*

18. **Did you install the bathroom faucet aerator from the energy efficiency items provided in class?**
    - O Yes
    - O No (*"Briefly explain why not." Same contingency question comment box.)*

19. **Did you install the low-flow showerhead from the energy efficiency items provided in class?**
    - O Yes
    - O No *("Briefly explain why not." Same contingency question comment box.)*

20. **On average, how many showers are taken each day?**
    - O 1-2
    - O 3-4

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- O 5-6
- O 7-8
- O 9-10
- O 11+

Refrigerator and Freezer

21. **Did you adjust the setting on your refrigerator to the setting recommended in the energy efficiency program (34°-40°F)?**
    - O Yes
    - O No *("Briefly explain why not." Same contingency question comment box.)*
22. **Did you adjust the setting on your freezer to the setting recommended in the energy efficiency program (0°-5°F)?**
    - O Yes
    - O No *("Briefly explain why not." Same contingency question comment box.)*

Conclusion

23. Have you made any other changes or do you plan to make any other changes in your home as a result of this unit?
    - O Yes *(Briefly describe any changes: Contingency, a small 250 character comment box for them to describe any changes)*
    - O No
24. Please share any comments you may have about this unit. *(Contingency- another small 250 character comment box here for comments)*

25. **Who provides electric service to your home?**
    - O AEP-Ohio (American Electric Power)
    - O Dayton Power and Light
    - O Ohio Rural Electric Cooperative
    - O Other utility
    - O Don't know

26. **How many people live in your home?**
    - O 2

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- 3
- 4
- 5
- 6+

27. In what type of dwelling do you reside?

- Single family home
- Apartment/Condo/Duplex

28. What is your zip code?

29. Would you be willing to participate in a phone survey about this program? If so, please provide your phone number with area code.

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Appendix E Appendix E. e³smart℠ Teacher Evaluation Form

e³smart TEACHER EVALUATION FORM

Name________________________ School_______________________
District____________________
1. Grade Level/Class in which you used the unit_____
2. Number of participating students _____
3. Average pre-poll score_____ Average post-poll score_____
4. Did you use the entire unit?
_____Yes _____No If no, circle which lessons/activities you used.
#1: Intro to E #2: Insulation #3: Heating & Cooling #4: Saving Water #5: Lightbulbs #6: Appliances #7 E Synopsis
5. Circle the lesson(s)/activity(ies) that were most effective.
#1: Intro to E #2: Insulation #3: Heating & Cooling #4: Saving Water #5: Lightbulbs #6: Appliances #7 E Synopsis
6. Please rate the following aspects of the program.

Poor __________________________ Excellent

a- Clarity of instructions (Easy to follow 1 2 3 4 5 6 7
b- Ease of using activities 1 2 3 4 5 6 7
c- Acceptability of preparation 1 2 3 4 5 6 7
d- Age appropriateness of energy content 1 2 3 4 5 6 7
e- Interest and motivation of students 1 2 3 4 5 6 7
f- Support and participation of families 1 2 3 4 5 6 7
g- Academic standards met 1 2 3 4 5 6 7
h- Effectiveness of home to school approach 1 2 3 4 5 6 7
i- Ability to positively affect attitudes about energy 1 2 3 4 5 6 7
including the importance of conservation and efficiency
j- Students' overall evaluation of unit 1 2 3 4 5 6 7
k- Your (teacher) overall evaluation of unit 1 2 3 4 5 6 7

7. How many student kits were you provided? _______
8. How many student kits were given to students? _______
9. How many student kits were completely installed in some other manner? _______

A. school members _____ B. community members _____ C. service projects _____ D. others _____

Please explain:

10. How many student kits are being stored by you? _______
11. Did you obtain any publicity during the unit? Explain.
12. Would you conduct the unit again? Explain.
13. What recommendations do you have to improve the unit or lessons?
14. What would make the unit more useful to you?
15. Do you believe the unit changed student and/or family attitudes or behavior about energy conservation and energy efficiency? Explain.
16. Any other comments or suggestions.

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Appendix F Parent/Guardian Survey

AEP Ohio e³smart Program: Parent/Guardian Interview Guide
Updated: 03/14/13

Module	Questions	Research Questions
Screener	S1	
Program-Specific Verification Questions	PR1-PR2A CFL1-CFL9 SH1- SH5 FA1-FA5 LED1-LED4 INS1-INS7 OM1-OM8	Feedback on permission request process Verify measure installations, and measure retention
Program Satisfaction	PS1-PS7	Satisfaction with the program Suggestions for program improvements
Other Programs/Channeling	OP1 – OP4	Have participants participated in any other EE programs. Did the Appliance Recycling program influence this participation?
Spillover	SO1-SO2	Are any spillover actions (Other energy savings actions) occurring outside program participation? What is the influence of the THINK! ENERGY program on this behavior?

INTRODUCTION AND SCREENER

Hello, this is __________________ calling from The Blackstone Group on behalf of AEP Ohio, your electric utility. May I please speak with [INSERT CUSTOMER_NAME]?

INTRO. We are contacting customers whose middle school children participated in an AEP Ohio sponsored school energy efficiency program called **e³smart** to gather information that will help improve the program. The program included both in-classroom instruction on energy and a take-home energy kit with items that could be installed in your home as part of the learning experience, including compact fluorescent light bulbs, a low-flow showerhead, kitchen and bathroom faucet aerators, and an LED nightlight. This is not a sales call, and all responses will be kept anonymous.

Depending on your responses, the survey will take about 10 minutes to complete.

Are you the person who is most familiar with what was done with the e³smart energy efficiency take-home kit? (IF NOT: May I please speak with the person who is most familiar with that?)

1. YES
2. NO **[Is the person who is most familiar available now OR SCHEDULE CALL-BACK]**
3. DID NOT PARTICIPATE IN PROGRAM **[THANK AND TERMINATE]**
98. DON'T KNOW **[THANK AND TERMINATE]**
99. REFUSED **[THANK AND TERMINATE]**

SCREENING QUESTIONS

S1. Does AEP Ohio provide electric service to your home? [SINGLE PUNCH]

NAVIGANT

1. YES [SKIP TO PR1]
2. NO
98. DON'T KNOW [TERMINATE]
99. REFUSED [TERMINATE]

S2. Who provides electric service to your home? [SINGLE PUNCH]

1. COLUMBUS SOUTHERN POWER
2. OHIO POWER COMPANY
3. SOME OTHER COMPANY (SPECIFY) [OPEN END] [TERMINATE]
98. DON'T KNOW [TERMINATE]
99. REFUSED [TERMINATE]

PARTICIPATION REQUEST AND MEASURE INSTALLATION

PR1. Do you recall receiving the permission slip for your child to participate in the e³smart program? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO CFL1]
98. DON'T KNOW [SKIP TO CFL1]
99. REFUSED [SKIP TO CFL1]

PR2A. When you received the permission slip, what concerns, if any, did you have about your child being a part of the program? (PROBE)

97. [OPEN END]
96. I DIDN'T HAVE ANY CONCERNS
98. DON'T KNOW
99. REFUSED

Measure Installation:

DISP1. I'd like to talk about the items that were in the take-home energy kit.

NAVIGANT

CFL1. The take-home energy kit included four Compact Fluorescent Lights also known as CFLs. How many of the CFLs did you install in your home? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

1. ONE
2. TWO
3. THREE
4. FOUR
5. NONE [GO TO SKIP BEFORE CFL8]
98. DON'T KNOW [SKIP TO SH1]
99. REFUSED[SKIP TO SH1]

CFL2. Of those [INSERT RESPONSE FROM CFL1] CFL bulbs that you actually installed, how many of those replaced…? (READ 1-3, RECORD ONE NUMBER FOR EACH OPTION. CONTINUE UNTIL YOU REACH [INSERT RESPONSE FROM CFL1])

1. Incandescent bulbs [NUMBERICAL OPEN END. RANGE 0-4]
2. CFL bulbs [NUMBERICAL OPEN END. RANGE 0-4]
3. Halogen bulbs [NUMBERICAL OPEN END. RANGE 0-4]
4. (IF STILL NOT AT [INSERT RESPONSE FROM CFL1], ASK:" Did the CFLs replace any other type of bulb?" SPECIFY TYPE OF BULB.) [OPEN END]
98. DON'T KNOW
99. REFUSED

[ASK CFL3 IF CFL1 = 1 OR 2 OR 3, ELSE SKIP TO CFL5.]

CFL3. What was your reasoning for not installing the other CFLs? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. ALREADY HAVE CFLS INSTALLED
2. DO NOT LIKE THE LIGHT THAT THE CFLS GIVE OFF
3. THE CFL WAS BROKEN
4. THE CFL DID NOT WORK
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

CFL4. What did you do with the CFL(s) you did not install? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. STORED IT/THEM FOR FUTURE USE
2. STORED IT/THEM TO GIVE TO SOMEONE ELSE LATER
3. STORED IT/THEM TO DISPOSE OF LATER
4. RECYCLED IT/THEM
5. THREW IT/THEM AWAY IN THE GARBAGE
6. GAVE IT/THEM TO SOMEONE ELSE

97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

CFL5. How many of the CFLs that you originally installed are still installed? [INSERT SELECTION FROM CFL1 AND ALL LESSER OPTIONS. FOR EXAMPLE, IF CFL1=2 THE RESPONSE OPTIONS SHOULD INCLUDE 1 AND 2.]

98. DON'T KNOW
99. REFUSED

[ASK CFL6 IF CFL5 < CFL1. ELSE GO TO SKIP BEFORE CFL8.]
CFL6. Why did you remove the CFL(s)? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. DID NOT LIKE THE LIGHT THE CFL GIVES OFF
2. THE CFL WAS BROKEN
3. THE CFL DID NOT WORK
4. THE CFL STOPPED WORKING ALREADY

97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

CFL7. What happened to those CFL(s) that were removed? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. THROWN AWAY
2. IN STORAGE
3. SOLD OR GIVEN AWAY

97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED[EXCLUSIVE]

[ASK CFL8 IF CFL1 = 1 OR 2 OR 3 OR 5, ELSE SKIP TO CFL9.]

NAVIGANT

CFL8. Do you plan on installing the [IF CFL1=1 OR 2 OR 3 INSERT "additional"] CFLs? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO CFL9]
98. DON'T KNOW [SKIP TO CFL9]
99. REFUSED [SKIP TO CFL9]

[ASK IF CFL8=1] CFL8a. When do you plan on installing the [IF CFL1=1 OR 2 OR 3 INSERT "additional"] CFLs? Would you say…? (READ LIST. RECORD ONE RESPONSE.)[SINGLE PUNCH]

1. In the next month or two
2. In 3 to 6 months
3. In 7 to 12 months
4. More than a year from now, or
5. As current CFLs burn out
98. DON'T KNOW
99. REFUSED

CFL9. On a scale of 0 to 10, where 0 means "extremely dissatisfied" and 10 means "extremely satisfied", how satisfied were you with the CFLs? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON'T KNOW
99. REFUSED

SH1. Did you install the energy efficient showerhead you received in the energy kit? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO SH4]
98. DON'T KNOW [SKIP TO FA1]
99. REFUSED [SKIP TO FA1]

NAVIGANT

SH2. Is the showerhead still installed? [SINGLE PUNCH]

1. YES [SKIP TO FA1]
2. NO
98. DON'T KNOW [SKIP TO FA1]
99. REFUSED [SKIP TO FA1]

SH3. What was your reasoning for removing the showerhead? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. DID NOT LIKE THE WATER FLOW (PRESSURE) OF THE SHOWERHEAD
2. DID NOT LIKE THE SPRAY
3. IT STOPPED WORKING
97. OTHER (RECORD REASON.) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[AFTER ASKING SH3 SKIP TO FA1.]

SH4. What was your main reason for not installing the showerhead? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. ALREADY HAVE AN EFFICIENT SHOWERHEAD INSTALLED
2. I LIKE MY CURRENT SHOWERHEAD THAT IS NOT ENERGY EFFICIENT
3. WORRIED ABOUT THE POSSIBLE REDUCED PRESSURE OF THE SHOWERHEAD
4. TOO DIFFICULT TO INSTALL
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

SH5. Do you plan on installing the showerhead in the future? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO FA1]
98. DON'T KNOW [SKIP TO FA1]
99. REFUSED [SKIP TO FA1]

SH5A. When do you plan on installing the showerhead? Would you say…? (READ LIST. RECORD ONE RESPONSE.)[SINGLE PUNCH]

1. In the next month or two
2. In 3 to 6 months
3. In 7 to12 months
4. More than a year from now, or
5. As current showerhead stops working
98. DON'T KNOW
99. REFUSED

NAVIGANT

FA1. Did you install both kitchen and bathroom faucet aerators you received in the energy kit? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

1. YES, INSTALLED BOTH
2. NO, JUST INSTALLED THE KITCHEN AERATOR
3. NO, JUST INSTALLED THE BATHROOM AERATOR [GO TO SKIP BEFORE FA2A]
4. NO, DID NOT INSTALL EITHER [GO TO SKIP BEFORE FA3]
98. DON'T KNOW [SKIP TO LED1]
99. REFUSED [SKIP TO LED1]

FA2. Is the kitchen faucet aerator still installed? [SINGLE PUNCH]

1. YES
2. NO
98. DON'T KNOW
99. REFUSED

[ASK FA2A IF FA1=1 OR 3. ELSE GO TO SKIP BEFORE FA2B]

FA2A. Is the bathroom faucet aerator still installed? [SINGLE PUNCH]

1. YES
2. NO
98. DON'T KNOW
99. REFUSED

[ASK FA2B IF FA2=2 OR FA2A=2. ELSE GO TO SKIP BEFORE FA3]

FA2B. What was your reasoning for removing the faucet aerator(s)? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. I ALREADY HAVE A FAUCET AERATOR
2. DO NOT LIKE THE PRESSURE OF THE FAUCET AERATOR
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[ASK FA3 IF FA1 = 2 OR 3 OR 4. ELSE SKIP TO LED1.]

FA3. What was your main reason for not installing [IF FA1= 2 OR 3 INSERT "both". IF FA1=4 INSERT "either"] of the faucet aerator(s)? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. ALREADY HAVE (AN) EFFICIENT FAUCET AERATOR(S) INSTALLED
2. DO NOT LIKE THE PRESSURE OF THE FAUCET AERATOR
3. TOO DIFFICULT TO INSTALL
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

NAVIGANT

FA4. Do you plan on installing the faucet aerator(s) in the future? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO LED1]
98. DON'T KNOW [SKIP TO LED1]
99. REFUSED [SKIP TO LED1]

FA4A. When do you plan on installing the faucet aerator(s)? Would you say…? (READ LIST. RECORD ONE RESPONSE.)[SINGLE PUNCH]

1. Within the next month or two
2. In 3 to 6 months
3. In 7 to 12 months
4. More than a year from now, or
5. As current faucet aerator stops working
98. DON'T KNOW
99. REFUSED

LED1. Did you install the LED nightlight you received in the energy kit? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO LED3]
98. DON'T KNOW [SKIP TO INS1]
99. REFUSED [SKIP TO INS1]

LED1A. Is the LED nightlight still installed? [SINGLE PUNCH]

1. YES [SKIP TO LED2]
2. NO
98. DON'T KNOW [SKIP TO INS1]
99. REFUSED [SKIP TO INS1]

LED1B. What was your reasoning for removing the LED nightlight? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. I DECIDED I DID NOT NEED A NIGHTLIGHT WHERE I PUT IT
2. DO NOT LIKE THE TYPE OF LIGHT IT PROVIDES
3. NOT SATISFIED WITH THE NIGHTLIGHT
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[AFTER ASKING LED1B SKIP TO INS1.]
LED2. Which of the following best describes how you used the LED nightlight that you installed? Did it…? (READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

1. Replace a regular incandescent nightlight,
2. Replace an older efficient nightlight, or
3. Get placed in a location that didn't previously have a nightlight?
98. DON'T KNOW
99. REFUSED

NAVIGANT

[AFTER ASKING LED2 SKIP TO INS1.]
LED3. What was your main reason for not installing the LED nightlight? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. WAITING FOR EXISTING NIGHTLIGHT TO BURN OUT
2. HAVEN'T GOTTEN AROUND TO IT YET
3. NOT SATISFIED WITH THE NIGHTLIGHT
4. DO NOT LIKE THE TYPE OF LIGHT IT PROVIDES
5. DO NOT HAVE THE NEED FOR ANOTHER NIGHTLIGHT
6. DO NOT HAVE A NEED FOR NIGHTLIGHTS
97. OTHER SPECIFY (RECORD REASON.) [OPEN END.]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

LED4. Do you plan on installing the nightlight in the future?

1. YES
2. NO [SKIP TO INS1]
98. DON'T KNOW [SKIP TO INS1]
99. REFUSED [SKIP TO INS1]

LED4A. When do you plan on installing the nightlight? Would you say…? (READ LIST. RECORD ONE RESPONSE.)[SINGLE PUNCH]

1. Within the next month or two
2. In 3 to 6 months
3. In 7 to 12 months
4. More than a year from now, or
5. When the current nightlight burns out
98. DON'T KNOW
99. REFUSED

INS1. The take home energy kit included three insulation measures: a door sweep, weather-stripping, and an outlet gasket. Did you install any of these items?

1. YES [SKIP TO INS2]
2. NO
98. DON'T KNOW [SKIP TO OM1]
99. REFUSED [SKIP TO OM1]

NAVIGANT

INS1A. What was your reasoning for not installing any of the measures? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. TOO DIFFICULT TO INSTALL
2. HAVEN'T GOTTEN AROUND TO IT YET
3. NOT SATISFIED WITH THE MEASURES
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[AFTER ASKING INS1A SKIP TO OM1.]

INS2. Which of these three measures did you install? (READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. The door sweep
2. The weather-stripping
3. The outlet gasket
98. DON'T KNOW [EXCLUSIVE] [SKIP TO OM1]
99. REFUSED [EXCLUSIVE] [SKIP TO OM1]

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[CREATE VARIABLE INSNO. INSNO = NUMBER OF RESPONSE OPTIONS SELECTED IN INS2. E.G., IF 1 “DOOR SWEEP” AND 2 “WEATHER STRIPPING” ARE SELECTED, INSNO=2.]
[ASK INS2A IF INSNO < 3. ELSE SKIP TO INS3.]
INS2A. What was your reasoning for not installing all three measures? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. ALREADY HAVE SOME OF THE MEASURES INSTALLED
2. TOO DIFFICULT TO INSTALL
3. HAVEN’T GOTTEN AROUND TO IT YET
4. NOT SATISFIED WITH THE MEASURES
97. OTHER (RECORD REASON) [OPEN END]
98. DON’T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

INS3. Are all of the measures you originally installed still installed? [SINGLE PUNCH]

1. YES [SKIP TO OM1]
2. NO
98. DON’T KNOW [SKIP TO OM1]
99. REFUSED [SKIP TO OM1]

[ASK INS4 IF INSNO > 1. ELSE GO TO SKIP BEFORE INS5.]
INS4. Which measures did you remove? Did you remove…? (READ LIST. SELECT ALL THAT APPLY.) [ONLY SHOW OPTIONS SELECTED IN INS2. MULTIPUNCH]

1. The door sweep
2. The weather-stripping
3. The outlet gasket

[ASK INS5 IF (INSNO=1 AND INS2=1) OR IF INS4=1. ELSE GO TO SKIP BEFORE INS6.]
INS5. What was your reasoning for removing the door sweep? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. I DECIDED I DID NOT NEED A DOOR SWEEP
2. NOT SATISFIED WITH THE DOOR SWEEP
3. THE DOOR SWEEP BROKE
4. THE DOOR SWEEP WAS INCONVENIENT/GOT IN THE WAY
97. OTHER (RECORD REASON) [OPEN END]
98. DON’T KNOW [EXCLUSIVE]
99. REFUSED[EXCLUSIVE]

[ASK INS6 IF (INSNO=1 AND INS2=2) OR IF INS4=2. ELSE GO TO SKIP BEFORE INS7.]
INS6. What was your reasoning for removing the weather-stripping? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. I DECIDED I DID NOT NEED WEATHER-STRIPPING
2. NOT SATISFIED WITH THE WEATHER-STRIPPING
3. THE WEATHER-STRIPPING BROKE
4. THE WEATHER-STRIPPING WAS INCONVENIENT/GOT IN THE WAY

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97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[ASK INS7 IF (INSNO=1 AND INS2=3) OR IF INS4=3. ELSE SKIP TO OM1.]
INS7. What was your reasoning for removing the outlet gasket? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. I DECIDED I DID NOT NEED AN OUTLET GASKET
2. NOT SATISFIED WITH THE OUTLET GASKET
3. THE OUTLET GASKET BROKE
4. THE OUTLET GASKET WAS INCONVENIENT/GOT IN THE WAY
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

OM1. After receiving the take-home energy kit, did you do any of the following…?(READ A-D. RECORD ONE RESPONSE FOR EACH.) [FORMAT AS GRID WITH 1. YES, 2. NO, 96. NOT APPLICABLE, 98. DON'T KNOW, 99. REFUSED ACROSS THE TOP AND A-D AS STUBS ON THE LEFT SIDE. RANDOMIZE A-D.]

A. Lower your thermostat to the temperature setting recommended in the home energy kit
B. Raise your air conditioner to the temperature setting recommended in the home energy kit
C. Adjust your refrigerator to the recommended setting
D. Adjust your freezer to the recommended setting

[ASK OM2 IF OM1A=2. ELSE GO TO SKIP BEFORE OM3.]
OM2. What was your reasoning for not lowering your thermostat? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. THOUGHT THE SETTING WAS TOO COLD
2. DO NOT CONTROL THE THERMOSTAT
3. THERMOSTAT IS BROKEN
4. TOO DIFFICULT TO ADJUST
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[ASK OM3 IF OM1B=2. ELSE GO TO SKIP BEFORE OM4.]
OM3. What was your reasoning for not raising your air conditioner temperature? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. DID NOT THINK THE SETTING WAS COLD ENOUGH
2. AIR CONDITIONER IS BROKEN
3. TOO DIFFICULT TO ADJUST
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]

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99. REFUSED [EXCLUSIVE]

[ASK OM4 IF OM1C=2. ELSE GO TO SKIP BEFORE OM5.]

OM4. What was your reasoning for not adjusting your refrigerator temperature? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. THOUGHT THE RECOMMENDED TEMPERATURE WAS TOO WARM
2. THOUGHT THE RECOMMENDED TEMPERATURE WAS TOO COLD
3. TOO DIFFICULT TO ADJUST
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[ASK OM5 IF OM1D=2. ELSE SKIP TO PS1.]

OM5. What was your reasoning for not adjusting your freezer temperature? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. THOUGHT THE RECOMMENDED TEMPERATURE WAS TOO WARM
2. THOUGHT THE RECOMMENDED TEMPERATURE WAS TOO COLD
3. TOO DIFFICULT TO ADJUST
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

Program Satisfaction

PS1. On a scale of 0 to 10 where 0 means extremely dissatisfied and 10 means extremely satisfied, please rate your overall satisfaction with the e³smart program. (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON'T KNOW
99. REFUSED

PS2. What was your reasoning for giving it a rating of [INSERT RATING FROM PS1]?

97. [OPEN END]
98. DON'T KNOW
99. REFUSED

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PS3. How would your child rate their experience in the e³smart program on a scale of 0 to 10 where 0 means "did not enjoy it at all" and 10 means "enjoyed it very much"? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. DID NOT ENJOY AT ALL
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. ENJOYED VERY MUCH
98. DON'T KNOW
99. REFUSED

PS4. Did you and your child discuss the contents of the e³smart kit? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO PS7]
98. DON'T KNOW [SKIP TO PS7]
99. REFUSED [SKIP TO PS7]

PS5. Did you learn anything new about energy efficiency when discussing the e³smart program with your child? If so, what did you learn? [SINGLE PUNCH]

1. YES (RECORD LEARNINGS) [OPEN END]
2. NO
98. DON'T KNOW
99. REFUSED

PS6. Have you continued to have energy efficiency conversations with your child since the e³smart program? [SINGLE PUNCH]

1. YES
2. NO
98. DON'T KNOW
99. REFUSED

PS7. What, if anything, do you recommend AEP Ohio do to improve the e³smart program? [SINGLE PUNCH]

97. [OPEN END]
96. NO RECOMMENDATIONS
98. DON'T KNOW
99. REFUSED

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Other Programs/Channeling

OP1. Have you participated in any other energy efficiency programs provided by AEP Ohio? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO SO1]
98. DON'T KNOW [SKIP TO SO1]
99. REFUSED [SKIP TO SO1]

OP2. Which other energy efficiency programs offered by AEP Ohio have you participated in? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. **APPLIANCE RECYCLING PROGRAM** (REFRIGERATOR AND FREEZER PICK UP)
2. **COMMUNITY ASSISTANCE PROGRAM** (WEATHERIZATION SERVICES AND PRODUCTS FOR LOW INCOME RESIDENTIAL CUSTOMERS, INCLUDING HOME ENERGY ASSESSMENT, ATTIC AND WALL INSULATION, AIR SEALING, CFLS, REFRIGERATOR REPLACEMENT, AND OTHER ENERGY IMPROVEMENTS
3. **CONTINUOUS IMPROVEMENT PROGRAM** (ENERGY MANAGEMENT SUPPORT FOR LARGE INDUSTRIAL CUSTOMERS)
4. **CUSTOM PROGRAM** (BUSINESS INCENTIVES FOR SPECIALIZED ENERGY-EFFICIENT IMPROVEMENTS AND TECHNOLOGIES NOT INCLUDED IN THE PRESCRIPTIVE PROGRAM)
5. **ENERGY CHECK TOOLKIT LIBRARY LENDING PROGRAM** (LENDING OF A TOOLKIT INCLUDING A KILL-A-WATT METER AND OTHER ITEMS TO ASSESS HOME ENERGY USAGE)
6. **ENERGY STAR APPLIANCE REBATE PROGRAM** (MAIL-IN REBATES ON CLOTHES WASHERS, DEHUMIDIFIERS, FREEZERS, REFRIGERATORS, HIGH EFFICIENCY ELECTRIC WATER HEATERS, AND ELECTRIC HEAT PUMP WATER HEATERS)
7. **ENERGY STAR NEW HOMES PROGRAM** (HOMEOWNERS PURCHASE FROM PARTICIPATING BUILDERS TO ENSURE THEIR NEW HOME IS BUILT TO MEET STRINGENT ENERGY PERFORMANCE GUIDELINES)
8. **EXPRESS PROGRAM** (ENERGY EFFICIENCY UPGRADE FOR SMALL BUSINESS CUSTOMERS)
9. **IN-HOME ENERGY PROGRAM** (CHOICE OF 3 OPTIONS (ENERGY ASSESSMENT, ENERGY AUDIT, OR ONLINE ENERGY CHECK-UP); OPTIONS INCLUDE RECOMMENDATIONS FOR ENERGY EFFICIENCY IMPROVEMENTS AND REBATES FOR INSTALLING FREE ENERGY-SAVING ITEMS PROVIDED, SUCH AS CFLS, PROGRAMMABLE THERMOSTATS, LOW-FLOW SHOWER HEADS, AND PIPE WRAP
10. **NEW CONSTRUCTION PROGRAM** (BUSINESS INCENTIVES FOR ENERGY-EFFICIENT IMPROVEMENTS AND TECHNOLOGIES IN NEW CONSTRUCTION AND MAJOR RENOVATION PROJECTS)
11. **PRESCRIPTIVE PROGRAM** (BUSINESS INCENTIVES FOR HVAC, LIGHTING, MOTORS AND DRIVES, REFRIGERATION, AND MISCELLANEOUS FOOD PREPARATION & STORAGE EQUIPMENT)
12. **RETROCOMMISSIONING PROGRAM** (INCENTIVES FOR COMMERCIAL BUILDING SYSTEM TUNE-UPS)

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13. **SELF-DIRECT PROGRAM** (BUSINESS CREDIT PAYMENT OR ENERGY EFFICIENCY/PEAK DEMAND REDUCTION RIDER EXEMPTION FOR PREVIOUS ENERGY EFFICIENCY PROJECTS)
14. **SOLUTION PROVIDER NETWORK** (CONNECTS CUSTOMERS WITH CONTRACTORS, ENGINEERS, ESCOS, ARCHITECTS, SUPPLIERS, DISTRIBUTORS AND OTHER VENDORS WHO HAVE BEEN TRAINED ON AEP OHIO'S BUSINESS ENERGY EFFICIENCY PROGRAMS)
15. **T12 LIGHTING INCENTIVES** (INCENTIVES FOR T12 LAMP REPLACEMENTS)
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE] [SKIP TO SO1]
99. REFUSED [EXCLUSIVE] [SKIP TO SO1]

OP4. How much did your experience with the e^{3}smart program influence you to participate in the other energy efficiency programs? Please use a 0 to 10 scale, where 0 means "did not influence at all" and 10 means "influenced very much".

00. DID NOT AT ALL INFLUENCE
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. INFLUENCED VERY MUCH
98. DON'T KNOW
99. REFUSED

Spillover

SO1. Have you made any other energy efficient upgrades to your home since being involved in the e^{3}smart program? (EXAMPLE FOR INTERVIEWER: ANYTHING FROM MORE CFLS, INSULATION, NEW APPLIANCES, TO SOLAR PANELS AND EVERYTHING IN BETWEEN.) [SINGLE PUNCH]

1. YES
2. NO [SKIP TO END]
98. DON'T KNOW [SKIP TO END]
99. REFUSED [SKIP TO END]

SO1A. What upgrades have you made?

97. [OPEN END]
98. DON'T KNOW
99. REFUSED

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SO2. How much did your experience with the e³smart program influence you to make other energy efficient upgrades? Please use a 0 to 10 scale, where 0 means "did not influence at all" and 10 means "influenced very much".

00. DID NOT AT ALL INFLUENCE
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. INFLUENCED VERY MUCH
98. DON'T KNOW
99. REFUSED

END. Those are all of the questions I have for you today. Thank you for your time; AEP Ohio appreciates your participation!

APPENDIX E

NAVIGANT

IN-HOME ENERGY PROGRAM

Program Year 2012 Evaluation Report

Prepared for:
AEP Ohio

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Executive Summary

Program Description

The purpose of the In-Home Energy Program is to provide energy efficiency information and easy-to-install measures to help customers take action to reduce energy use. An energy audit service was provided at three levels: 1) an *In-Home Energy Assessment*, 2) an *In-Home Energy Audit* or 3) an *Online Energy Checkup*. At the end of 2012, a multi-family direct install component was added to the program.

The Online Energy Checkup is a free web tool that allows AEP Ohio customers to quickly and easily calculate home energy costs and identify opportunities for savings. The Checkup includes a report with customized energy savings recommendations and each customer receives a free energy efficiency kit. After completing the Checkup, participants are also eligible for rebates for retrofit measures.
The In-Home Energy Assessment includes a visual inspection of the home and an interview with the homeowner about his or her lifestyle and energy use. The auditor can identify most energy-saving opportunities (especially quick to install measures) available in the home and can recommend retrofit measures to reduce energy use. There is a $25 fee for the one-hour In-Home Energy Assessment, which the customer could pay for over the telephone while scheduling an appointment prior to July 1, 2012. After July 1, the customer pays directly to the assessor after July 1. The $25 fee may be rebated if a customer installs at least $1,000 worth of measures within 6 months of the assessment.

The In-Home Energy Audit is available only to all-electric customers and is patterned after a Building Performance Institute (BPI) audit and includes a thorough inspection of the home, an interview with the homeowner, and diagnostic testing for air leakage and combustion safety. The auditor utilizes a computer software program to generate a prioritized list of energy-saving measures and the calculated energy savings, estimated installed costs and simple payback. There is a $50 fee for an In-Home Energy Audit. Customers who have an audit and install at least $1,000 worth of measures within six months are eligible for a performance bonus rebate of $50.

Key Impact Findings

Navigant used calibrated building simulation modeling and engineering algorithms to verify energy and demand savings for the In-Home Energy Program. The annual energy and demand savings associated with each measure was calculated as the difference between the baseline and measure simulation results. Modeling results were applied to all projects in the database to determine program total *ex-post* savings. The In-Home Energy Program reported 8,251 MWh of energy savings and 1,190 kW of demand savings in 2012. The verified (*ex-post*) energy and demand savings for 2012 were 6,060 megawatt hours (MWh) and 932 kilowatts (kW). *Ex-post* energy savings (MWh) savings fell short of the program energy savings goals of 10,904 MWh though *ex-ante* peak demand exceeded the program goal of 704 kW, as shown in Table ES-1. The realization rates were 73 percent for MWh and 78 percent for peak kW, indicating that both the *ex-ante* energy savings and the *ex-ante* demand savings reported by AEP Ohio were close to the evaluation-calculated savings.

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Table ES-1. 2012 Overall Evaluation Results

2012 Program Goals		2012 *Ex-ante*[1] Claimed Savings (a)		2012 *Ex-post* Savings (b)		2012 Realization Rates RR = (b) / (a)	
MWh	kW	MWh	kW	MWh	kW	MWh	kW
10,904	704	8,251	1,190	6,060	932	0.73	0.78

[1]*Ex ante* differs slightly from AEP Ohio Portfolio Status Report due to different final data sets.

Key Process Findings and Recommendations

The process evaluation component of the In-Home Energy Program assessed the effectiveness of the program operations, delivery for the energy audits/assessments, and rebates for retrofit measures. Navigant's process evaluation included in-depth interviews with program staff, participating customers and trade allies, and a review of program tracking systems, reports and marketing materials.

Participants are satisfied with most aspects of the program. Respondents reported that their satisfaction with various elements of the In-Home Energy Program was quite high; the reported average satisfaction with the overall program was 4.38 on a scale of 1 to 5 (where 1 was "extremely dissatisfied" and 5 was "extremely satisfied"). The highest ratings were provided for the programmable thermostat and hot water heater pipe wrap installations, the auditor who assessed home performance, and the length of time it took to complete the audit/assessment. When asked about their satisfaction with the rebate amount received for participation in the program, an average score of 4.30 was reported, indicating a high level of satisfaction. Somewhat lower ratings were provided for the low flow showerheads and aerators installed and for rebate processing time, which received an average score of 3.88.

» **Recommendation: Consider experimenting with different types of showerheads and aerators to find models that customers are less likely to remove.** Consistently low satisfaction ratings and high removal rates indicate that low-flow showerheads are not popular with customers. These measures were often removed after installation because customers did not like the flow rate and/or water pressure. It may be the case that a different brand of showerhead would be more successful. Consider finding different models at the same flow rate (1.5-1.75 GPM), though if necessary, a showerhead with a higher flow rate (2.0 GPM) would still result in greater energy savings if customers leave them in place.

Data tracking. Navigant has concerns with the quality of the Ecova tracking system. While the database contains fewer data entry errors than the CLEAResult database, many data fields needed for evaluation are not being recorded or were left blank.

» **Recommendation: Record all information collected from audits and incentive application forms.** At a minimum, all data collected in rebate applications should be recorded in the tracking system for verification purposes. In addition, it is recommended that the program record data collected during audits. This information is necessary for calculation of program impacts and for verifying measure eligibility.

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Rebate processing time. Navigant completed a review of the rebate processing times entered into the rebate tracking dataset. The overall average time from application submission to rebate payment is 8.7 weeks (down from 11 weeks in 2011), though average rebate processing time improved from 9.8 weeks to 6.8 weeks in the latter part of 2012 under Ecova's management.

» **Recommendation:** Rebate processing time was noted by both participating customers and trade allies as a weakness of the program. The program saw a significant improvement in 2012 and rebate cycle times should continue to improve with the transition to tablet based data collection and online rebate processing. Contractors reporting difficulty adjusting to the online web portal software in 2012. To ensure that rebate cycle times continue to improve, ensure that the new tablet-based process is fully tested and functional, and that contractors receive proper training before the transition.

Quality assurance/control (QA/QC) processes are effective. The transition to electronic forms that contain internal data validation requirements appears to have streamlined the data collection and entry process and now results in fewer errors. Navigant's review of the tracking system found that much of the rebate data needed for verification is missing or incomplete. However, Navigant did not find many instances of erroneous data or data entry errors. The program appears to be finding and correcting these issues, which indicates that current QA/QC procedures are effective.

Program marketing and outreach. Navigant completed a review of sample program advertisements and found that the program messaging was presented clearly. Contact details to obtain more information about the program were also presented visibly on the advertising materials.

Program administration and delivery. The biggest challenged faced in the implementation of In-Home Energy Program in 2012 was the transition to a new implementation contractor. Ecova took over implementation in July, 2012 and had the task of developing the infrastructure needed to continue running the program without interruption, while resolving a host of issues inherited during the transition. The most significant of these challenges were data tracking, rebate processing and customer satisfaction issues related to a backlog of rebates from the first part of 2012. Ecova staff were able to resolve most residual rebate issues within the first few months of implementation and their increased focus on customer service resulted in positive feedback from customers and AEP Ohio staff.

Program participation. Program marketing efforts resulted in the scheduling of 3,900 assessments in 2012 (down from 4,193 in 2011) and 670 audits (up from 432 during 2011). In addition to the Direct Install measures installed during audits and assessments, 2,286 customers (up from 1,772 in 2011) received incentives for upgrades recommended during the audit/assessment, resulting in 8,763 total rebates paid (up from 5,603 in 2011). The program also distributed 4,623 energy kits to Online Checkup participants. Navigant's 2011 evaluation identified audit cost, processing time and the requirement for an audit/assessment before receiving rebates as potential barriers to participation, each of which was addressed by the program in 2012.

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Trade ally participation. Trade ally participation and satisfaction were identified as issues to be addressed by the program in 2011 and again in 2012. Most contractors indicated that the incentive levels were fair, however there were a few specific complaints related to the incentive for home energy assessments and windows. All contractors agreed that the incentives were effective when combined with a strong sales approach, and incentives were highlighted as being particularly effective in encouraging HVAC replacement or repair among homeowners. A number of issues were reported with the incentive application process however. All respondents indicated that the rebate processing time is too long. Most respondents were in favor of the new web portal used to upload data, though many expressed some frustration with user-friendliness of the process.

» **Recommendation: Focus on contractor engagement and training.** The program plans to introduce a tablet-based data collection and incentive application process in 2013, which is expected to be an improvement in the participation process for customers and contractors. Program staff should take this opportunity to create a new start with trade allies and re-engage them through regular contractor meetings, communications and trainings.

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1 Program Description and Theory

This section provides an overview of the AEP Ohio In-Home Energy Program. The section begins with a brief description, followed by a summary of various aspects of the implementation strategy and marketing.

1.1 Program Description

The purpose of the In-Home Energy Program is to provide energy efficiency information and easy-to-install measures to help customers take action to reduce energy use. An energy audit service was provided at three levels: 1) an *In-Home Energy Assessment*, 2) an *In-Home Energy Audit* or 3) an *Online Energy Checkup*. In addition, the program added a multi-family direct install component at the end of program year 2012.

The Online Energy Checkup is a free web tool that allows AEP Ohio customers to quickly and easily calculate home energy costs and identify opportunities for savings. The Checkup includes a report with customized energy savings recommendations and each customer receives a free energy efficiency kit. After completing the Checkup, participants are also eligible for rebates for retrofit measures.

The In-Home Energy Assessment includes a visual inspection of the home and an interview with the homeowner about his or her lifestyle and energy use. The auditor can identify approximately 80 percent of the energy-saving opportunities (especially quick to install measures) available in the home and can recommend retrofit measures to reduce energy use. There is a $25 fee for the one-hour In-Home Energy Assessment, which the customer could pay for over the telephone while scheduling an appointment in early 2012 and paid directly to the assessor/auditor after July 1, 2012 . Customers who have an assessment and install at least $1,000 worth of measures within six months are eligible for a performance bonus rebate of $25.

The In-Home Energy Audit is patterned after a Building Performance Institute (BPI) audit and includes a thorough inspection of the home, an interview with the homeowner, and diagnostic testing for air leakage and combustion safety. The auditor utilizes a computer software program to generate a prioritized list of energy-saving measures and the calculated energy savings, estimated installed costs and simple payback. There is a $50 fee for an In-Home Energy Audit. Customers who have an audit and install at least $1,000 worth of measures within six months are eligible for a performance bonus rebate of $50.

The In-Home Energy Program also added a multifamily component in 2012. The Multifamily program achieves energy savings by installing energy efficiency measures in apartment units at no cost to the tenant or building owner. AEP Ohio's direct installation team conducts a walk-through energy assessment and direct installation of efficient equipment, which include CFLs, showerheads, faucet aerators and LED nightlights. Multifamily units are not eligible for additional equipment rebates at this time.

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1.2 Implementation Strategy

1.2.1 Program Marketing Strategy

The program marketing strategy focuses on residential customers in existing homes and multi-family housing. The program targets promotion to customers with both above average consumption and mean household income to maximize savings impacts and the percentage of customers who implement improvements.

1.2.2 Role of AEP Ohio Staff

The AEP Ohio staff member most involved in the administration of In-Home Energy Program is the Consumer Programs Coordinator. The program is delivered and managed primarily by the staff of Ecova, an implementation contractor.

The AEP Ohio Consumer Programs Coordinator is responsible for day-to-day program management responsibilities for the utility, including weekly communication with the program implementer, program tracking and reporting, and assisting with development of program marketing materials. The role of the Coordinator has not changed significantly over the course of 2012.

1.2.3 Roles of the Implementation Contractor

Ecova, Inc. replaced CLEAResult as implementation contractor mid-year in 2012 and maintained existing roles and program structure for 2012. Ecova works on marketing jointly with AEP Ohio and is directly responsible for communicating with customers, scheduling appointments with participants, and coordinating auditors and trade allies who are responsible for assessing participant homes, installing measures, and providing participants with energy surveys that include recommendations for further energy saving actions. Ecova also provides AEP Ohio with reporting, which includes progress toward goals, and participant and measure-level databases.

1.2.4 Measures and Incentives

The In-Home Energy Program provides direct installation services for the following measures:

- Compact fluorescent lamps (CFLs)
- Low-flow showerhead for homes with electric water heating
- Faucet aerators (kitchen and bathrooms) for homes with electric water heating
- Pipe insulation, R-4 rated for homes with electric water heating
- Programmable setback thermostat (not for heat pumps)
- LED nightlight

In addition to the direct installation service, the program offers two levels of the in-home energy service: an "Assessment" and an "Audit." Both services seek to identify recommendations for equipment upgrades along with rebates for installation of recommended energy efficiency upgrades.

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Customers are eligible for rebates for a list of measures identified during audits or assessments. Table 1-1 shows incentives offered through the In-Home Energy Program. Some conditions apply. For instance, rebates for ENERGY STAR windows are $25 per window with maximum rebates listed in the table.

Table 1-1. AEP Ohio In-Home Energy Measure Incentives

In-home Energy Rebates	All Electric or Electric Heat	Central AC w/Gas or Other
PIN Based CFL Indoor Fixture	$20.00	$20.00
PIN Based CFL-Outdoor Fixture	$35.00	$35.00
CFL Torchieres	$20.00	$20.00
Wall Insulation	$200.00	$75.00
Air Sealing	$200.00	$50.00
Window Film	$0.00	$45.00
ENERGY STAR® Window Replacement	$200.00	$75.00
Attic Insulation	$200.00	$90.00
Shower Start/Stop	$25.00	$25.00
ENERGY STAR® Ceiling Fan	$20.00	$20.00
Heat Pump Programmable Thermostat	$50.00	$25.00
Duct Sealing	$150.00	$50.00
RCA Tune Up	$50.00	$50.00
Furnace Replacement w/ ECM	$150.00	$150.00
ENERGY STAR® Central Air Conditioning Replacement	$100.00	$100.00
ENERGY STAR® Heat Pump Replacement	$350.00	$150.00
Complete System Bonus	$150.00	$150.00
Performance Bonus (Assessment / Audit)	$25 / $50	$25 / $50

1.3 *Program Theory and Logic Model*

This section contains the program theory, logic model, and performance indicators for the In-Home Energy Program.

1.3.1 Program Theory

The objective of the AEP Ohio In-Home Energy Program is to produce long-term electric energy savings in the consumer sector by helping customers analyze their energy use and recommending and providing

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incentives for appropriate weatherization measures and the installation of high-efficiency HVAC, lighting, and other equipment.

1.3.2 Logic Model

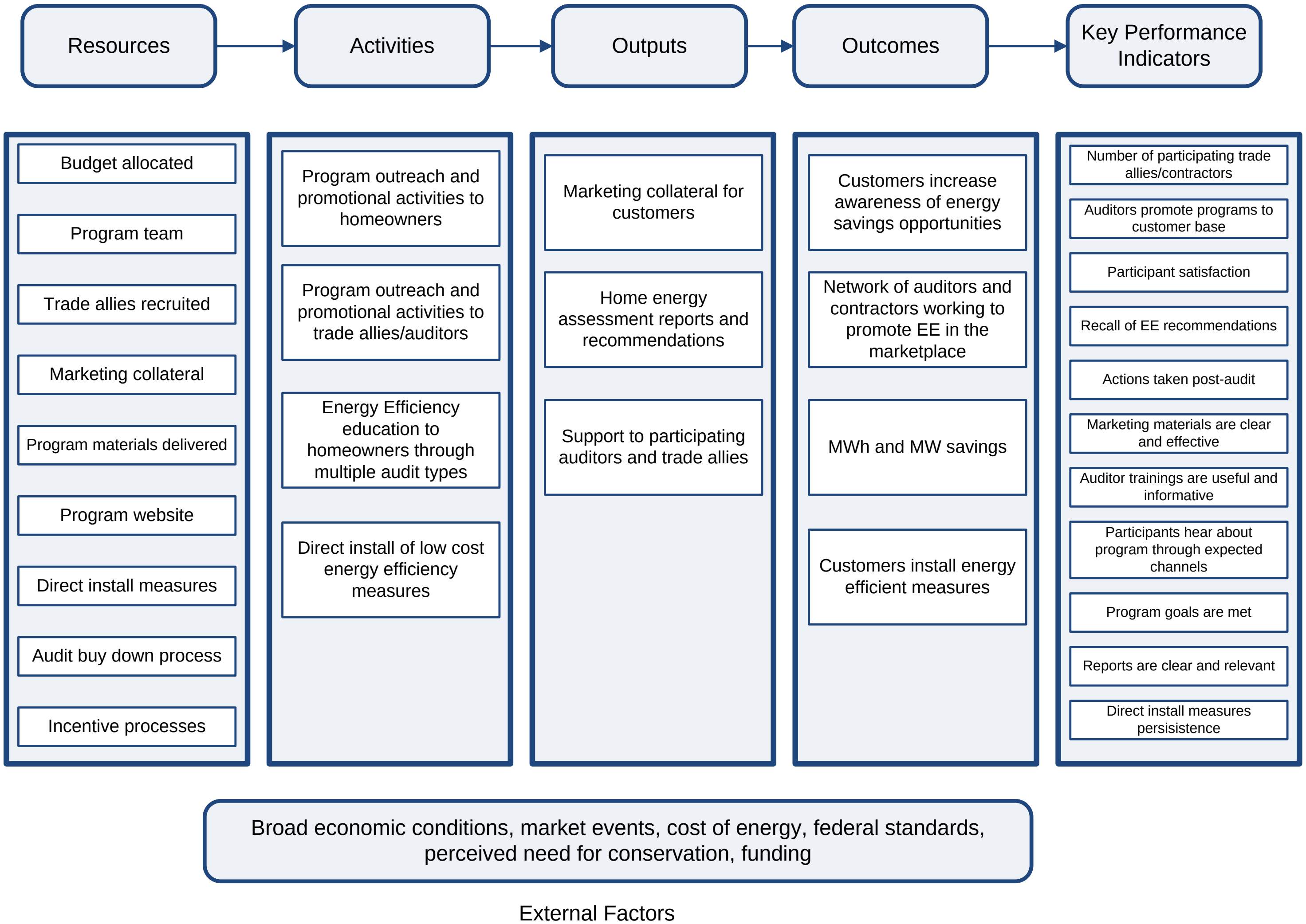
Best practices for energy efficiency programs indicate that all programs should have a sound program plan and clearly articulated program theory. Navigant drafted a program logic model following program documentation review and initial program staff interviews. The goal of creating such a model is to show the main programmatic activities AEP Ohio has in place and the anticipated market outputs and outcomes. More importantly, the logic model identifies the key performance indicators appropriate for the program. The finalized logic model is presented in Figure 1-1.

The logic model can be linked to key performance indicators to provide ongoing feedback to program management. The model flows from top to bottom and left to right, and is organized according to five basic categories:

» Program Resources (Inputs)
» Program Activities
» Outputs
» Outcomes
» Key Performance Indicators

Stepping across the activities enumerated in the logic model indicates an approximate "flow" in the sequence of activities. For example, this logic model starts with the program resources that support program activities that are expected to yield immediate outputs, followed by the short-term and long-term outcomes that are expected to have a series of impacts, including direct energy savings, and then key performance indicators are presented. The program theory links market and program outputs causally with the expected market and program short-term and long-term outcomes.

Figure 1-1. AEP Ohio In-Home Energy Program Logic Model



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2 Evaluation Methods

This section describes the analytic methods and data collection activities implemented as part of the 2012 process evaluation of the In-Home Energy Program, including the data sources and sample designs used as the foundation for the data collection activities and analysis.

2.1 *Overview of Approach*

To meet the objectives of this evaluation, Navigant undertook the following activities:

1. **Development of Evaluation Questions.** Key evaluation questions were established from the development of the 2012 evaluation plan with AEP Ohio staff and a review of the key outcomes of the 2011 program evaluation.
2. **Tracking Data Review.** The program tracking data collected by CLEAResult and Ecova were reviewed.
3. **Review of New Program Documentation**. Reviewed any program documentation that differed from 2011 (e.g., new marketing materials).
4. **Primary Data Collection.** Primary data collection was performed through interviews with program staff, implementers, and telephone and on-site surveys with participating customers.
5. **Methods Used to Analyze Impact Data.** Key impact parameters for direct install and retrofit measures were determined by reviewing and analyzing secondary data sources, program tracking data, and data collected through the evaluation. These key impact parameters were used to develop calibrated building simulation models of weather-dependent retrofit measures and to develop inputs for energy savings algorithms for non-weather-dependent direct-install measures.
6. **Methods Used to Analyze Process Data.** The effectiveness of the program processes was assessed by analyzing program tracking data, in-depth interview data, and participant survey data.

2.2 *Evaluation Questions*

The evaluation sought to answer the following key research questions. Each of these questions is addressed in the remainder of the evaluation report.

2.2.1 Impact Questions

1. What is the level of annual energy (kWh) and peak demand (kW) savings induced by the program?
2. What were the realization rates? (Defined as evaluation-verified (*ex-post*) savings divided by program-reported (*ex-ante*) savings.)
3. How cost effective is the program?

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2.2.2 Process Questions

2.2.2.1 Marketing and Participation

1. Is the marketing effort sufficient to meet current and future program participation goals?
2. How do participating customers and contractors become aware of the program? What marketing strategies could be used to boost program awareness?
3. Is the program outreach to customers and contractors effective in increasing awareness of the program opportunities?
    a. What is the format of the outreach?
    b. How often does the outreach occur?
    c. Are the outreach messages clear and actionable?

2.2.2.2 Program Characteristics and Barriers

1. How do participating customers and contractors perceive the incentives and costs related to this program?
    a. Are customers and contractors sufficiently satisfied with the program incentives to sustain participation goals?
    b. Should the budget allocation between incentive spending and marketing spending be adjusted to meet participation and savings goals?
    c. Are there particular program characteristics that could be changed to improve customer and/or contractor satisfaction while maintaining program effectiveness?
2. What are key barriers to participation in the program for eligible customers and contractors who do not participate, and how can these be addressed by the program?

2.2.2.3 Administration and Delivery

1. How has program administration and delivery changed over the course of 2012?
2. Is program administration being documented and program tracking being conducted in a way that makes the program evaluable?
3. Is the program efficient and well managed? How are problems resolved?
4. What are the verification procedures for the program? Have these been implemented in a manner consistent with program design? Do these procedures present their own implementation barrier?
5. What are the opportunities for program improvement?

2.3 Data Collection Methods

Four primary data collection efforts were conducted in support of this evaluation: 1) in-depth interviews with program staff, 2) a participant telephone survey, 3) on-site field verification surveys and 4) trade ally telephone surveys. In addition to this primary data collection, other data sources are leveraged including:

» Program tracking data

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- Program collateral and marketing material
- Secondary sources, such as Technical Resource Manuals and other program evaluations

Program tracking data were used to determine key impact parameters and were closely reviewed to determine discrepancies, outliers, missing values, and potentially missing variables. The tracking database includes data collected during audits along with measure data from incentive application forms.

Program staff members were interviewed in January to March 2013. Each interview lasted roughly 90 minutes and covered program design and implementation; marketing and promotion; and perceived barriers to participation.

A telephone survey of 239 program participants was conducted in March 2013. The telephone survey addressed both impact and process related research objectives including marketing and promotion, customer satisfaction and suggestions for program improvement.

Navigant conducted on-site field verification visits on a stratified random sample of 74 projects during the month of March 2013. Navigant field engineers conducted a brief survey with the customer to gather and/or validate information from the project files on building type, occupancy, floor area, and other parameters relevant to the estimation of savings.

Table 2-1 summarizes data collection activities, along with the details regarding the sampling and timing.

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Table 2-1. Data Collection Activities

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	All Program Participants	Tracking Database	-	All	February 2013
Rebate Application Files	All Program Participants	Tracking Database	Random Sample of Program Participants	20	February 2013
In-depth Telephone Interview	AEP Ohio Program Coordinator	Contact from AEP Ohio	Program Coordinator	1	February 2013
In-depth Telephone Interview	Implementation Contractor	Contact from Ecova	Program Implementer	1	March 2013
CATI Telephone Surveys	Program Participants	Tracking Database	Random Sample of Program Participants	239	March 2013
On-Site Field Surveys	Program Participants	Tracking Database	Random Sample of Program Participants	74	March 2013
Trade Ally Telephone Surveys	Program Participants	Tracking Database	Random Sample of Program Participants	9	March 2013

2.4 *Impact Evaluation Analytical Methods*

The impact evaluation consisted of on-site surveys with program participants, tracking system review, participant telephone surveys, engineering algorithm review and building simulation modeling.

2.4.1 On-Site Surveys

The on-site survey sample is a stratified random sample from the population of program participants in the 2012 tracking database at the site-level. The sample targets confidence and precision of 90/10 and was stratified to ensure that the sample properly reflects the true population's impacts and installation rates. The Navigant team bundled the measures that are likely to have the same range of verification rates, which effectively results in stratification primarily based on measure type. Ultimately, the team identified four strata as seen in Table 2-2.

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Table 2-2. On-Site Survey Target Sample Size

Stratum	Site Visits
Shell Measures, Electric	11
Shell Measures, Gas	17
HVAC Measures, Equipment	39
HVAC Measures, Other	7
Total	74

Once on site, Navigant field technicians conducted a brief survey with the homeowner to gather and/or validate information from the project files on building type, occupancy, floor area, and other parameters relevant to the estimation of impacts. The field engineer then toured the home to inspect and record the type and quantity of measures installed and compared these against the corresponding information in the program tracking database. Where discrepancies were identified in the type or quantity of measures, the field engineer attempted to gather information from the site contact on the reasons for such discrepancies. Information gathered on site was recorded for subsequent analysis and reporting.

2.4.2 Tracking System Review

Navigant conducted a review of program data in the AEP Ohio In-Home Energy Audit tracking system to assess their accuracy and effectiveness for use in recording, tracking, and reporting the processes and impacts of the program. This review included an assessment of the rebate processing timeframes, a review of the project data for outliers and missing information, and an assessment of the data collected on rebate applications and recorded in the tracking systems.

2.4.3 Engineering Algorithm Review

Navigant conducted a review of measure savings algorithms and underlying assumptions for direct-install measures, using data collected from site visits and telephone surveys, including hours of operation, occupancy and installation rates.

2.4.4 Building Simulation Modeling

Navigant used the BEopt™[1] (Building Energy Optimization) software to calculate savings resulting from weather-dependent air sealing, insulation and HVAC measures. Models were created with an aggregate of home characteristics (wall construction, roof construction, window U-factors, window to wall area, etc.) from program participants. Baseline and post-retrofit models were developed, based on data collected during site-visits and telephone surveys. Baseline models were calibrated to within 5 percent of 2010-2011 utility records for participants' annual electric consumption using lighting, appliance loads, home electronics loads, heating loads and cooling loads. The annual energy and demand savings associated with the retrofit measures were calculated as the difference between the baseline and retrofit

[1] See http://beopt.nrel.gov/.

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simulation results. Peak demand savings from retrofit measures were extracted directly from the BEopt hourly simulation results during AEP Ohio's peak period.

2.5 Process Evaluation Analytical Methods

The process evaluation consisted of in-depth interviews with the AEP Ohio program staff, the program implementer and trade allies, as well as a Computer-Assisted Telephone Interviewing (CATI) telephone survey with program participants.

2.5.1 Program Staff Interviews

Program staff members were interviewed by telephone in February and March 2013. Each interview lasted between one and two hours and covered program design and implementation; marketing and promotion; and perceived barriers to participation. Table 2-3 provides a summary of the data collection activities conducted to support the process evaluation.

Table 2-3. Data Collection Activities

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
In-Depth Telephone Interviews	AEP Ohio Program Staff	Contacts from AEP Ohio	In-Home Energy Program Coordinator	1	February 2013
	Staff of Program Implementer	Contacts from Ecova	Program Manager	1	March 2013

Interview guides were developed based on the research issues and metrics identified in the background review for the program. The purpose of the guides was to solicit information from those who implement the program. The questions in the guides were primarily focused on these topics:

» Program Contact and Roles
» Program Goals and Objectives
» Program Design and Participation
» Marketing and Outreach
» Program Tracking
» Quality Assurance and Quality Control (QA/QC)
» Staffing and Communication

Separate interviews were conducted with AEP Ohio staff and the implementation contractor to encourage candor and help identify any potential issues regarding the relationships between the two parties. Consistent with standard market research procedure, the confidentiality of each person interviewed was guaranteed, and comments are not attributed to any one individual; rather the evaluation focuses on trends and issues that arose from a variety of perspectives.

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2.5.2 Participant Telephone Survey

Two telephone surveys were developed and fielded to assist in the evaluation of the In-Home Energy Program. One survey was delivered to participants who received an energy audit/assessment and rebates for retrofit measures. A similar survey was delivered to participants of the Online Energy Checkup who received a free energy kit. The surveys were completed by 239 program participants and were designed to serve several purposes:

» To verify and/or update the assumptions that feed into engineering algorithms of measure level savings
» To obtain information on participant satisfaction with the program design and implementation
» To identify any steps in the participation process that customers found difficult or confusing
» To gain insight into customer motivations and the effectiveness of existing and potential communication channels
» To elicit customer suggestions on opportunities for program improvement

The first of the above purposes plays a role in determining the verified savings of the program. The remaining four are relevant to the process evaluation, which is discussed in Section 3.

2.5.3 Trade Ally Interviews

In-depth interviews were conducted with nine participating trade allies to engage in conversation with those firms that are most intimately involved with the delivery of the In-Home Energy Program. The final list of interview candidates was developed based on a review of the program database. In designing the interview guide, key objectives were to develop an understanding of trade ally perspectives on the market in which the program operates and to gather feedback on the program structure and processes. Trade ally interviews were conducted via telephone surveys, with in-depth interview instruments guiding the discussions. The majority of questions were opened ended to facilitate open discussion of the topics, but some information was captured as discrete values to facilitate analysis and comparison.

2.5.4 Program Material Review and Secondary Research

Navigant has reviewed all program materials provided by AEP Ohio to date and conducted a review of best practices for implementing residential energy audit programs. A summary list of program materials reviewed to date for this report follows.

» Program tracking data
» Program impact algorithms and assumptions
» Program marketing materials/collateral
» Industry best practices
» Program design and implementation plans

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3 Program Level Results

This section presents detailed findings of the evaluation of the In-Home Energy Program.

3.1 *Impact Evaluation Findings*

3.1.1 Measure In-Service Rates

The in-service rate for each measure installed through the program was determined through both on-site audits as well as participant telephone surveys. During the on-site audits, Navigant verified that the number of measures installed in the home matched the number listed in the program database. This information was verified both visually and by speaking with the participant to understand any discrepancies between the number of measures reported in the database and the observed number of measures installed. Participants who did not have an on-site audit completed but who were surveyed by telephone responded to several questions about the number and types of measures installed through the program. In cases where the number of measures listed in the database differed from the number of measures reported, participants were asked to indicate what happened to the additional measures (thrown away, given away, in storage etc.). The ratio of the number of measures still installed (as reported or verified) was compared to the number of measures in the program database to determine the installation rate. Table 3-1 illustrates that a wide range of installation rates was found for direct install measures. The lowest realization rates were found for low-flow showerheads, which corresponded to low satisfaction ratings found for this measure.

Table 3-1. In-Home Energy Program Direct Install Measure In-Service Rates

DI Measures	Telephone Survey		On Sites		Overall	
	Percent Installation	Number of Respondents	Percent Installation	Number of Respondents	Percent Installation	Number of Respondents
CFLs	72%	142	79%	64	74%	206
Showerheads	47%	44	50%	16	47%	60
Aerators	72%	30	57%	15	67%	45
Pipe Insulation	78%	46	82%	18	79%	64
LED Nightlight	71%	141	75%	62	73%	203
Programmable Thermostat	100%	17	98%	21	99%	38

Realization rates for retrofit measures were also calculated based on survey data and on-site data. Table 3-2 shows realization rates for retrofit measures.

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Table 3-2. In-Home Energy Program Retrofit Measure In-Service Rates

Retrofit Measures	Phone Survey		On Sites		Overall	
	Percent Installation	Number of Respondents	Percent Installation	Number of Respondents	Percent Installation	Number of Respondents
ECM Motor	84%	50	96%	45	89%	95
Central AC Replacement	86%	36	100%	34	93%	70
Heat Pump Replacement	77%	13	100%	8	86%	21
Window Replacement	100%	2	100%	4	100%	6
Attic Insulation	100%	17	100%	13	100%	30
Air Sealing	89%	19	100%	18	95%	37
Wall Insulation	100%	5	100%	11	100%	16
Programmable Thermostat	-	-	93%	14	93%	14

Navigant conducted a telephone survey of Online Energy Checkup participants and collected data on installation rates for energy kit measures mailed to participants. Table 3-3 shows realization rates for energy kit measures.

Table 3-3. In-Home Energy Program Energy Kit In-Service Rates

Kit Measures	Phone Survey	
	Percent Installation	Number of Respondents
CFLs	84%	76
Showerheads	31%	35
Aerators	35%	42
Pipe Insulation	39%	38
LED Nightlight	76%	45

3.1.2 Tracking System Review

Navigant conducted a review of program data in the AEP Ohio In-Home Energy Audit tracking systems to assess their accuracy and effectiveness for use in recording, tracking, and reporting the processes and impacts of the program. This review included an assessment of the rebate processing timeframes, a review of the project data for outliers and missing information, and an assessment of the data collected on rebate applications and recorded in the tracking systems.

Two final program tracking databases were provided in support of this evaluation by AEP Ohio in March of 2013. A final summary database was prepared by AEP Ohio, compiling separate data extracts provided by CLEAResult and Ecova. The CLEAResult database contained records through August 2012 and the Ecova database contained data from July through December 2012. Navigant conducted a review of the tracking data and documented any issues that were discovered.

3.1.2.1 CLEAResult Tracking System Review Findings

The structure and contents of the CLEAResult database were unchanged since 2011 and most of the issues found in last year's evaluation remain. The database contained over 900 fields, though many were either no longer in use or never populated, and therefore were blank. The program dataset provided by AEP Ohio contains 9,287 records, all of which were marked as having the rebate paid.

Many fields in the tracking database contained missing data and/or outliers, most of which were determined to be data entry errors. In addition, several fields needed for evaluation were missing. Many of these issues are identified in the QA/QC Manual as data requirements necessary for rebate processing, though were not being followed.

3.1.2.2 Ecova Tracking System Review Findings

The Ecova tracking data extract contained separate databases for single-family and multifamily measures. The single family dataset contained 67 data fields and 29,905 records. The multifamily dataset contained 64 data fields and 6,133 records. The original extract contained over 40,000 records, though many of those were found to be measures that had been rejected for non-compliance. Following is a summary of missing data or data entry errors identified during this review:

- Many data fields needed for evaluation were not fully populated or left blank altogether, and the database contained no customer or contractor information (name, address, etc.).
- Many direct install water-savings measures were installed in homes with gas water heating. These measures are only supposed to be installed in homes with electric water heating.
- The tracking system only seems to contain data needed for calculating savings. Other information contained collected on application forms and used to verify eligibility were not tracked.
- The evaluation team calculated energy savings for each measure in the database using the *ex-ante* calculations provided. The following issues were identified:
    - Navigant found that 67 retrofit measures were recorded with no energy savings, though savings should have been applied.
    - Navigant identified 31 water-savings measures that were directly installed in homes with gas water heating.
    - Energy savings were incorrectly calculated for 16 retrofit measures based on inputs recorded in the database.
    - LED deemed savings referenced in the algorithms does not match the value entered in the tracking system
    - The HVAC system type fields in the database were left blank. The evaluation team was unable to verify that correct algorithm applied based on the system type.
    - Pin-based CFL savings calculations do not yield the values recorded in the tracking data.

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- RCA Tune-up algorithm does not work as provided. The algorithm references the wrong measure attributes. In addition, the algorithm is for heat pumps only and is incorrect when applied to central AC systems.
- The faucet aerator algorithm provided uses a different base flow (GPM) value than referenced in the equation.
- The water heater pipe insulation algorithm provided uses a different value for circumference of pipe than referenced in the calculations.

» The tracking system review found a number of instances where measure names and savings values were incorrectly assigned. The following is a summary of these issues:
  - All energy kit measures were incorrectly labeled as direct install measures.
  - Attic insulation savings are calculated based on heating system type and 60 attic insulation values were assigned savings for electric heat when the home actually had a heat pump. The same issue was also found for 41 air sealing measures and all wall insulation and window replacement measures.
  - All attic insulation measures were assigned gas heat savings values though many of those homes had electric heat.

Since the CLEAResult tracking system is no longer in use, issues identified above are not relevant for future program years. However, Navigant has concerns with the contents of the Ecova tracking system. While the database contains fewer data entry errors than the CLEAResult database, many data fields needed for evaluation are not being recorded or were left blank. At a minimum, all data collected in rebate applications should be recorded in the tracking system for verification purposes. In addition, it is recommended that the program record data collected during audits. This information is necessary for calculation of program impacts and for verifying measure eligibility.

3.1.3 Verification and Due Diligence

Navigant reviewed the quality assurance and verification activities currently carried out by program and implementation contractor staff. This assessment was based on conversations with program staff and documentation of current program processes. Ecova has drafted a Quality Assurance/Quality Control Policies and Procedures Manual, although this is only in draft form and was not available for review during this evaluation.

3.1.3.1 Quality Assurance/Control Policies

During In-Home Energy Audits and Assessments, the contractor inspects the home, installs low-cost measures (CFLs, low flow showerheads, etc.) and completes an Assessment Form detailing home characteristics (age, size, appliances, insulation levels, etc.) and contact information. Once recommended measures are installed, the customer or contractor then fills out a Rebate Claim Form. The form requires customer and contractor contact information, rebates claimed, date installed and receipts for measures installed. The Rebate Claim Form and invoices are entered into a contractor web portal and uploaded into the tracking database.

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The Ecova rebate processing team reviews each application upon arrival to ensure customer accounts are valid and critical data fields are complete and accurate. If the data collection form contains all of the data the program implementer deems as critical data, the record is processed for invoicing to AEP Ohio and eventual payment to the contractor or participant.

Any forms that do not contain necessary information are denied and follow-up takes place with the contractor. The majority of denied applications are related to measure ineligibility, due to missing measure information or measure specifications that do not meet minimum program requirements. Navigant's review of a sample of rebate application forms found a number of instances where a measure claimed on the rebate application was rejected because the measure did not meet minimum requirements. This indicates that the QA/QC process was effective in these instances.

Ecova has a process in place for in-field inspection of audits/assessments and direct install services. Fully 100 percent of "do-it-yourself" rebate projects are inspected and roughly 5-10 percent of contractor rebates receive field inspection. The only major QA/QC issues uncovered through this process so far was related to several contractors who claimed to have completed an audit instead of an assessment and were paid higher incentive accordingly. This contractor was not removed from the program but was given the chance to continue working with the program under close supervision, with every project receiving field inspections.

The transition to electronic forms that contain internal data validation requirements appears to have streamlined the data collection and entry process and results in fewer errors. However, the system was reported to be difficult to use. The data validation does not accept a project if data is not entered correctly though complaints were received that the system didn't save the correct data, requiring all data to be re-entered.

Navigant's review of the tracking system found that much of the rebate data needed for verification is missing or incomplete. However, Navigant did not find many instances of erroneous data or data entry errors. The program appears to be finding and correcting these issues, which indicates that current QA/QC procedures are working.

3.1.4 Algorithm Review

Navigant conducted a review of measure savings algorithms and underlying assumptions, using data collected from site visits and telephone surveys, including hours of operation, occupancy and installation rates. The review of measures savings was conducted by Navigant to improve the accuracy of *ex-ante* program impact claims, and minimize the potential for major *ex-post* adjustments to program savings. Table 3-4 below provides *ex-ante* and *ex-post* values based on our review. Measure installation rates are factored into the *ex-post* savings values.

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Table 3-4. 2012 Default Energy Savings Values

Measure	*Ex-ante* (Annual kWh/unit)	*Ex-ante* (Annual kW/unit)	*Ex-post* (Annual kWh/unit)	*Ex-post* (Annual kW/unit)
13 Watt CFL Lamp	46.3	0.004	34.5	0.003
Low Flow Showerhead	148.0	0.019	130.7	0.010
Faucet Aerators	31.0	0.004	22.7	0.003
Pipe Insulation	25.0	0.003	51.8	0.006
LED Nightlight	13.6	0.000	21.1	0.000

3.1.5 Integral Compact Fluorescent Lamps

3.1.5.1 Measure Definition

This measure is defined as direct program installation of integral compact fluorescent lamps to replace incandescent lamps that the occupant states operate at least two hours per day. The installation rate accounts for CFLs installed through the program in the current program year that have not since been removed by the occupant.

3.1.5.2 Algorithms

The energy and demand algorithms used for evaluating the integral CFL measure savings are as follows:

$$\text{Ex-post kWh} = \frac{\text{Delta Watts} * \text{HOU} * \text{Installation Rate}}{1000 \text{ Wh/kWh}}$$

$$\text{Ex-post Coincident kW} = \frac{\text{Delta Watts} * \text{Installation Rate} * \text{Coincidence Factor}}{1000 \text{ W/kW}}$$

3.1.5.3 Assumptions

Sources and assumptions for calculating *ex-post* savings for CFLs using the algorithms above are provided in Table 3-5.

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Table 3-5. Key Impact Parameters for CFLs

Parameter Description	Parameter Value	Source
Incandescent Wattage	60 W	Program specification
CFL Wattage	13 W	Program specification
Delta Watts Saved	47 W	Program specification
Hours of Use (HOU)	2.7 hours/day	EmPOWER Maryland Metering Study[a]
Installation Rate	74%	Participant surveys and on-site data collection
Coincidence Factor	0.087	EmPOWER Maryland Metering Study[a]

[a] Navigant Consulting 2012 EmPOWER Maryland 2011 Evaluation Report Chapter 5: Residential Lighting And Appliances, prepared for Baltimore Gas & Electric, Potomac Electrical Power Company, Delmarva Power, Southern Maryland Electric Cooperative, and Potomac Edison

3.1.5.4 *Results*

Table 3-6 summarizes AEP's *ex-ante* energy and coincident peak demand savings and the *ex-post* estimates based on Table 3-5 assumptions. The difference between the *ex-ante* and *ex-post* values is due to the 74 percent installation rate found in participant surveys and on-site data collection.

Table 3-6. *Ex-post* Savings Estimates for CFL Impacts

Measure	Unit	*Ex-ante* (kWh/unit)	*Ex-ante* (kW/unit)	*Ex-post* (kWh/unit)	*Ex-post* (kW/unit)
13 Watt CFL Lamp	Lamp	46.3	0.004	34.5	0.003

3.1.6 Low-Flow Showerhead

3.1.6.1 *Measure Definition*

This measure consists of direct installation of a new showerhead to reduce the flow rate relative to the existing showerhead. The program implementation contractor instructs its energy specialists to visually inspect the base showerhead rated water flow and offer to replace it if it is rated at or greater than 2.5 GPM, which is the current Federal standard for maximum flow rate at 80 psi water pressure.

3.1.6.2 *Algorithms and Assumptions*

The energy and demand algorithms used for evaluating the low-flow showerhead measure savings are as follows:

$$\Delta kWh = ((GPM\_base - GPM\_low) * Length * Household * SPCD * 365 / SPH) * EPG\_electric * ISR$$

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$$kW = kWh / Hours * CF$$

The *ex-post* impact parameters are provided in Table 3-7.

Table 3-7. Key Impact Parameters for Low-flow Showerheads

Parameter Description	Parameter	Mean Value	Source
Household	Household	2.4	2012 participant survey
Showers per household	SPH	1.6	Pacific Northwest Laboratory (a)
Showers per capita per day	SPCD	0.7	LBNL report (b)
Gallons per minute baseload	GPM_base	2.5	Federal minimum standard
Gallons per minute replaced unit	GPM_low	1.75	Program specification
Shower length (minutes)	Length	8.2	LBNL report (b)
Energy per gallon of hot water supplied by electric	EPG_electric	0.127	Formula from the Illinois Statewide Technical Reference Manual (c)
Average cold water temperature	Supply Temp	58.1	Average mains temperature in Columbus, OH: Building America Benchmark 2010
Average mixed temperature of shower	Shower Temp	105	LBNL report (b)
In-service rate	ISR	47%	2012 telephone and on-site survey results
Annual electric DHW recovery hours for showerhead use	Hours	268	Formula from the Illinois Statewide Technical Reference Manual (d)
Peak Demand Coincidence Factor	CF	0.0196	Aquacraft, Inc. Water Engineering and Management (e)

[a.] "Estimate based on Pacific Northwest Laboratory; "Energy Savings from Energy-Efficient Showerheads: REMP Case Study Results, Proposed Evaluation Algorithm, and Program Design Implications"
[b.] Biermayer, Peter J., Potential Water and Energy Savings from Showerheads, March 17, 2006, Lawrence Berkeley National Laboratory.
[c] Calculated as follows: Specific weight of water (8.33 lbs/gal) * heat capacity of water (1.0 btu/lb-F) * Shower Temp (105 F) - Supply Temp (58.1F)) / (Water heater recovery efficiency (0.98) * 3412)
[d] Calculated as follows: (Total annual hot water used for showers = 2.65*10.1*365*0.78 HW% = 7361 gallons) / (27.51GPH recovery of electric water heater) = 268 hours per year. GPH calculated for 65.9F temp rise (120-54.1), 98% recovery efficiency, and typical 4.5kW electric resistance storage tank.
[e] Calculated as follows: Assume 11% showers take place during peak hours (based on: http://www.aquacraft.com/sites/default/files/pub/DeOreo-%282001%29-Disaggregated-Hot-Water-Use-in-Single-Family-Homes-Using-Flow-Trace-Analysis.pdf). Assuming savings are constant throughout the year, the coincidence factor (or probability that the kW savings occur during peak hours) is 3/12 (months) * 5/7 days * 0.11% during peak hours = 0.0196

3.1.6.3 Results

Table 3-8 provides *ex-ante* and *ex-post* energy and demand savings for low-flow showerheads. The *ex-post* values factors in the 47 percent installation rate found through on-site visits and telephone surveys.

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Table 3-8. *Ex-post* Evaluation Savings Estimates for Direct Installation of Low-Flow Showerheads

Measure	Unit	*Ex-ante* (kWh/unit)	*Ex-ante* (kW/unit)	*Ex-post* (kWh/unit)	*Ex-post* (kW/unit)
Low Flow Showerhead	Showerhead	148.0	0.019	130.6	0.010

3.1.7 Kitchen Faucet Aerator & Bathroom Faucet Aerator

3.1.7.1 Measure Definition

This measure consists of direct installation of a new faucet aerator to reduce the flow rate relative to the existing faucet.

3.1.7.2 Algorithms and Assumptions

The energy and demand algorithms used for evaluating the low-flow faucet aerator measure savings are as follows:

*Water savings per year (gallons/year) = Household water use * flow reduction*

Where:

Household water use = Number of household members * total daily household faucet use per capita * 365 days * % of use affected by replacement
Flow reduction = % flow rate reduction * % of straight-down-the-drain use
Straight-down-the-drain use = Percent of water that flows straight down the drain since water volume that fills a sink for batch use is not affected by the flow rate.

*Faucet water energy savings = Aerator water use reduction * (Avg. faucet mix temperature - Temperature of incoming cold-water) * conversion to energy / water heater recovery efficiency*

The impact parameter assumptions for calculating *ex-post* energy and demand savings using the algorithms listed above are provided in Table 3-9.

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Table 3-9. Key Impact Parameters for Faucet Aerator *Ex-post* Impacts

Impact Parameter	Parameter Value	Source
Household members per household	2.40	Based on participant survey results
Total daily household faucet use	14 gallons per capita per day at 365 days per year	References provided in Summit Blue Enbridge/Union Gas study
Installation Rate	61%	Based on participant survey results
Percent of household faucet use affected – kitchen	65% of total faucet use	Provided in Summit Blue Enbridge/Union Gas study, assuming all kitchen faucet use is treated by the direct install program
Percent of household faucet use affected – bath	35% of total faucet use	Provided in Summit Blue Enbridge/Union Gas study, assuming all bath faucet use is treated by the direct install program
Kitchen - Percent flow rate reduction, 2.2 GPM to 1.0 GPM full-on average flow (@ 60psi)	32%	(2.2-1)/2.2. Flow ratings at 60 psi are assumed representative of typical residential water pressures. 2.2 GPM is federal minimum standard.
Bath - Percent flow rate reduction, 2.2 GPM to 1.0 GPM full-on average flow (@ 60psi)	55%	(2.2-1)/2.2. Flow ratings at 60 psi are assumed representative of typical residential water pressures. 2.2 GPM is federal minimum standard.
Percent of water that flows straight down the drain	50% kitchen	Summit Blue Enbridge/Union Gas study
Percent of water that flows straight down the drain	70% bath	Summit Blue Enbridge/Union Gas study
Average faucet mixing temperature	90 F	References provided in Summit Blue Enbridge/Union Gas study
Average cold water temperature	58.1 F	Average mains temperature in Columbus, OH: Building America Benchmark 2010
Water heater efficiency	0.90	Federal minimum standard

3.1.7.3 Results

Table 3-10 compares the *ex-ante* and *ex-post* savings impacts from applying the assumptions in Table 3-9 to the preceding faucet aerator algorithms.

Table 3-10. *Ex-post* Evaluation Savings Estimates for Direct Installed Faucet Aerators

Measure	Unit	*Ex-ante* (kWh/unit)	*Ex-ante* (kW/unit)	*Ex-post* (kWh/unit)	*Ex-post* (kW/unit)
Faucet Aerator	Aerator	31.0	0.004	22.7	0.003

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3.1.8 Pipe Insulation

3.1.8.1 Measure Definition

This measure consists of direct installation of pipe wrap onto pipe connected to the hot water tank. The program implementation contractor installs pipe wrap in lengths of three feet.

3.1.8.2 Algorithms and Assumptions

The energy and demand algorithms used for evaluating hot water heater pipe insulation measure savings are as follows:

$$\Delta kWh = ((1/Rexist - 1/Rnew) * (L * C) * \Delta T * 8{,}760) / \eta\ DHW / 3{,}413$$

Where:

Rexist = R-value of existing un-insulated piping
Rnew = R-value of existing pipe plus installed insulation
Length = Length of piping insulated (ft)
Circumference = Circumference of piping (ft)
ΔT = Temperature difference between water in pipe and ambient air
8,760 = Hours per year
η DHW = DHW Recovery efficiency (ηDHW)
3413 = Conversion from Btu to kWh

The impact parameter assumptions for calculating *ex-post* energy and demand savings using the algorithms listed above are provided in Table 3-11.

Table 3-11. Key Impact Parameters for Pipe Insulation *Ex-post* Impacts

Impact Parameter	Parameter Value	Source
Rexist	R-1	Ohio Technical Reference Manual – 2010
Rnew	R-4	Program protocols
Length	3 ft	Program protocols
Circumference	0.196 ft	Ohio Technical Reference Manual – 2010
ΔT	56.5	NCDC - OH Climate Norms
Hours per year	8760	Ohio Technical Reference Manual – 2010
ηDHW	0.98	Ohio Technical Reference Manual – 2010
Installation rate	0.79	Based on participant telephone surveys and on-site surveys

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3.1.8.3 Results

Table 3-12 summarizes *ex-ante* and *ex-post* energy and demand savings based on the assumptions in Table 3-11.

Table 3-12. *Ex-post* Savings Estimates for Pipe Insulation Impacts

Measure	Unit	*Ex-ante* (kWh/unit)	*Ex-ante* (kW/unit)	*Ex-post* (kWh/unit)	*Ex-post* (kW/unit)
Pipe Insulation	3 LF	25.0	0.003	51.8	0.007

3.1.9 Building Simulation Modeling

Navigant used BEopt™ (Building Energy Optimization) software to calculate savings resulting from air sealing, insulation and HVAC measures. Models were created with an aggregate of home characteristics (wall construction, roof construction, window U-factors, window to wall area, etc.) from program participants. Baseline and post-retrofit models were developed, based on data collected during site-visits and telephone surveys. Baseline models were calibrated to within 5 percent of 2010-2011 utility records for participant annual electric consumption using lighting, appliance loads, home electronics loads, heating loads and cooling loads. The annual energy and demand savings associated with the retrofit measures was calculated as the difference between the baseline and retrofit simulation results. Peak demand savings from retrofit measures were extracted directly from the peak period of BEopt hourly simulation results.

3.1.10 Verified Savings

Navigant developed independent estimates of verified energy and demand savings for the program using industry-standard algorithms, building simulation modeling, and realization rates derived from the telephone and field surveys. Table 3-13 presents *ex-ante* program savings and Navigant's independent estimates developed using data collected from the field and participant surveys.

Table 3-13. Tracking System (*Ex-ante*) and Verified (*Ex-post*) Savings Estimates

Measure	*Ex Ante* Savings (MWh)	*Ex Ante* Savings (MW)	Ex Post Savings (MWh)	Ex Post Savings (MW)	Realization Rates	
					kWh	kW
Energy Kit Measures	2,084	328	1,418	185	0.68	0.57
Direct Install	3,301	298	2,518	204	0.76	0.68
Retrofit Measures	2,865	563	2,125	543	0.74	0.96
Total Savings	8,251	1,190	6,060	932	0.73	0.78

Based on Navigant's engineering review of savings algorithms, which include measure installation rates, the Direct Install component of the program obtained a kWh realization rate of 76 percent, and 75

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percent for Energy Kit Measures. For Retrofit Savings, Navigant applied data collected for the sample to a BEopt™ simulation model, obtaining a realization rate of 74 percent for energy savings and 96 percent for demand savings. The realization rate for total program energy savings was 73 percent and 78 percent for demand savings.

3.2 Process Evaluation Findings

Data sources for the process evaluation included in-depth interviews with program staff, including the AEP Ohio Consumer Programs Coordinator and the Ecova Program Manager, as well as the CATI telephone surveys with a sample of program participants.

3.2.1 Participant Satisfaction

As shown in Table 3-14, respondents reported that their satisfaction with various elements of the In-Home Energy Program was quite high; the reported average satisfaction with the overall program was 4.38 on a scale of 1 to 5 (where 1 was "extremely dissatisfied" and 5 was "extremely satisfied"). Satisfaction with the different aspects of the program did not vary substantially – all aspects scored above 4.2 (with the exception of low flow showerheads; 3.85, n=34). The highest ratings were provided for the programmable thermostat installation, the auditor who assessed home performance, the hot water tank pipe wrap installation, and the length of time it took to complete the audit/assessment. Somewhat lower ratings were provided for the low flow showerheads and aerators installed through the program.

Table 3-14. Mean Satisfaction Scores

Program Aspect	Satisfaction Rating, Scale of 1 to 5	
	Mean	N
AEP Ohio's auditor that assessed your home's energy performance.	4.60	161
The *In-Home Energy Audit* program overall	4.38	165
The length of time it took to complete the audit/assessment in your home	4.55	164
The programmable thermostat installed through the program	4.92	13
The utility contribution ($) toward your energy assessment	4.35	124
The time it took to schedule the energy audit/assessment	4.47	164
The LED nightlight installed through the program	4.41	139
The energy audit report	4.44	161
The CFL bulbs installed through the program	4.32	143
The hot water tank pipe wrap installed through the program	4.55	41
AEP Ohio overall	4.21	165
The low flow showerheads installed through the program	3.85	34
The utility contribution ($) toward your energy audit	4.52	33
The faucet aerators installed through the program	4.30	31

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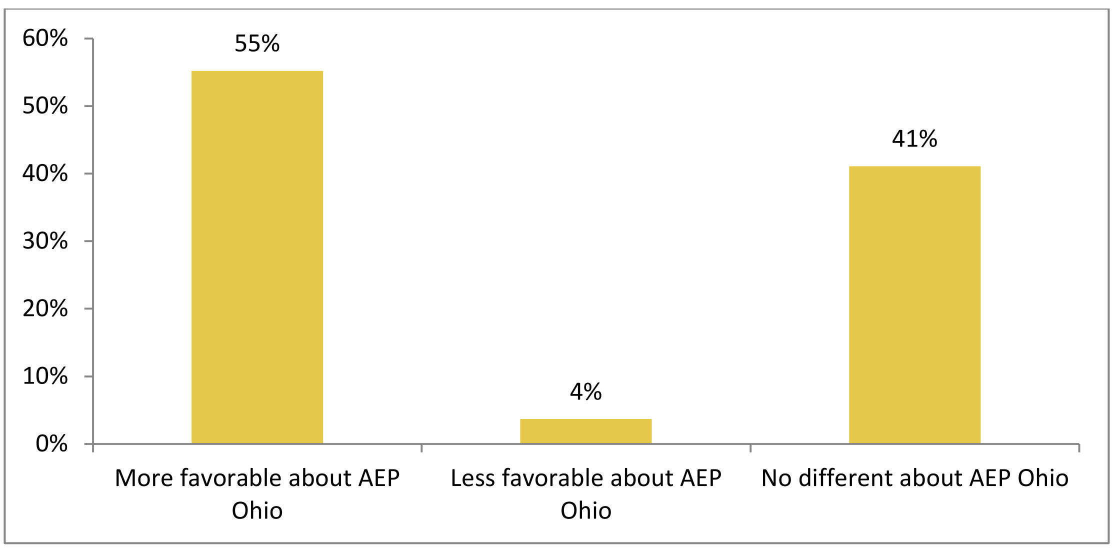
Another factor affecting participant satisfaction with the program is whether a customer notices a reduction in his or her electricity bill after participating. Table 3-15 illustrates that 42 percent of respondents indicated they noticed a reduction in the electricity bill after participating in the program. This year, slightly fewer participants indicated that they noticed a reduction in their electricity bill.

Table 3-15. Did Participants Notice a Reduction in their Electricity Bill After Participating?

	N	Percentage
Yes	70	42%
No	74	45%
Don't know	21	13%

Figure 3-1 illustrates that when asked how participation in the program affects their opinion of AEP Ohio, the majority of participants (55%) feel more favorable about AEP Ohio as a result of having participated in the program, though this is down from 67 percent in 2011. Only 4 percent of respondents indicated feeling less favorable about AEP Ohio.

Figure 3-1. Effect of the Program on Participants Opinion of AEP Ohio (n=202)



Participant satisfaction can also be gauged by examining how many participants recommended the program to others. Fifty-five percent of participants indicated that they have already recommended the program to others. When asked to indicate how likely they are on a scale of 1 to 5, where 1 – 'not at all likely' and 5 – 'very likely' to recommend the program to others, participants reported an average likelihood of 3.95. The high occurrence of reporting the program to others and the high likelihood of doing so in the future is a good indication of program satisfaction. Individuals who indicated they were unlikely to recommend the program to others (Likelihood < 3) were asked why they would not

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recommend the program. The majority of these individuals indicated they do not typically talk about these things with others, do not have anyone to tell, or that it would not come up in conversation. Approximately 20 percent of the respondents reporting a recommendation likelihood of less than 3 indicated they would be unlikely to recommend the program to others due to lack of energy or financial benefits from the program.

Participants who purchased rebated energy efficient products through the program were asked to indicate their satisfaction with the measures purchased. Table 3-16 shows participants reported fairly high satisfaction with all the measures, with satisfaction ratings varying from 4.0 to 5.0, on the same 1-5 scale discussed previously.

Table 3-16. Participant Satisfaction with Rebated Measures

Satisfaction with Rebated Measure		
	N	Mean
Air Sealing	20	4.00
Furnace w ECM Replacement	49	4.86
CAC	34	4.88
AC Tune up	7	4.57
Heat Pump Replacement	12	4.75
Programmable Thermostat	14	4.92
Window Replacement	2	5.00
Wall Insulation	5	4.40
Ceiling Fan	2	5.00

3.2.2 Audit/Assessment Customer Enrollment Process

Eighteen percent of respondents indicated that they had contacted AEP Ohio during their participation in the program. When asked to indicate their satisfaction with this interaction, respondents reported an average satisfaction of 4.20 on a scale of 1 to 5 (n=30). This high level of satisfaction indicates that most respondents feel the representative was able to address their questions or concerns. Respondents who reported a satisfaction level less than 3 were asked why they were dissatisfied with the interaction. Three respondents indicated that the representative was not knowledgeable enough to answer their questions about the program and one respondent indicated that AEP Ohio did not call them back.

3.2.3 Home Audit/Assessment Process

As indicated earlier, participants reported a high level of satisfaction with the home audit/assessment process. On average, the auditor who assessed the home performance received a rating of 4.60 on a scale of 1 to 5 (n=161), the length of time it took to complete the audit/assessment received an average rating of 4.55 (n=164), and the time it took to schedule the audit/assessment received an average rating of 4.47 (n=164).

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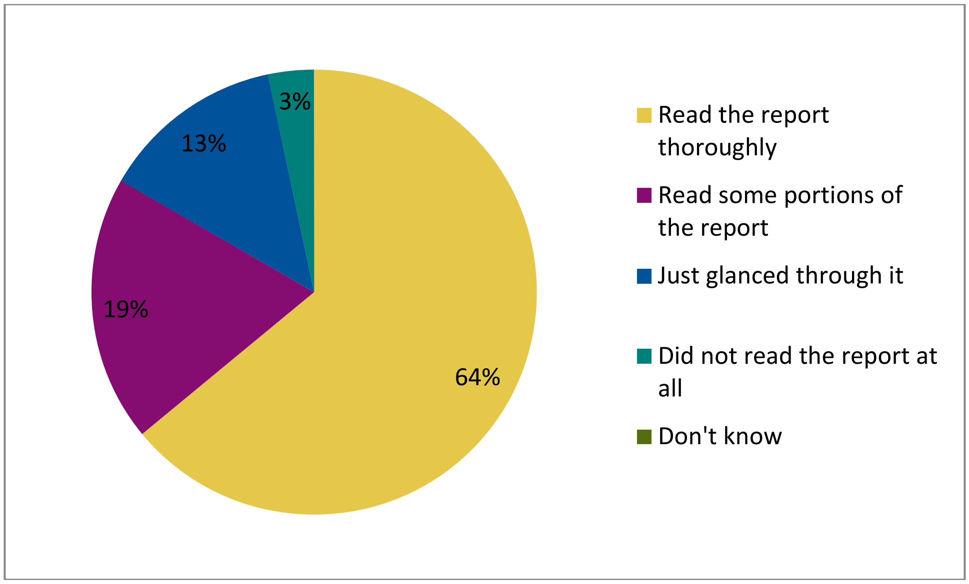
When asked about the Energy Audit report provided following the home audit/assessment, the majority of participants (64 percent) indicated that they had read the report thoroughly. Figure 3-2 illustrates that only 3 percent of participants indicated that they did not read the report at all.

Figure 3-2. Did Participants Read the Energy Audit Report?



Participants who indicated that they read the report thoroughly were asked how useful the report was on a scale of 1 to 5 where 1 – "not at all useful" and 5 – "very useful." The average rating was 4.23 (n=96), indicating a high level of satisfaction with the report.

3.2.4 Incentive Payment Process

Surveyed participants were asked to indicate if they had received their rebate. Ninety-three percent of respondents (n=71) indicated that they had received their rebate, two respondents indicated that they had not, two did not know, and one refused to respond. Navigant verified rebate processing status in the rebate tracking database for individuals who indicated they had not received their rebate or did not know if they had received their rebate. The database indicated all individuals received their rebate for all items. It is possible that the contractor received the rebate and included it in the customer invoice.

Participants who indicated that they had received their rebate were asked to report how long it took to receive. An average of 46 days or 6.6 weeks was reported by respondents. This is significantly lower than the processing time recorded in the rebate tracking database, which may be the result of data entry issues in the rebate tracking database, or with issues regarding the accuracy of respondents' perceptions of this matter.

When asked about their satisfaction with the rebate amount received for participation in the program, an average score of 4.30 on a scale of 1 to 5 was reported (n=67), indicating a high level of satisfaction. Participants were also asked about their satisfaction with the timing of the rebate. This aspect received

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an average score of 3.88 on a scale of 1 to 5 (n=68). While the average time to receive the rebate was 5.6 weeks, some individuals reported waiting over 12 weeks for their rebate, which likely contributed to the lower satisfaction.

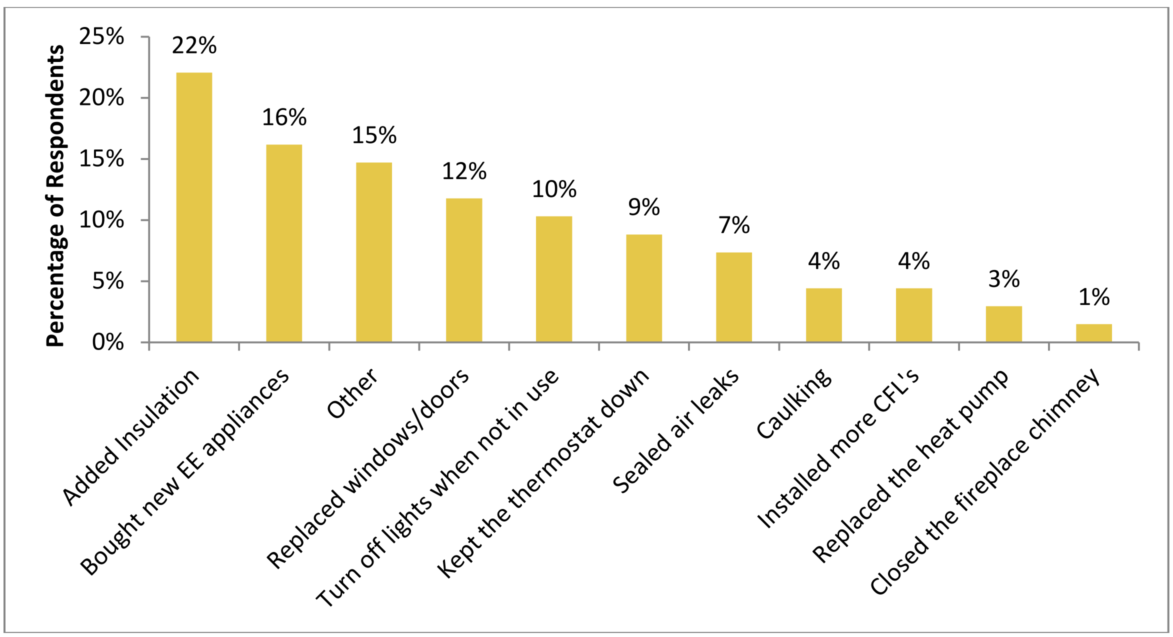
3.2.4.1 Review of Incentive Forms

Navigant completed a review of a sample of rebate forms to verify the accuracy of the Ecova database. A sample of 17 randomly selected rebate forms were requested for review from Ecova. The rebate form inputs were verified against what was entered in the rebate tracking database. All applications were found to be in good order except for two projects for which the specifications of the existing and/or new equipment were not recorded on the application.

3.2.5 Additional Actions Taken

To evaluate if the program was effective in motivating participants to take additional energy savings actions outside of program participation, survey respondents were asked several questions. Forty-one percent of respondents (n=165) indicated having taking some additional energy savings action as a result of participation in the In-Home Energy Program. Figure 3-3 illustrates that installation of additional insulation was reported by 22 percent of those who indicated taking additional action. Replacing windows/doors and turning off lights when not in use were also commonly reported additional energy savings actions.

Figure 3-3. Additional Energy Savings Actions Taken by Participants



Participants were also asked to indicate if they have participated in any other AEP Ohio programs. Only 8 percent of individuals (n=165) indicated that they had participated in another program, and 57 percent of those fourteen individuals (eight respondents) indicated that their participation in the additional

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program occurred before participation in the In-Home Energy Program. Five individuals reported participating in the Refrigerator Rebate program, which was the most popular of the additional programs listed by respondents.

3.2.6 Marketing and Program Awareness

The In-Home Energy Program is advertised through a number of marketing channels, including television, newspaper, bill inserts, community outreach events, participating contractors and direct mail to targeted customers.

Navigant completed a review of sample program advertisements and found that the program message was presented clearly. Contact details to obtain more information about the program were also presented visibly on the advertising materials.

It may be beneficial to advertise financial savings associated with efficiency upgrades, rather than only rebate values. Average savings per home per year (in dollar terms) could be included, with an approximate payback and return on investment. It would be important to note that the numbers are for illustration only and may not represent each homeowner's experience with the program. Additionally, AEP Ohio contributions to the cost of an energy audit could be emphasized, as well as the market value of the free direct install measures that are included in the audit. For instance, the audit costs the homeowner $50 but is a $300-$700 value.

A few of the materials could be further clarified. The flyer for the "Bundle up and Save" promotion did not make it clear that an audit was required in order to qualify for the savings. On the positive side, the multifamily marketing materials mention that CFLs can use 75% less energy and last 10 times longer, while efficient shower heads can save 30% of water heating costs. This is useful information that should be included across all marketing materials for as many measures as possible. Finally, on the rebate schedule for single family homes, the top three rows of the table are shaded green for no clear reason. This formatting change could be confusing to participants and trade allies

Figure 3-4 shows sources of program awareness among participant survey respondents. Respondents were first asked to report how they heard about the program, and were then asked which of these sources of program awareness was the most influential in their decision to participate.

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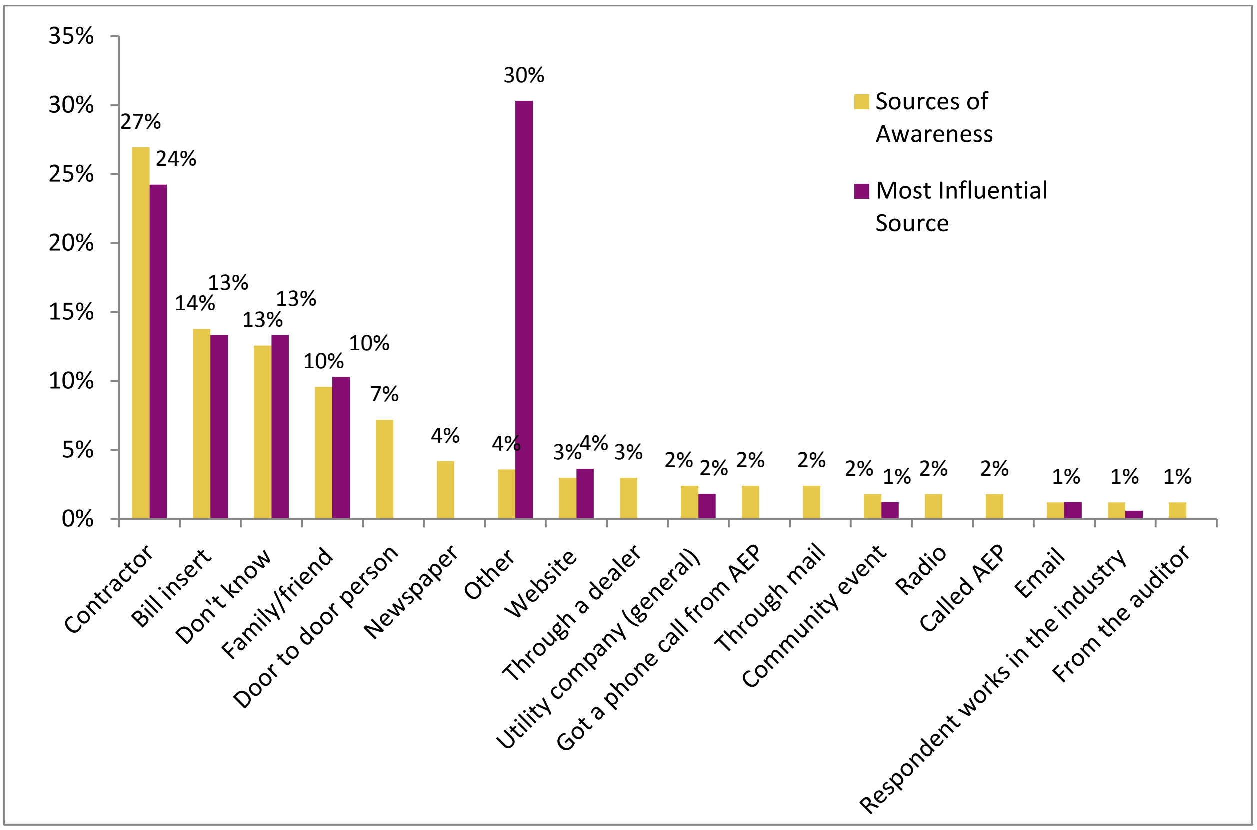
Contractors, bill inserts, and family/friends were the most often cited sources of program knowledge among participants. Notably, bill inserts were substantially more effective than in the previous year (2011: 6%; 2012: 14%). When participants were asked to indicate which source of awareness was most influential in their decision to participate it was often difficult to categorize their responses. Therefore, the most influential source was something other than those listed in Figure 3-4. In total, 27 percent of respondents reported having heard of the program from a contractor, 14 percent recalled hearing about the program from a bill insert, and 10 percent reported hearing about the program by word-of-mouth from family and friends (n=167).

Figure 3-4. Sources of Program Awareness and Influence



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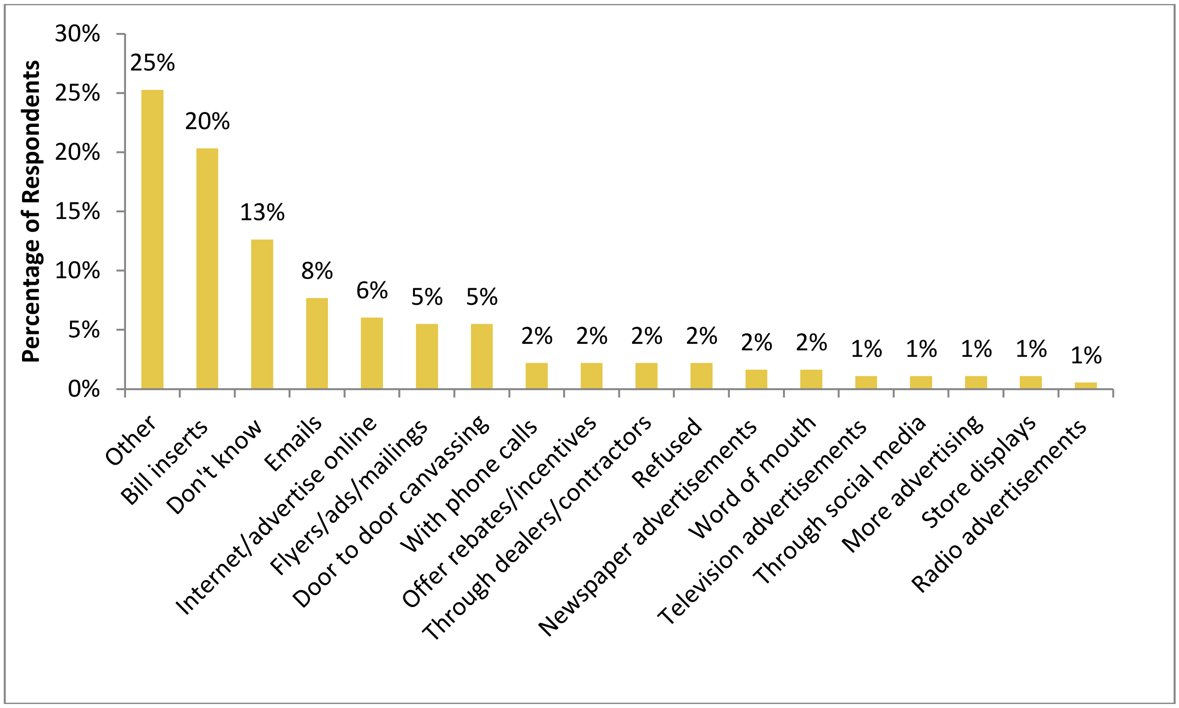
When asked to indicate how the program should be advertised in the future, the most commonly cited methods were bill inserts and emails. Interestingly, for program year 2011, 16% of respondents indicated that the program should by advertised by television, but this year that number dropped drastically to only 1 percent. These data are shown graphically in Figure 3-5.

Figure 3-5. Suggestions for Future Advertising Methods



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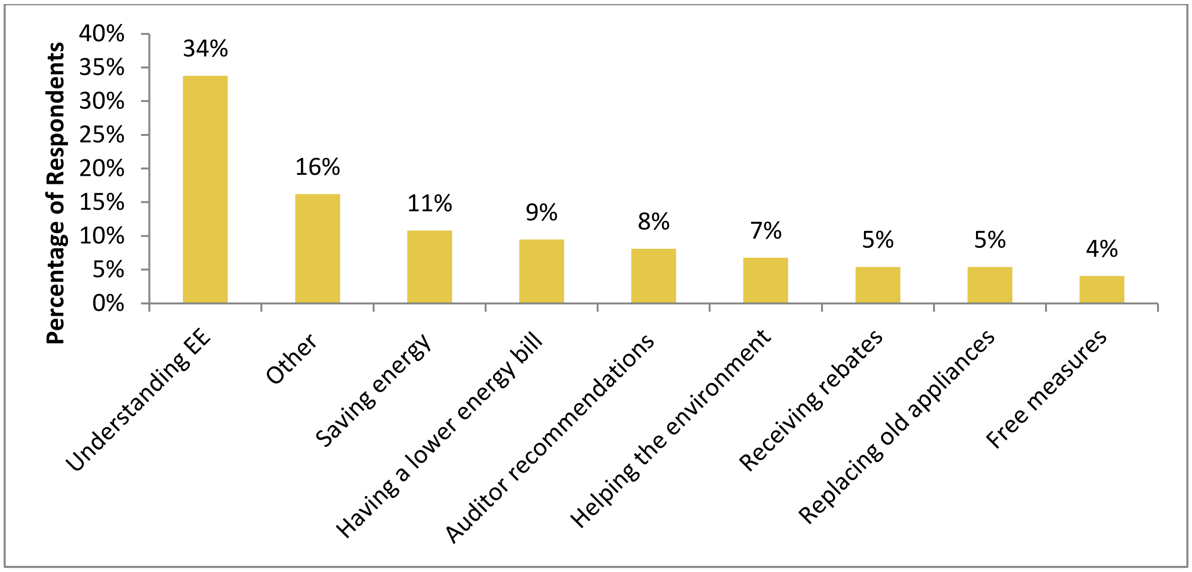
Understanding energy efficiency was listed as the main benefit for participating in the program (n=74). Figure 3-6 illustrates that saving energy was also reported by many participants as a main benefit to participating. These benefits can be used to inform future advertising campaigns, as they reveal the most important program aspects from a participant perspective.

Figure 3-6. Main Benefits of Program Participation



3.2.7 Application and Payment Processing Time

Navigant completed a review of the rebate processing times entered into the rebate tracking dataset. Table 3-17 further breaks down the time period between rebate submission and rebate payment by showing the cumulative number of weeks between application and rebate payment over time for a total of 4,636 rebates. The overall average time from application submission to rebate payment is 8.7 weeks, though 75 percent of respondents received their rebates in slightly more than 10 weeks. Based on participant survey results, an average rebate processing time of 6.6 weeks was reported. The higher processing time determined from analysis of the database inputs may be the result of data entry issues, or a result of the contractors accepting rebates on behalf of the participants, or some customers reporting inaccurate waiting times. The average rebate processing time improved from 9.8 weeks to 6.8 weeks in the latter part of 2012 under Ecova's management.

Table 3-17. Rebate Processing Time

Implementation Contractor	Average Days	Average Weeks	Number of rebates issued	Weighting
Ecova	48	6.8	1762	0.38
CLEAResult	69	9.8	2874	0.62
2012 weighted average	61	8.7	4636	1.00

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Table 3-16. Rebate Processing Time by Quartile

Quartile	Ecova		CLEAResult		Combined	
	Number of Days	Number of Weeks	Number of Days	Number of Weeks	Number of Days	Number of Weeks
Minimum	21	3	10	1	10	1
1st Quartile	35	5	42	6	38	5
Median	43	6	57	8	51	7
3rd Quartile	59	8	80	11	72	10
Maximum	100	14	391	56	391	56
Average	48	7	69	10	61	9

3.2.8 Online Energy Checkup Participant Satisfaction

As shown in Table 3-18, Mean Satisfaction Score respondents reported that their satisfaction with various elements of the Online Energy Checkup Program was high; the reported average satisfaction with the overall program was 8.30 on a scale of 1 to 10 (where 1 was "extremely dissatisfied" and 10 was "extremely satisfied"). The highest ratings were provided for the LED night light, the hot water tank pipe wrap, CFL bulbs, faucet aerators received as a part of the energy savings kit, the customized energy report, and the length of time it took to complete the online checkup. Somewhat lower ratings were provided for the energy savings kit as a whole received through the program.

Table 3-18. Mean Online Checkup Satisfaction Scores

Program Aspect	Satisfaction Rating (1-10)	
	Mean	N
Overall Online Energy Check program	8.30	56
Customized energy report with recommended ways to save energy	8.11	74
Information about eligible rebates for recommended energy efficiency improvements	8.16	74
The length of time it took to complete the online checkup	8.46	75
CFL bulbs received in the kit	8.57	75
Faucet aerators received in the kit	8.27	38
Low flow showerhead received in the kit	7.96	39
Hot water tank pipe wrap received in the kit	9.17	40
LED nightlight received in the kit	9.16	43
AEP Ohio overall	7.65	74

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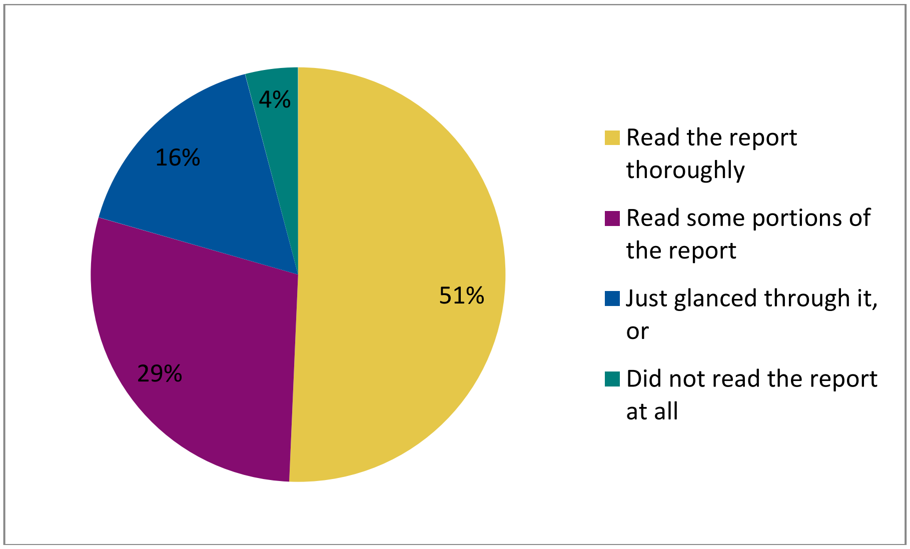
3.2.9 Online Energy Check-up Process

When asked about the Energy report provided following the Online Checkup, the majority of participants (51 percent) indicated that they had read the report thoroughly. Figure 3-7 illustrates that only 4 percent of participants indicated that they did not read the report at all.

Figure 3-7. Did Participants Read the Energy Report after Online Checkup?



Participants who indicated that they read the report thoroughly were asked how useful the report was on a scale of 1 to 5 where 1 – "not at all useful" and 5 – "very useful." The average rating was 4.23 (n=96), indicating a high level of satisfaction with the report.

Participants were also asked to indicate if they have participated in any other AEP Ohio programs. The survey found that 15 percent of individuals (n=72) indicated that they had participated in another program, mostly receiving appliance or HVAC rebates. Of those individuals, 44 percent indicated that their participation occurred after the Online Energy Checkup Program, indicating that the Online Checkup is successful at channeling some customers to other programs.

Having a lower energy bill was listed as the main benefit for participating in the program. Figure 3-8 illustrates that saving energy was also reported by many participants as a main benefit to participating. These benefits can be used to inform future advertising campaigns, as they reveal the most important program aspects from a participant perspective.

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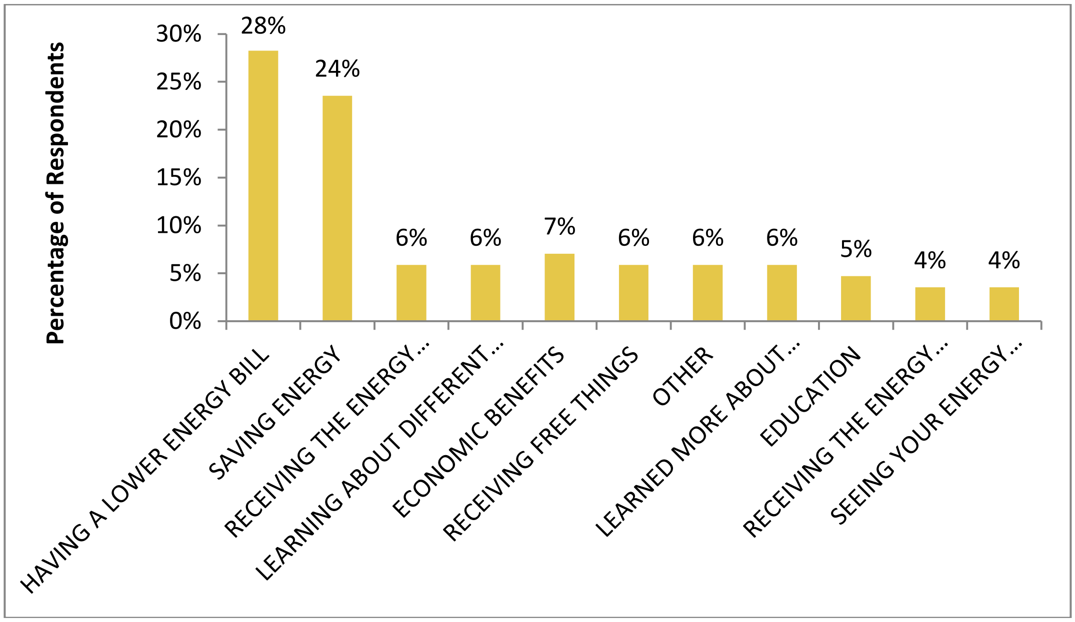
Figure 3-8. Benefits of Online Energy Checkup Participation



3.2.10 Program Administration

The previous contract for implementation of the In-Home Energy Program expired in June 2012 and was subsequently awarded to Ecova, Inc. for 2012-2013. Ecova took over implementation of the program in July, maintaining the same program design and delivery structure for the rest of 2012. Ecova staff in Columbus consists of a program manager, field manager, two field coordinators, three field installers, project lead, project coordinator and four call center personnel.

AEP Ohio and Ecova staff communicate on a regular basis to discuss details of marketing, customer service, data tracking, and program administration. Bi-weekly check-in calls are also held to discuss program progress and outstanding issues. Both AEP Ohio and Ecova are satisfied with the level and quality of communication.

3.2.11 Implementation Challenges

The biggest challenged faced in the implementation of In-Home Energy Program in 2012 was the transition to a new implementation contractor. Ecova took over implementation in July, 2012 and had the task of developing the infrastructure needed to continue running the program without interruption, while resolving a host of issues inherited from the previous implementer. The most significant of these challenges were data tracking, rebate processing and customer satisfaction issues related to a backlog of rebates from the first part of 2012. Ecova staff was able to resolve most residual rebate issues with the first few months of implementation and their increased focus on customer service resulted in positive feedback from customers and AEP Ohio staff.

Data tracking also proved to be a hurdle during the transition to a new implementation contractor. Ecova designed their tracking system around the previous system developed by CLEAResult. AEP Ohio,

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however, had developed new savings calculations for 2012, requiring different data to be collected from auditors. This required time-intensive and complex redesign of the tracking system and application forms, which also had to be communicated to contractors, causing some frustration and QA/QC issues.

3.2.12 Program Participation

Program marketing efforts resulted in the scheduling of 3,900 assessments and 670 audits during 2012, which is roughly similar to participation levels for 2011. In addition to the Direct Install measures installed during audits and assessments, 2,286 customers (up from 1,772 in 2011) received incentives for upgrades recommended during the audit/assessment, resulting in 8,763 total rebates paid (up from 5,603 in 2011).

Navigant's 2011 evaluation identified several barriers to participation to be addressed by the program, each of which was addressed by the program in 2012.

- **Audit cost.** In 2011, audits were delivered by local trade allies who determine the price they charged to customers, while the assessment had a fixed cost of $25 to the homeowner. The variable and relatively high cost of an audit compared to an assessment was identified as a potential barrier for customers in choosing to receive a full audit. In addition, customers could receive a full audit from Columbia Gas for only $50. In 2012, the program set a fixed price of $50 for the full audit for all-electric customers.
- **Assessment/audit as a pre-condition for receiving rebates.** In 2011 the program received negative feedback from contractors who were unable to complete scheduled work until an assessment and all the associated paperwork were complete. In some cases, this situation may have been preventing contractors from recommending program participation. In response to this, the program developed a new on-line audit tool at the end of 2011, which allowed customers to receive incentives without an audit/assessment.
- **Audit report processing time**. In 2011, auditors collected data on handwritten forms while on-site and developed a report with recommendations for efficiency improvements. In many cases, these reports are sent to customers months after the audit was conducted. Reports and rebate applications were then mailed to CLEAResult and manually entered into the tracking system for rebate processing. This process often resulted in slow rebate cycle times and customer dissatisfaction. Ecova shifted to online submittal of rebate application forms, resulting in a noticeable decrease in incentive processing time.

3.2.13 Trade Ally Satisfaction

Trade ally participation and satisfaction were identified as issues to be addressed by the program in 2011 and again in 2012. In 2012, the program transitioned to a web-portal for rebate application submittal and began requiring additional data. The web portal was difficult for some contractors to use and some contractors complained about the difficulty of additional data requirements. In addition, Ecova initially had a policy of paying rebates to contractors, who would reduce customer invoices by the incentive amount and apply for reimbursement. After some dissatisfaction from contractors, the program changed the application policy to allow either customers or contractors to fill out the application.

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The program plans to introduce a tablet-based data collection and incentive application process in 2013, which is expected to be an improvement in the participation process for customers and contractors. This new process is designed to simplify the data collection and application submission process, while providing standardized customer reports, and allowing contractors to log-in and view the status of incentive applications.

Nine In-Home Energy Program trade allies were interviewed to determine their satisfaction with various aspects of the program. Participants were asked to rate their overall satisfaction with AEP Ohio, and their overall satisfaction with the implementation contractors (CLEAResult and Ecova) on a scale of 1 to 10 where 1 – "Not at all satisfied" and 10 – "Extremely satisfied." Table 3-19 indicates that trade allies were generally somewhat more satisfied with the program overall than the implementation contractors.

Table 3-19. Trade Ally Satisfaction Scores

	Overall Program	Implementation Contractors
Mean	7.9	6.5
Median	8.0	7.0
Mode	8.0	4.0

Interview participants performed a variety of services for AEP Ohio customers, and considered different aspects of home performance as their "primary business activity" as seen in Table 3-20. Interviewees had an average of two years of experience in their field, and only one did not have consistent direct contact with AEP Ohio customers. Of the nine companies sampled, three had fewer than ten employees, three had between 11 and 100 employees, and three had over 100 employees.

Table 3-20. Home Performance Services Provided by Interviewees

	Identified as a Service Provided for Program Participants	Identified as the Primary Business Activity
Air Sealing	5	0
Energy Auditing	7	2
HVAC Repair or Replacement	6	5
Insulation	5	2

All companies participated in the In Home Energy Program for the entirety of 2012, and three companies indicated they had participated in the program since its inception approximately 2.5 years ago. On average, 65 percent of interviewees' projects received incentives through the program. However, some contractors indicated only 10 percent of their projects were submitted to AEP Ohio for rebates, while other contractors submitted up to 95 percent of their jobs to the program. The majority of respondents indicated that the number of jobs they conducted as part of the program increased in 2012 relative to 2011, some contractors were unsure, but none indicated that their participation had decreased.

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Most contractors indicated that the incentive levels were fair, however there were a few specific complaints related to the incentive for home energy assessments and windows. Home energy auditors and assessors stated that the $50 audit or $25 assessment rebate did not justify the amount of time and paperwork required to qualify for the rebate. Several contractors suggested that AEP Ohio match Columbia Gas incentive levels so AEP Ohio trade allies could compete with Columbia Gas trade allies. One contractor expressed that there should be an incentive for insulation of conditioned basement walls, and the window incentive is such a small percentage of the cost of new windows that it is unsuccessful at encouraging homeowners to pursue this measure. All contractors agreed that the incentives were effective when combined with a strong sales approach, and incentives were highlighted as being particularly effective in encouraging HVAC replacement or repair among homeowners.

Respondents indicated that the program is very well known among the network of contractors, but needs to be marketed more aggressively toward AEP Ohio customers. Some of the trade allies utilized AEP Ohio's fliers as marketing. Respondents generally found the fliers ineffective on their own, yet effective as supplementary information for interested customers who heard about the program through word of mouth. Trade allies suggested utilizing the same marketing channels used by Columbia Gas, such as the local newspapers, television, and internet. Respondents suggested it is important not to overwhelm the potential customer with information—they suggest succinctly conveying the savings and benefits of the program on a single page.

A number of issues were reported with the incentive application process. All respondents indicated that the rebate processing time is too long, yet this was particularly salient for the smaller companies that have a difficult time covering costs while waiting for the rebates owed to them. If payment is delayed to the homeowner, the homeowner tends to blame the contractor first, which increases the number of callbacks trade allies receive, and decreases their customer satisfaction ratings. Most respondents were in favor of the new web portal used to upload data, yet were frustrated by the fact that they needed to enter all of the data by hand. Furthermore, many respondents reported that the web portal "updates infrequently"—there is a need to wait several weeks before a customer's account number appears in the webportal. Several respondents suggested that the data collection form be streamlined to exclude a rating of "good, fair, or poor" for appliances. Finally, the rebate application should indicate in writing that a central air conditioner is required to receive insulation and air sealing rebates.

Respondents indicated that both CLEAResult and Ecova maintained fairly good communication with the trade allies and responded to issues in a timely manner. However, some issues were mentioned including Ecova neglecting to answer their 800 number when customers call, and certain contractors being scheduled by the call centers to audit homes that have already been audited. Lower satisfaction ratings for the implementation contractor relative to the overall program are likely associated with the two most-often cited drawbacks to the program: slow rebate processing times and extensive paperwork. Overall, trade allies saw the program as largely beneficial for growing their business through lead generation and homeowner education.

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4 Conclusions and Recommendations

This section highlights the findings from the process evaluation of the In-Home Energy Program for 2012.

4.1 *Impact Findings*

Navigant used calibrated building simulation modeling and engineering algorithms to verify energy and demand savings for the In-Home Energy Program. The annual energy and demand savings associated with each measure were calculated as the difference between the baseline and measure simulation results. Modeling results were applied to all projects in the database to determine program total *ex-post* savings.

The In-Home Energy Program reported 8,251 MWh of energy savings and 1,190 kW of demand savings in 2012. The verified (*ex-post*) energy and demand savings for 2012 were 6,060 megawatt hours (MWh) and 932 kilowatts (kW). *Ex-post* energy savings (MWh) savings fell short of the program energy savings goals of 10,904 MWh though *ex-ante* peak demand exceeded the program goal of 704 kW, as shown in Table 4-1. The realization rates were 73 percent for MWh and 78 percent for peak kW, indicating that both the *ex-ante* energy savings and the *ex-ante* demand savings reported by AEP Ohio were close to the evaluation-calculated savings.

Table 4-1. Overall Evaluation Results

2012 Program Goals		2012 *Ex-ante* Claimed Savings (a)		2012 *Ex-post* Savings (b)		2012 Realization Rates RR = (b) / (a)	
MWh	kW	MWh	kW	MWh	kW	MWh	kW
10,904	704	8,251	1,190	6,060	932	0.73	0.78

4.2 *Cost-Effectiveness Review*

This section addresses the cost effectiveness of the In-Home Energy Program. Cost effectiveness is assessed through the use of the Total Resource Cost (TRC) test. Table 4-2. summarizes the unique inputs used in the TRC test.

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Table 4-2. Inputs to Cost-Effectiveness Model for In-Home Energy Program

Item	
Average Measure Life	11
Residences	11,384
Annual Energy Savings (MWh)	6,060
Coincident Peak Savings (kW)	932
Third Party Implementation Costs	1,268,258
Utility Administration Costs	82,493
Utility Incentive Costs	1,811,492
Participant Contribution to Incremental Measure Costs	5,118,910

Based on these inputs, the TRC ratio is 0.4. Therefore, the program does not pass the TRC test. Table 4-3 summarizes the results of the cost-effectiveness tests. Results are presented for the Total Resource Cost test, the Ratepayer Impact Measure Test, and the Utility Cost Test.

Table 4-3. Cost Effectiveness Results for the In-Home Energy Program

Test Results	
Total Resource Cost	0.4
Participant Cost Test	1.0
Ratepayer Impact Measure	0.4
Utility Cost Test	0.9

At this time, additional benefits related to reduction of greenhouse gas emissions have not been quantified in the calculation of the TRC. These additional benefits would increase the given TRC benefit/cost ratio.

4.3 Key Process Findings and Recommendations

The process evaluation component of the In-Home Energy Program assessed the effectiveness of the program operations, delivery for the energy audits/assessments, and rebates for retrofit measures. Navigant's process evaluation included in-depth interviews with program staff, participating customers and trade allies, and a review of program tracking systems, reports and marketing materials.

Participants are satisfied with most aspects of the program. Respondents reported that their satisfaction with various elements of the In-Home Energy Program was quite high; the reported average satisfaction with the overall program was 4.38 on a scale of 1 to 5 (where 1 was "extremely dissatisfied" and 5 was "extremely satisfied"). The highest ratings were provided for the programmable thermostat installation, the auditor who assessed home performance, the hot water tank pipe wrap installation, and the length of time it took to complete the audit/assessment. When asked about their satisfaction with the

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rebate amount received for participation in the program, an average score of 4.30 was reported, indicating a high level of satisfaction. Somewhat lower ratings were provided for the low flow showerheads and aerators installed through the program, and for rebate processing time, which received an average score of 3.88.

» **Recommendations: Consider experimenting with different types of showerheads and aerators to find models that customers are less likely to remove.** Consistently low satisfaction ratings and high removal rates indicate that low-flow showerheads are not popular with customers. These measures were often removed after installation because customers did not like the flow rate and/or water pressure. It may be the case that a different brand of showerhead would be more successful. Consider finding different models at the same flow rate (1.75 GPM), though if necessary, a showerhead with a higher flow rate (2.0 GPM) would still result in greater energy savings if customers leave them in place.

Data tracking. Navigant has serious concerns with the quality of the Ecova tracking system. While the database contains fewer data entry errors than the CLEAResult database, many data fields needed for evaluation are not being recorded or were left blank.

» **Recommendation: Record all information collected from audits and incentive application forms.** At a minimum, all data collected in rebate applications should be recorded in the tracking system for verification purposes. In addition, it is recommended that the program record data collected during audits. This information is necessary for calculation of program impacts and for verifying measure eligibility.

Rebate processing time. Navigant completed a review of the rebate processing times entered into the rebate tracking dataset. The overall average time from application submission to rebate payment is 8.7 weeks (down from 11 weeks in 2011), and average rebate processing time improved from 9.8 weeks to 6.8 weeks in the latter part of 2012 under Ecova's management.

» **Recommendation:** Rebate processing time was noted by both participating customers and trade allies as a weakness of the program. The program saw a significant improvement in 2012 and rebate cycle times should continue to improve with the transition to tablet based data collection and online rebate processing. Contractors reporting difficulty adjusting to the online web portal software in 2012. To ensure that rebate cycle times continue to improve, ensure that the new tablet-based process is fully tested and functional, and that contractors receive proper training before the transition.

Quality assurance/control processes are effective. The transition to electronic forms that contain internal data validation requirements appears to have streamlined the data collection and entry process and now results in fewer errors. Navigant's review of the tracking system found that much of the rebate data needed for verification is missing or incomplete. However, Navigant did not find many instances of erroneous data or data entry errors. The program appears to be finding and correcting these issues, which indicates that current QA/QC procedures are effective.

Program marketing and outreach. Navigant completed a review of sample program advertisements and found that the program message was presented clearly. Contact details to obtain more information about the program were also presented visibly on the advertising materials.

Program administration and delivery. The biggest challenged faced in the implementation of In-Home Energy Program in 2012 was the transition to a new implementation contractor. Ecova took over implementation in July, 2012 and had the task of developing the infrastructure needed to continue running the program without interruption, while resolving a host of issues inherited during the transition. The most significant of these challenges were data tracking, rebate processing and customer satisfaction issues related to a backlog of rebates from the first part of 2012. Ecova staff were able to resolve most residual rebate issues within the first few months of implementation and their increased focus on customer service resulted in positive feedback from customers and AEP Ohio staff.

Program participation. Program marketing efforts resulted in the scheduling of 3,900 assessments in 2012 (down from 4,193 in 2011) and 670 audits (up from 432 during 2011). In addition to the Direct Install measures installed during audits and assessments, 2,286 customers (up from 1,772 in 2011) received incentives for upgrades recommended during the audit/assessment, resulting in 8,763 total rebates paid (up from 5,603 in 2011). Navigant's 2011 evaluation identified audit cost, processing time and the requirement for an audit/assessment before receiving rebates as potential barriers to participation, each of which was successfully addressed by the program in 2012.

Trade ally participation. Trade ally participation and satisfaction were identified as issues to be addressed by the program in 2011 and again in 2012. Most contractors indicated that the incentive levels were fair, however there were a few specific complaints related to the incentive for home energy assessments and windows. All contractors agreed that the incentives were effective when combined with a strong sales approach, and incentives were highlighted as being particularly effective in encouraging HVAC replacement or repair among homeowners. However, a number of issues were reported with the incentive application process. All respondents indicated that the rebate processing time is too long. Most respondents were in favor of the new web portal used to upload data, though many expressed some frustration with user-friendliness of the process.

» **Recommendation: Focus on contractor engagement and training.** The program plans to introduce a tablet-based data collection and incentive application process in 2013, which is expected to be an improvement in the participation process for customers and contractors. Program staff should take this opportunity to create a new start with trade allies and re-engage them through regular contractor meetings, communications and trainings.

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Appendix A Data Collection Instruments

The following guides were used to conduct the in-depth surveys.

A.1 AEP Ohio In-Home Energy Program Participant Survey (Audit/Assessment Recipients)

Hello, my name is __________ and I'm calling on behalf of AEP Ohio, your electric utility. I'm calling recent participants in AEP Ohio's In-Home Energy Program to learn about their experience and satisfaction with the program. This is not a sales call, and all responses will be kept anonymous. May I please speak with [INSERT NAME] or someone in your household who was involved with your recent decision to purchase energy efficiency measures for your home (IF NEEDED: such as high-efficiency furnace, air sealing, insulation, etc.)? [IF THE DECISION-MAKER IS NO LONGER THERE, THANK AND TERMINATE].

READ IF ASKED:

- Depending on your responses, the survey will take about **15** minutes to complete.

Screeners

S1. Can you confirm you are an AEP Ohio customer?

1. YES – SKIP to S3
2. NO
98. DON'T KNOW
99. REFUSED

S2. Are you a Columbus Southern Power or Ohio Power Company customer?

1. YES
2. NO [TERMINATE]
88. (DON'T KNOW) [TERMINATE]
99. (REFUSED) [TERMINATE]

S3. Our records indicate that you received an energy <Job Type>and received a rebate for installing energy efficiency improvements in your home. Is that correct?

3. YES
4. NO [TERMINATE]
1. (DON'T KNOW) [TERMINATE]
99. (REFUSED) [TERMINATE]
   a.

S2. Were you home during the <Job Type>when the auditor was present and participating in the process?

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a. YES **[CONTINUE TO NEXT SECTION]**
b. NO **[CONTINUE TO S2A]**
c. DON'T KNOW **[THANK AND TERMINATE]**
d. REFUSED **[THANK AND TERMINATE]**

S2A. May I speak with someone who was home during the <Job Type>when the auditor was present, and who followed along the <Job Type>process?

b. YES **[CONTINUE]**
c. NO **[THANK AND TERMINATE]**
d. DON'T KNOW **[THANK AND TERMINATE]**
e. REFUSED **[THANK AND TERMINATE]**

Measure Verification

CFLs [If QTYCFL>0]

CFL1. Our records indicate that the auditor installed [QTYCFL] CFL(s) during the <Job Type>, is this correct?

a. YES [Skip to CFL2]
b. NO [Continue to CFL1A]
c. DON'T KNOW [Skip to next applicable section]
d. REFUSED [Skip to next applicable section]
f.

CFL1A. **[ASK IF CFL1=B]** How many CFLs did the auditor install during the <Job Type>?

[NUMERIC OPEN-END]
98. DON'T KNOW
99. REFUSED

IF RESPONDENT ANSWERS "0" SKIP TO NEXT APPLICABLE SECTION.

CFL2. How many CFLs were just handed to you during the <Job Type>? (If needed: "As opposed to actually being installed by the auditor")

[NUMERIC OPEN-END]
98. DON'T KNOW
99. REFUSED

CFL3. [If CFL2=1] "Is the CFL that was installed during the <Job Type>still in place?"
[If CFL2>1 or CFL2=98 or 99] "Are all the CFLs that were installed through the <Job Type>still in place?"

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

[If CFL2>1 and CFL3=b] CFL4. How many of the CFLs which were installed during the <Job Type>are still installed?

[NUMERIC OPEN-END]

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98. DON'T KNOW
99. REFUSED

[If CFL3=b] CFL5. What happened to the CFL(s) which are no longer installed **[ALLOW MULTIPLE RESPONSES]**?

a. THROWN AWAY
b. IN STORAGE
c. SOLD OR GIVEN AWAY
d. OTHER [SPECIFY]
e. DON'T KNOW
f. REFUSED

CFL6. Did you have specific plans to install CFLs before hearing about the program?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED
g.

CFL7. On a scale of 1 to 10 where 1 is "not very likely" and 10 is "very likely", how likely is it that you would have installed the same CFLs if you had not received (it/them) through the program?

____________________- [RECORD RESPONSE 1-10]

CFL8. On a scale of 1 to 10 where 1 is "not at all influential" and 10 is "very influential", how influential was the program in your decision to implement the installation of the CFLs?

____________________- [RECORD RESPONSE 1-10]

Showerheads [if QTYSHOW>0]

SHOW1. Our records indicate that the auditor installed [QTY_SHOW] low flow showerhead(s) during the <Job Type>, is this correct?

1. YES [Skip to SHOW2]
2. NO [Continue to SHOW1A]
88. DON'T KNOW [Skip to next applicable section]
99. REFUSED [Skip to next applicable section]

SHOW1A. [Ask If SHOW1=b] How many low flow showerheads were installed during the <Job Type>?

[NUMERIC OPEN-END]
88. DON'T KNOW
99. REFUSED

IF RESPONDENT ANSWERS "0" SKIP TO NEXT APPLICABLE SECTION.

SHOW2. Was/were the showerhead(s) actually *installed* during the <Job Type>or just left behind?

1. All were installed
2. Some were installed
3. All were left behind

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88. DON'T KNOW
99. REFUSED

(ASK IF SHOW2=1)
SHOW3. [If SHOW1A=1] "Is the low flow showerhead that was installed during the <Job Type>still in place?" [If SHOW1A>1] "Are all the low flow showerheads that were installed through the <Job Type>still in place?"

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

[If SHOW1A>1 and SHOW3=b] SHOW4. How many of the showerheads are still installed?

[NUMERIC OPEN-END]

98. DON'T KNOW
99. REFUSED

[If SHOW3=b] SHOW5. What happened to the showerhead(s) which are no longer installed? **[ALLOW MULTIPLE RESPONSES]**

a. THROWN AWAY
b. IN STORAGE
c. SOLD OR GIVEN AWAY
d. OTHER [SPECIFY]
e. DON'T KNOW
f. REFUSED

SHOW6. Did you have specific plans to install low flow showerheads before hearing about the program?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED
h.

SHOW7. On a scale of 1 to 10 where 1 is "not very likely" and 10 is "very likely", how likely is it that you would have installed the same showerheads if you had not received (it/them) through the program?

____________________- [RECORD RESPONSE 1-10]

DON'T KNOW
REFUSED

SHOW8. On a scale of 1 to 10 where 1 is "not at all influential" and 10 is "very influential", how influential was the program in your decision to implement the installation of the low flow showerheads?

____________________- [RECORD RESPONSE 1-10]

DON'T KNOW
REFUSED

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AERATORS [if QTYAER>0]

AER1. Our records indicate that the auditor installed [QTYAER] low flow aerator(s) during the <Job Type>, is this correct?

a. YES [Skip to AER2]
b. NO [Continue to AER1A]
c. DON'T KNOW [Skip to next applicable section]
d. REFUSED [Skip to next applicable section]

AER1A. How many low flow aerators were installed during the <Job Type>?

[NUMERIC OPEN-END]
98. DON'T KNOW
99. REFUSED

IF RESPONDENT ANSWERS "0" SKIP TO NEXT APPLICABLE SECTION.

AER2. How many of those aerators were actually *installed* during the <Job Type>, as opposed to just being left behind?

[NUMERIC OPEN-END]
98. DON'T KNOW
99. REFUSED

AER3. [If AER2=1] "Is the low flow aerator that was installed during the <Job Type>still in place?" [If AER2>1 or AER2=98 or 99] "Are all the low flow aerators that were installed through the <Job Type>still in place?"

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

[If AER2>1 and AER3=b] AER4. How many of the aerators are still installed?

[NUMERIC OPEN-END]
98. DON'T KNOW
99. REFUSED

[If AER3=b] AER5. What happened to the aerator(s) which are no longer installed?

a. THROWN AWAY
b. IN STORAGE
c. SOLD OR GIVEN AWAY
d. OTHER [SPECIFY]
e. DON'T KNOW
f. REFUSED

AER6. Did you have specific plans to install low flow aerators before hearing about the program?

a. YES

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b. NO
c. DON'T KNOW
d. REFUSED
i.

AER7. On a scale of 1 to 10 where 1 is "not very likely" and 10 is "very likely", how likely is it that you would have installed the same aerators if you had not received (it/them) through the program?

____________________- [RECORD RESPONSE 1-10]
DON'T KNOW
REFUSED

AER8. On a scale of 1 to 10 where 1 is "not at all influential" and 10 is "very influential", how influential was the program in your decision to implement the installation of the low flow aerators?

____________________- [RECORD RESPONSE 1-10]
DON'T KNOW
REFUSED

Pipe [If QTY_PIns>0]

PINS1. Our records indicate that pipe insulation was installed on the pipe connected to your hot water heater during the <Job Type>, is this correct?

a. YES
b. NO [SKIP TO NEXT APPLICABLE SECTION]
c. DON'T KNOW [SKIP TO NEXT APPLICABLE SECTION]
d. REFUSED [SKIP TO NEXT APPLICABLE SECTION]

PINS2. Is the pipe insulation that was installed during the <Job Type>still in place?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

PINS3. Did you have specific plans to install pipe insulation on the pipe connected to your hot water heater before hearing about the program?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED
j.

PINS4. On a scale of 1 to 10 where 1 is "not very likely" and 10 is "very likely", how likely is it that you would have installed the same pipe insulation if you had not received it through the program?

____________________- [RECORD RESPONSE 1-10]
DON'T KNOW
REFUSED

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PINS5. On a scale of 1 to 10 where 1 is “not at all influential” and 10 is “very influential”, how influential was the program in your decision to implement the installation of the pipe insulation?

____________________- [RECORD RESPONSE 1-10]
DON’T KNOW
REFUSED

LED Nightlight [if QTY_LEDNL>0]

LEDNL1. Our records indicate that an LED nightlight was installed during the <Job Type>, is this correct?

a. YES
b. NO [SKIP TO NEXT APPLICABLE SECTION]
c. DON’T KNOW [SKIP TO NEXT APPLICABLE SECTION]
d. REFUSED [SKIP TO NEXT APPLICABLE SECTION]

LEDNL2. Is the LED Nightlight that was installed during the <Job Type>still installed?

a. YES
b. NO
c. DON’T KNOW
d. REFUSED

[If LEDNL2=b] LED3. What happened to the LED nightlight that is no longer installed?

a. IT WAS THROWN AWAY
b. IT’S IN STORAGE
c. IT WAS SOLD OR GIVEN AWAY
d. OTHER [SPECIFY]
e. DON’T KNOW
f. REFUSED
k.

LEDNL4. Did you have specific plans to install an LED nightlight before hearing about the program?

a. YES
b. NO
c. DON’T KNOW
d. REFUSED
l.

LEDNL5. On a scale of 1 to 10 where 1 is “not very likely” and 10 is “very likely”, how likely is it that you would have installed the same LED nightlight if you had not received it through the program?

____________________- [RECORD RESPONSE 1-10]

LEDNL6. On a scale of 1 to 10 where 1 is “not at all influential” and 10 is “very influential”, how influential was the program in your decision to implement the installation of the LED nightlight?

____________________- [RECORD RESPONSE 1-10]

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Programmable Setback Thermostat [If QTY_PTherm>0]

PT1. Our records indicate that a programmable thermostat was installed during the <Job Type>, is this correct?

a. YES
b. NO [SKIP TO NEXT SECTION]
c. DON'T KNOW [SKIP TO NEXT SECTION]
d. REFUSED [SKIP TO NEXT SECTION]

PT2. Was the thermostat programmed during the <Job Type>?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

PT3. Is the programmable thermostat that was installed during the <Job Type>currently programmed?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED
m.

[If PTHERM3=b]

PT4. What happened to the programmable thermostat which is no longer installed?

a. THROWN AWAY
b. IN STORAGE
c. SOLD OR GIVEN AWAY
d. OTHER [SPECIFY]
e. DON'T KNOW
f. REFUSED

PT5. Did you have specific plans to install a programmable thermostat <u>before</u> hearing about the program?

e. YES
f. NO
g. DON'T KNOW
h. REFUSED
n.

PT6. On a scale of 1 to 10 where 1 is "not very likely" and 10 is "very likely", how likely is it that you would have installed a programmable thermostat if you had not received (it/them) through the program?

____________________- [RECORD RESPONSE 1-10]

DON'T KNOW
REFUSED

PT7. On a scale of 1 to 10 where 1 is “not at all influential” and 10 is “very influential”, how influential was the program in your decision to implement the installation and programming of the thermostat?

_____________________- [RECORD RESPONSE 1-10]

DON’T KNOW
REFUSED

[ASK IF STRATA = HVAC and SHELL, otherwise skip to next section]

Retrofit Measure Verification

Ask Questions R1 through R9 for each retrofit measure installed using the table below:

Y	Furnace Replacement
N	Attic Insulation
Y	Central Air Conditioning Replacement(s)
Y	Heat Pump Replacement(s)
Y	Programmable Thermostat(s)
N	Air Conditioner Tune Up
N	Wall Insulation
N	Air Sealing
Y	Window Replacement(s)
Y	Ceiling Fan(s)
N	Duct Sealing

R1. Our records indicate that you purchased [if pluralization =Y, QTYMeasure] [Measure Name(s)] after the energy <Job Type>, is this correct? DO NOT PIPE IN THE QTYMEASURE IF PLURALIZATION =N. For pluralization=N and qtymeasure=1 or more than 1, ask: “Our records indicate that you purchased attic insulation after the energy” <JOB Type >, is this correct?”

Example – if on the sample file, there are 5 attic insulations, in this question we still say only ‘attic insulation’. If the respondent says no, they will skip out of the section. This is because – in the case of attic insulation pluralization=N, so these people will not get R2.

For pluralization=Y and qtymeasure=1, “Our records indicate that you purchased one <measure name> after the energy” <JOB Type >, is this correct?”

Example – if on the sample file, there are 1 FURNACE REPLACMENTS, in this question we still say 1 FURNACE REPLACEMENT.

For pluralization=Y and qtymeasure>1, "Our records indicate that you purchased <qtymeasure> <measure name> after the energy" <JOB Type >, is this correct?"
Example – if on the sample file, there are 5 FURNACE REPLACMENTS, in this question we still say 5 FURNACE REPLACEMENTS.

a. YES
b. NO
c. DON'T KNOW [SKIP TO NEXT SECTION]
d. REFUSED [SKIP TO NEXT SECTION]
o.

IF pluralization=N, and R1=NO, skip out of section)
[If R1=b and Pluralization=Y] R2. How many [Measure Name(s)] did you purchase after the <Job Type>?

[NUMERIC OPEN-END]

98. DON'T KNOW [SKIP TO NEXT SECTION]
99. REFUSED [SKIP TO NEXT SECTION]

[For pluralization=Y, IF R1=NO, and R2=0, skip section]

[DO NOT ASK R3 IF R1= DON'T KNOW or REFUSED]
R3. [If QTYMeasure=1] Has the [Measure Name] purchased through the program been installed in your home? [If QTYMeasure>1] Have all the [Measure Name(s)] purchased through the program been installed in your home?

a. YES
b. NO
c. DON'T KNOW [SKIP TO NEXT SECTION]
d. REFUSED [SKIP TO NEXT SECTION]
p.

R4. [If R3=b and QTYMeasure>1] How many of the [Measure Name](s) have been installed in your home?

[NUMERIC OPEN-END]

98. DON'T KNOW
99. REFUSED

R5. [If R3=b] Why have you not installed the [Measure Name](s) purchased through the program? **[ALLOW MULTIPLE RESPONSES]**

a. HAVE NOT GOTTEN AROUND TO IT
b. NOT SATISFIED WITH THE [MEASURE NAME] PURCHASED
c. WAITING FOR THE EXISTING EQUIPMENT TO STOP WORKING
d. NOT THE RIGHT TYPE/WON'T FIT
e. OTHER (SPECIFY)
f. DON'T KNOW
g. REFUSED

R6. [If R3=b] When do you intend on installing the [Measure Name(s)] which have not yet been installed?

a. IN THE NEXT 3 MONTHS

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b. IN THE NEXT 6 MONTHS
c. IN THE NEXT YEAR
d. MORE THAN A YEAR FROM NOW
e. NEVER
f. DON'T KNOW
g. REFUSED

R7. Did you have specific plans to install a [Measure Name](s) before hearing about the program?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

[DO NOT ASK R8 or R9 IF R3=DON'T KNOW or REFUSED]
R8. On a scale of 1 to 10 where 1 is "not very likely" and 10 is "very likely", how likely is it that you would have installed the same [Measure Name](s) if you had not received (it/them) through the program?

____________________- [RECORD RESPONSE 1-10]
DON'T KNOW
REFUSED

R9. On a scale of 1 to 10 where 1 is "not at all influential" and 10 is "very influential", how influential was the program in your decision to purchase and install and the [Measure Name]?

____________________- [RECORD RESPONSE 1-10]
DON'T KNOW
REFUSED
q.

Process Questions

P1. How did you first find out about the In-Home Energy Program? **[DO NOT READ LIST. ENTER ALL THAT APPLY.]**

a. BILL INSERT
b. COMMUNITY EVENT/COUNTY/STATE FAIR
c. CONTRACTOR (SUCH AS A PLUMBER, ELECTRICIAN, OR GENERAL CONTRACTOR)
d. EMAIL
e. FAMILY/FRIEND
f. RESPONDENT WORKS IN THE INDUSTRY
g. UTILITY COMPANY (GENERAL)
h. WEBSITE
i. YARD SIGNS
j. SOME OTHER WAY (SPECIFY)
k. DON'T KNOW
l. REFUSED

NAVIGANT

[IF P1 HAS MORE THAN ONE ANSWER, ASK P2, OTHERWISE AUTO-FILL.]

P2. Which of these sources of information was most influential in your decision to participate in the program? [SHOW ANSWERS GIVEN IN P1.] **[ENTER ONE RESPONSE.]**

P3. How would you suggest AEP Ohio try to reach out to their customers in the future to get them to participate in this program? [DO NOT READ. ALLOW MULTIPLE RESPONSES]

a. BILL INSERTS
b. FLYERS/ADS/MAILINGS
c. HOMEOWNERS ASSOCIATION
d. NEWSPAPER ADVERTISEMENTS
e. RADIO ADVERTISEMENTS
f. TELEVISION ADVERTISEMENTS
g. WITH PHONE CALLS
h. OTHER (SPECIFY)
i. DON'T KNOW
j. REFUSED

P4. On a scale of 1 to 5, where 1 is extremely dissatisfied and 5 is extremely satisfied, how would you rate your satisfaction with… [SCALE 1-5; 96=not applicable, 98=Don't know, 99=Refused]

a. The energy <Job Type>REPORT you received that showed your home's energy usage and recommended ways to save energy.
b. [If QTY_CFL≥1] The CFL bulbs installed through the program
c. [If QTY_AER≥1] The faucet aerators installed through the program
d. [If QTY_SHOW≥1] The low flow showerheads installed through the program
e. [If QTY_ PIns ≥1] The hot water tank pipe wrap installed through the program
f. [If QTY_PTherm1≥1] The programmable Thermostat installed through the program
g. [If QTY_LEDNL≥1] The LED nightlight installed through the program
h. The time it took to schedule the energy <Job Type>
i. The length of time it took to complete the <Job Type>in your home
j. AEP Ohio's auditor that assessed your home's energy performance.
k. [If JOB TYPE=1] The utility contribution ($) toward your energy assessment
l. [If JOB TYPE=2] The utility contribution ($) toward your energy audit
m. The *In-Home Energy* program overall
n. AEP Ohio overall

(SP TEAM: As this question for any of the P4a-n<4. Pipe in the response as shown below)
[If any P4a-n≤2] P5. You mentioned you were not satisfied with <P4a-n<4>. Why did you give this rating? **[OPEN-END. RECORD RESPONSE]**

NAVIGANT

98. DON'T KNOW
99. REFUSED

P6. What do you see as the main benefits to participating in the *program*? [DO NOT READ; MULTIPLE RESPONSE, UP TO 3]

a. HAVING A LOWER ENERGY BILL
b. SAVING ENERGY
c. RECEIVING THE DIRECT INSTALL PROGRAM EQUIPMENT
d. RECEIVING THE ENERGY SURVEY RECOMMENDATIONS
e. RECEIVING REBATES ON RETROFIT MEASURES
f. NO IMPROVEMENTS/FINE THE WAY IT IS
g. OTHER, SPECIFY
h. DON'T KNOW
i. REFUSED
r.

P7. Have you noticed a reduction in the amount of your electric bill since participating in the program?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

P8. Would you say participating in this program has made you feel more favorable, less favorable, or no different about AEP Ohio?

a. MORE FAVORABLE ABOUT AEP OHIO
b. LESS FAVORABLE ABOUT AEP OHIO
c. NO DIFFERENT ABOUT AEP OHIO
d. DON'T KNOW
e. REFUSED
s.

P9. Have you recommended the AEP Ohio In-Home Energy Program to others since participating?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

P10. On a scale of 1 to 5, where 1 is "Not at All Likely", and 5 is "Extremely Likely", how likely are you to recommend this program to others in the future?

____________________- [RECORD RESPONSE 1-5]

DON'T KNOW
REFUSED

[If P10≤4] P11. Why might you <u>not</u> recommend the program to others? [DO NOT READ, MARK ALL THAT APPLY]

a. ENERGY USAGE SAVINGS WERE NOT HIGH ENOUGH

NAVIGANT

b. ENERGY BILL SAVINGS WEREN'T HIGH ENOUGH
c. TOO MUCH OF A HASSLE/TOO MUCH RED TAPE
d. IT TOOK TOO LONG TO RECEIVE THE REBATE
e. THE REBATE WASN'T WORTH IT/WAS TOO LOW
f. THE RECOMMENDATIONS WERE NOT HELPFUL
g. RESPONSE WAS NEUTRAL/NOT NEGATIVE
h. OTHER [SPECIFY]
i. DON'T KNOW
j. REFUSED

P12. At any point during your participation in the *In-Home Energy* program, did you contact a representative at AEP Ohio?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

[If P12=a] P13. On a scale of 1 to 5, where 1 is Extremely Dissatisfied, and 5 is Extremely Satisfied, please rate your satisfaction with your experience contacting AEP Ohio regarding the In-Home Energy program.

____________________- [RECORD RESPONSE 1-5]

DON'T KNOW
REFUSED

[If P13≤2] P14. Why are you dissatisfied with your experience contacting AEP Ohio regarding the In-Home Energy program? **[Record verbatim]**

DON'T KNOW
REFUSED

P15. Now I would like you to focus on the Report you received after the <Job Type>. After receiving the report that contained recommendations for ways to reduce your energy consumption and your utility bill, would you say that you….(Read list)

a. Read the report thoroughly
b. Read some portions of the report
c. Just glanced through it
d. Did not read the report at all
e. DON'T KNOW
t.

P16. [ASK IF P15=a] On a scale of 1 to 5 where 1 is "not useful at all" and 5 is "extremely useful", please rate the usefulness of the recommendations contained in the report.

____________________- [RECORD RESPONSE 1-5]

DON'T KNOW
REFUSED

NAVIGANT

[If P15=a] P17. Thinking about all of the suggestions made by the auditor, what is your primary goal in implementing the recommendations? (RECORD ONE ANSWER)

a. REDUCE ENERGY COSTS
b. MAKE MY HOME MORE COMFORTABLE
c. TO IMPROVE THE MARKET VALUE OF MY HOME
d. TO MAKE GENERAL IMPROVEMENTS TO MY HOME
e. TO BENEFIT THE ENVIRONMENT
f. OTHER SPECIFY ______________________
g. DON'T KNOW
h. REFUSED

[IF STRATA = HVAC and SHELL} ASK P18, AND SUBSEQUENTLY P19 FOR ANY DEVICE (COLUMN S-AC)>0.
P18. On a scale of 1 to 5 where 1 is extremely dissatisfied and 5 is extremely satisfied, Please rate your satisfaction with the [Measure Name] purchased through the program

______________________- [RECORD RESPONSE 1-5]

[If P18≤2] P19. Why are you dissatisfied with the energy efficiency improvements? **[Record verbatim]**

Ask questions P20 through P23 if "Rebate Recipient" = "Homeowner"

P20. Did you receive your rebate for the energy efficiency improvements that you purchased through the program?

a. YES
b. NO
c. DON'T KNOW [SKIP TO P24]
d. REFUSED [SKIP TO P24]

P21. About how long did it take for you to receive the rebate? [Numeric Open-End] **[Record in days]**

P22. On a scale of 1 to 5, where 1 is "Not at All Satisfied", and 5 is "Extremely Satisfied" How satisfied were you with the rebate for the efficiency improvements?

______________________- [RECORD RESPONSE 1-5]

DON'T KNOW
REFUSED

P23. On a scale of 1 to 5, where 1 is "Not at All Satisfied", and 5 is "Extremely Satisfied" How satisfied were you with the amount of time it took to receive the rebate?

______________________- [RECORD RESPONSE 1-5]

DON'T KNOW
REFUSED

NAVIGANT

P24. Based on your participation in AEP Ohio's In-Home Energy Program, have you taken any additional actions to save energy in your home which were not part of the program or part of the retrofit rebates?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

P25. [If P24=a] What additional energy savings actions have you taken? **[Record verbatim]**

P26. Have you participated in any other AEP Ohio energy efficiency programs for your home?

a. YES
b. NO
c. DON'T KNOW
d. REFUSED

P27. [If P26=a] Which other programs have you participated in? **[Record verbatim]**

P28. [If P26=a] Did you participate in this/these programs before or after your participation in the In-Home Energy program?

a. BEFORE THIS ONE
b. AFTER THIS ONE
c. BOTH BEFORE AND AFTER [NOTE TO INTERVIEWER: COULD BE PARTICIPATION IN MULTIPLE PROGRAMS OR PARTICIPATION COULD HAVE TAKEN A LONGER TIME]
d. DON'T KNOW
e. REFUSED

u.

Demographics

D1. How many people live in your household year-round? ## [**NUMERIC OPEN END]**

a. DON'T KNOW
b. REFUSED

D4. Do you own or rent your home? **[DO NOT READ LIST. ENTER ONE RESPONSE.]**

a. Own
b. Rent
c. DON'T KNOW
d. REFUSED

D5. How many years have you lived in your current residence?

_________________________years
DON'T KNOW
REFUSED

NAVIGANT

D6. **[DO NOT READ: INTERVIEWER RECORD ANY INFORMATION RESPONDENT VOLUNTEERS ABOUT THE PROGRAM THAT WAS NOT CAPTURED DURING THE INTERVIEW HERE]**

Closing

That's all the questions that we have. On behalf of AEP Ohio, I'd like to thank you very much for taking the time to participate in this study.

NAVIGANT

A.2 AEP Ohio In-Home Energy Program Online Energy Checkup Participant Survey

Hello, my name is __________ from the Blackstone Group, and I'm calling on behalf of AEP Ohio, your electric utility. I'm contacting AEP Ohio customers who recently completed an "Online Energy Checkup" through AEP Ohio's website to learn about their experience and satisfaction with the service. This is not a sales call, and all responses will be kept anonymous. May I please speak with [INSERT NAME] or someone in your household who completed the Online Energy Checkup?

READ IF ASKED:

- Depending on your responses, the survey will take about **15** minutes to complete.
- Please be assured that this is a survey and in no way a sales call.
- All of your responses will be kept completely confidential.

Screeners

S1. Can you confirm you are an AEP Ohio customer? [SINGLE PUNCH]

1. YES [SKIP TO S3]
2. NO
98. DON'T KNOW
99. REFUSED

S2. Are you a Columbus Southern Power or Ohio Power Company customer? [SINGLE PUNCH]

1. YES
2. NO [TERMINATE]
98. DON'T KNOW [TERMINATE]
100.REFUSED [TERMINATE]

S3. Our records indicate that you completed an Online Energy Checkup on AEP Ohio's website at some point in 2012 and, as part of your participation, AEP Ohio mailed you an energy efficiency kit including products like a low-flow showerhead and LED nightlight. Is that correct? [SINGLE PUNCH]

1. YES
2. NO [TERMINATE]
98. DON'T KNOW [TERMINATE]
100.REFUSED [TERMINATE]

S4. Do you recall completing the "Online Energy Checkup" interactive tool that helps you evaluate how you use energy in your home and where you can save money?

1. YES
2. NO [SKIP TO CFL1]
98. DON'T KNOW [SKIP TO CFL1]

NAVIGANT

99. REFUSED [SKIP TO CFL1]

Online Energy Checkup Information Retention and Satisfaction

OS1. On a scale from 0 to 10 where 0 is "not at all knowledgeable" and 10 is "extremely knowledgeable" how would you rate your knowledge of energy efficiency **before** you participated in the Online Energy Checkup?

(DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. NOT AT ALL KNOWLEDGEABLE
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY KNOWLEDGEABLE
98. DON'T KNOW
99. REFUSED

OS2. How much did you learn about energy efficiency from the Online Checkup? Would you say you learned…? (READ LIST) [SINGLE PUNCH]

1. Nothing
2. Very Little
3. Some, or
4. A lot
97. OTHER, SPECIFY [OPEN END]
98. DON'T KNOW
99. REFUSED

OS3. On a scale of 0 to 10, where 0 means "extremely dissatisfied" and 10 means "extremely satisfied", how satisfied were you with the Online Energy Checkup overall? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.

05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON'T KNOW
99. REFUSED

[ASK OS4 IF OS3 <= 5. ELSE SKIP TO OS5.]
OS4. Why did you rate it that way? [OPEN END]

98. DON'T KNOW
99. REFUSED

OS5. From your perspective, what, if anything, could be done to improve the Online Energy Checkup program?

97. [OPEN END]
98. DON'T KNOW
99. REFUSED

OS6. On a scale of 1-5 with 1 being "strongly disagree" and 5 being "strongly agree," please indicate how much you agree or disagree with the following statements. [FORMAT AS GRID WITH 1 – STRONGLY DISAGREE TO 5 – STRONGLY AGREE, INCLUDE 98 DON'T KNOW AND 99 REFUSED ACROSS THE TOP. LIST A-G DOWN THE LEFT SIDE. RANDOMIZE A-G. SINGLE PUNCH FOR EACH RESPONSE.]

A. The information provided was easy to understand
B. The online checkup helped me learn about other sources of energy efficiency information and AEP Ohio energy efficiency programs
C. I learned something new from the online checkup
D. The online checkup provided information that I needed in order to take action to save energy and money in my home
E. The online checkup gave me a better understanding of where I can save energy and money in my home
F. The time needed to complete the online checkup was reasonable
G. The online checkup was easy to complete

OS7. On a scale of 0 to 10, where 0 means "extremely dissatisfied" and 10 means "extremely satisfied", how satisfied were you with the <u>energy savings kit</u>? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED

01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON'T KNOW
99. REFUSED

[ASK OS8 IF OS9 <= 5. ELSE SKIP TO OS9.]

OS8. Why did you rate it that way? [OPEN END]

98. DON'T KNOW
99. REFUSED

OS9. Would you recommend the Online Energy Checkup to a friend? [SINGLE PUNCH]

1. YES
2. NO
88. DON'T KNOW
99. REFUSED

OS10. Based on your overall experience as an AEP Ohio customer, how would you rate the company? Please use the same 0 to 10 scale, where 0 means "extremely dissatisfied" and 10 means "extremely satisfied"? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED

NAVIGANT

98. DON'T KNOW
99. REFUSED

Measure Verification

CFL BATTERY

CFL1) The energy savings kit included five Compact Fluorescent Light bulbs also known as CFLs. How many of the CFLs that you received in did you install in your home?

1. ONE
2. TWO
3. THREE
4. FOUR
5. FIVE
6. NONE [GO TO SKIP BEFORE CFL8]
88. DON'T KNOW [SKIP TO LED1]
99. REFUSED [SKIP TO LED1]

[ASK IF CFL1= 1 to 5 OTHERWISE SKIP TO CFL5]

CFL2) Of those [INSERT RESPONSE FROM CFL1] CFL bulbs that you actually installed, how many of those replaced: (READ 1-3, RECORD ONE NUMBER FOR EACH OPTION. CONTINUE UNTIL YOU REACH [INSERT RESPONSE FROM CFL1])

1. Incandescent bulbs [NUMERICAL OPEN END. RANGE 0 - 5]
2. CFL bulbs [NUMERICAL OPEN END. RANGE 0 - 5]
3. Halogen bulbs [NUMERICAL OPEN END. RANGE 0 - 5]
4. (IF STILL NOT AT [INSERT RESPONSE FROM CFL1], ASK: "Did the CFLs replace any other type of bulb?" SPECIFY TYPE OF BULB. [OPEN END]
98. DON'T KNOW
99. REFUSED

[ASK CFL3 IF CFL1=1, 2, 3, 4. ELSE SKIP TO CFL5]

CFL3) What was your reasoning for not installing the other CFLs? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. ALREADY HAVE CFLS INSTALLED
2. DO NOT LIKE THE LIGHT THAT THE CFLS GIVE OFF
3. THE CFL WAS BROKEN
4. THE CFL DID NOT WORK
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]

NAVIGANT

99. REFUSED [EXCLUSIVE]

CFL4) What did you do with the CFL(s) you did not install? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. STORED IT/THEM FOR FUTURE USE
2. STORED IT/THEM TO GIVE TO SOMEONE ELSE LATER
3. STORED IT/THEM TO DISPOSE OF LATER
4. RECYCLED IT/THEM
5. THREW IT/THEM AWAY IN THE GARBAGE
6. GAVE IT/THEM TO SOMEONE ELSE
77. OTHER (RECORD RESPONSE) [OPEN END]
88. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

CFL5. How many of the CFLs that you originally installed are still installed? [INSERT SELECTION FROM CFL1 AND ALL LESSER OPTIONS. FOR EXAMPLE, IF CFL1=2 THE RESPONSE OPTIONS SHOULD INCLUDE 1 AND 2.]

98. DON'T KNOW
99. REFUSED

[ASK CFL6 IF CFL5 < CFL1. ELSE GO TO SKIP BEFORE CFL7.]

CFL5) Why did you remove those CFLs? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. DID NOT LIKE THE LIGHT THE CFL GIVES OFF
2. THE CFL WAS BROKEN
3. THE CFL DID NOT WORK
4. THE CFL STOPPED WORKING ALREADY
97. OTHER (RECORD REASON) [OPEN END]
88. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

CFL6) What happened to those CFL(s) that are no longer installed? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. THROWN AWAY
2. IN STORAGE
3. SOLD OR GIVEN AWAY
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]

NAVIGANT

99. REFUSED [EXCLUSIVE]

[ASK CFL7 IF CFL1 = 1 OR 2 OR 3 OR 4 OR 6, ELSE SKIP TO CFL8.]

CFL7) Do you plan on installing the [IF CFL1=1 OR 2 OR 3 OR 4 INSERT “additional”] CFLs? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO CFL9]
98. DON’T KNOW [SKIP TO CFL9]
99. REFUSED [SKIP TO CFL9]

CFL8) When do you plan on installing the [IF CFL1=1 OR 2 OR 3 INSERT “additional”] CFLs? Would you say…? (READ LIST. RECORD ONE RESPONSE.)[SINGLE PUNCH]

1. In the next month or two
2. In 3 to 6 months
3. In 7 to 12 months
4. More than a year from now, or
5. As current CFLs burn out
98. DON’T KNOW
99. REFUSED

CFL9) On a scale of 0 to 10, where 0 means “extremely dissatisfied” and 10 means “extremely satisfied”, how satisfied were you with the CFLs? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON’T KNOW
99. REFUSED

[IF STRATA = KITS (ALL), ELSE SKIP TO P1]

NAVIGANT

LED NIGHTLIGHT BATTERY

LED1. Did you install the LED nightlight you received in the energy kit? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO LED5]
88. DON'T KNOW [SKIP TO SH1]
99. REFUSED [SKIP TO SH1]

LED2. Is the LED nightlight still installed? [SINGLE PUNCH]

1. YES [SKIP TO LED4]
2. NO
88. DON'T KNOW [SKIP TO SH1]
99. REFUSED [SKIP TO SH1]

LED3. What was your reasoning for removing the LED nightlight?

1. DO NOT LIKE THE TYPE OF LIGHT IT PROVIDES
2. I DECIDED I DID NOT NEED A NIGHTLIGHT WHERE I PUT IT
3. NOT SATISFIED WITH THE NIGHTLIGHT
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW
99. REFUSED

[AFTER ASKING LED3 SKIP TO SH1]

1. LED4. Which of the following best describes how you used the LED nightlight that you installed? Did it…? (READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]Replace a regular incandescent nightlight,
2. Replace an older efficient nightlight, or
3. Get placed it in a location that didn't previously have a nightlight?
98. DON'T KNOW
99. REFUSED

[AFTER ASKING LED4 SKIP TO LED7]

LED5. What was your main reason for not installing the LED nightlight? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. WAITING FOR EXISTING NIGHTLIGHT TO BURN OUT
2. HAVEN'T GOTTEN AROUND TO IT YET
3. NOT SATISFIED WITH THE NIGHTLIGHT
4. DO NOT LIKE THE TYPE OF LIGHT IT PROVIDES
5. DO NOT HAVE THE NEED FOR ANOTHER NIGHTLIGHT

6. DO NOT HAVE A NEED FOR NIGHTLIGHTS
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

LED6. Do you plan on installing the nightlight in the future? [SINGLE PUNCH]

o. 1. YES
p. 2. NO [SKIP TO SH1]
q. 98. DON'T KNOW [SKIP TO SH1]
r. 99. REFUSED [SKIP TO SH1]

LED6A. When do you plan on installing the nightlight? Would you say…? (READ LIST. RECORD ONE RESPONSE.)[SINGLE PUNCH]

1. Within the next month or two
2. In 3 to 6 months
3. In 7 to 12 months
4. More than a year from now
5. When the current nightlight burns out
6. I don't plan on installing the nightlight
98. DON'T KNOW
99. REFUSED

LED7. On a scale of 0 to 10, where 0 means "extremely dissatisfied" and 10 means "extremely satisfied", how satisfied were you with the nightlight?

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON'T KNOW
99. REFUSED

SHOWERHEAD BATTERY

SH1. Did you receive a water-saving showerhead in your energy kit?

NAVIGANT

1. YES
2. NO [SKIP TO FA1]
98. DON'T KNOW [SKIP TO FA1]
99. REFUSED [SKIP TO FA1]

SH2. Did you install the showerhead you received in the energy kit?
1. YES
2. NO [SKIP TO SH5]
88. DON'T KNOW [SKIP TO FA1]
99. REFUSED [SKIP TO FA1]

SH3. Is the showerhead still installed?
1. YES [SKIP TO SH7]
2. NO
88. DON'T KNOW [SKIP TO FA1]
99. REFUSED [SKIP TO FA1]

SH4. Why did you remove the showerhead? (DO NOT READ. RECORD ALL THAT APPLY) [MULTIPUNCH]
1. DID NOT LIKE THE SPRAY
2. DID NOT LIKE THE WATER FLOW (PRESSURE) OF THE SHOWERHEAD
3. IT STOPPED WORKING
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[AFTER ASKING SH4 SKIP TO FA1]

SH5. What was your main reason for not installing the showerhead? (DO NOT READ. RECORD ALL THAT APPLY.) [MULTIPUNCH]
1. ALREADY HAVE AN EFFICIENT SHOWERHEAD INSTALLED
2. I LIKE MY CURRENT SHOWERHEAD THAT IS NOT ENERGY EFFICIENT
3. TOO DIFFICULT TO INSTALL
4. WORRIED ABOUT THE POSSIBLE REDUCED PRESSURE OF THE SHOWERHEAD
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

SH6. Do you plan on installing the showerhead in the future? **[READ LIST]**
1. YES

NAVIGANT

2. NO [SKIP TO FA1]
98. DON'T KNOW [SKIP TO FA1]
99. REFUSED [SKIP TO FA1]

SH7. When do you plan on installing the showerhead? Would you say…? (READ LIST. RECORD ONE RESPONSE.)[SINGLE PUNCH]

1. In the next month or two
2. In 3 to 6 months
3. In 7 to12 months
4. More than a year from now, or
5. As current showerhead stops working
98. DON'T KNOW
99. REFUSED

SH8. On a scale of 0 to 10, where 0 means "extremely dissatisfied" and 10 means "extremely satisfied," how satisfied were you with the showerhead? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON'T KNOW
99. REFUSED

FAUCET AERATORS BATTERY

FA1. Did you install both kitchen and bathroom faucet aerators you received in the energy kit? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

1. YES, INSTALLED BOTH
2. NO, JUST INSTALLED THE KITCHEN AERATOR
3. NO, JUST INSTALLED THE BATHROOM AERATOR [GO TO SKIP BEFORE FA2A]
4. NO, DID NOT INSTALL EITHER [GO TO SKIP BEFORE FA3]

98. DON'T KNOW [SKIP TO PI1]
99. REFUSED [SKIP TO PI1]

FA2. Is the kitchen faucet aerator still installed? [SINGLE PUNCH]

1. YES
2. NO
98. DON'T KNOW
99. REFUSED

[ASK FA2A IF FA1=1 OR 3. ELSE GO TO SKIP BEFORE FA2B]

FA2A. Is the bathroom faucet aerator still installed? [SINGLE PUNCH]

1. YES
2. NO
98. DON'T KNOW
99. REFUSED

[ASK FA2B IF FA2=2 OR FA2A=2. ELSE GO TO SKIP BEFORE FA3]

FA2B. What was your reasoning for removing the faucet aerator(s)? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. I ALREADY HAVE A FAUCET AERATOR
2. DO NOT LIKE THE PRESSURE OF THE FAUCET AERATOR
97. OTHER (RECORD REASON) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[ASK FA3 IF FA1 = 2 OR 3 OR 4. ELSE SKIP TO LED1.]

FA3. What was your main reason for not installing [IF FA1= 2 OR 3 INSERT "both". IF FA1=4 INSERT "either"] of the faucet aerator(s)? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. ALREADY HAVE (AN) EFFICIENT FAUCET AERATOR(S) INSTALLED
2. DO NOT LIKE THE PRESSURE OF THE FAUCET AERATOR
3. TOO DIFFICULT TO INSTALL
97. OTHER (RECORD REASON) [OPEN END]

98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

FA4. Do you plan on installing the faucet aerator(s) in the future? [SINGLE PUNCH]

1. YES
2. NO [SKIP TO LED1]
98. DON'T KNOW [SKIP TO LED1]
99. REFUSED [SKIP TO LED1]

FA4A. When do you plan on installing the faucet aerator(s)? Would you say…? (READ LIST. RECORD ONE RESPONSE.)[SINGLE PUNCH]

1. Within the next month or two
2. In 3 to 6 months
3. In 7 to 12 months
4. More than a year from now, or
5. As current faucet aerator stops working
98. DON'T KNOW

REFUSED

FA5. On a scale of 0 to 10, where 0 means you "extremely dissatisfied" and 10 means you "extremely satisfied", please tell me how satisfied were you with the faucet aerators?(DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON'T KNOW
99. REFUSED

WATER HEATER PIPE INSULATION BATTERY

NAVIGANT

PI1. Did you install the hot water heater pipe insulation you received in the energy kit? [SINGLE PUNCH]

1. YES [SKIP TO PI4]
2. NO
88. DON'T KNOW [SKIP TO P1]
99. REFUSED [SKIP TO P1]

PI2. Why didn't you install the pipe insulation? [OPENEND]

PI3. What did you do with the pipe insulation you did not install? (DO NOT READ. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. GAVE IT TO SOMEONE ELSE
2. RECYCLED IT
3. STORED IT FOR FUTURE USE
4. STORED IT TO GIVE TO SOMEONE ELSE LATER
5. STORED IT TO DISPOSE OF LATER
6. THREW IT AWAY IN THE GARBAGE
97. OTHER (RECORD RESPONSE)[OPEN END]
98. DON'T KNO [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[AFTER ASKING PI3 SKIP TO PI7]

PI4. Is the pipe insulation still installed?

1. YES [SKIP TO PI7]
2. NO
98. DON'T KNOW [SKIP TO PI7]
99. REFUSED [SKIP TO PI7]

PI5. Why did you remove the pipe insulation? [OPEN END]

PI6. What did you do with the pipe insulation that you removed? (DO NOT READ. RECORD ALL THAT APPLY.) [MULTIPUNCH]

1. THROWN AWAY
2. IN STORAGE
3. SOLD OR GIVEN AWAY
97. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW [EXCLUSIVE]

NAVIGANT

99. REFUSED [EXCLUSIVE]

PI7. On a scale of 0 to 10, where 0 means you "extremely dissatisfied" and 10 means you "extremely satisfied", please tell me how satisfied were you with the pipe insulation?
(DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. EXTREMELY DISSATISFIED
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY SATISFIED
98. DON'T KNOW
99. REFUSED

PI8. Do you have an electric or gas water heater? [DO NOT READ. RECORD ONE RESPONSE.) [SINGLE PUNCH]

1. ELECTRIC WATER HEATER
2. GAS WATER HEATER
3. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW
99. REFUSED

Process Questions

P1. How did you find out about the Online Energy Checkup? (DO NOT READ LIST. RECORD ALL THAT APPLY.) [MULTIPUNCH]

a. BILL INSERT
b. COMMUNITY EVENT/COUNTY/STATE FAIR
c. CONTRACTOR (SUCH AS A PLUMBER, ELECTRICIAN, OR GENERAL CONTRACTOR)
d. EMAIL
e. FAMILY/FRIEND
f. RESPONDENT WORKS IN THE INDUSTRY
g. UTILITY COMPANY (GENERAL)
h. WEBSITE

NAVIGANT

i. YARD SIGNS
j. SOME OTHER WAY (RECORD RESPONSE.) [OPEN END]
88. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

[IF P1 HAS MORE THAN ONE ANSWER, ASK P2, OTHERWISE AUTO-FILL.]

P2. Which of these sources of information was most influential in your decision to participate in the program? (PROMPT IF NECESSARY. RECORD ONE RESPONSE.) [SHOW ANSWERS GIVEN IN P1. SINGLE PUNCH.]

P3. How would you recommend AEP Ohio reach out to customers in the future to get them to participate in this program? (DO NOT READ. RECORD ALL THAT APPLY.) [MULTIPUNCH]

a. BILL INSERTS
b. FLYERS/ADS/MAILINGS
c. HOMEOWNERS ASSOCIATION
d. NEWSPAPER ADVERTISEMENTS
e. RADIO ADVERTISEMENTS
f. TELEVISION ADVERTISEMENTS
g. WITH PHONE CALLS
h. OTHER (RECORD RESPONSE) [OPEN END]
98. DON'T KNOW
99. REFUSED

P4. On a scale of 1 to 10, where 0 is extremely dissatisfied and 10 is extremely satisfied, how would you rate your satisfaction with… (READ LIST. RECORD ONE RESPONSE FOR EACH. REPEAT SCALE AS NECESSARY.) [FORMAT AS GRID WITH 0 EXTREMELY DISSATISFIED TO 10 EXTREMELY SATISFIED INCLUDE 98 DON'T KNOW AND 99 REFUSED ACROSS THE TOP. SHOW A-I DOWN LEFT SIDE. RANDOMIZE A-I.]

a. The customized energy report you received with recommended ways to save energy
b. The CFL bulbs you received in the kit
c. [IF STRATA = KITS (ALL)] The faucet aerators you received in the kit
d. [IF STRATA = KITS (ALL)] The low flow showerhead you received in the kit
e. [IF STRATA = KITS (ALL)] The hot water tank pipe wrap you received in the kit
f. [IF STRATA = KITS (ALL)] The LED nightlight you received in the kit
g. The length of time it took to complete the online checkup
h. The information you received about eligible rebates for recommended energy efficiency improvements
i. AEP Ohio overall

NAVIGANT

[ASK P5 IF ANY P4A-P4I IS ≤ 4. ELSE SKIP TO P6]
P5. You mentioned you were not satisfied with some aspect of the program. Why did you give this rating? [OPEN END]

98. DON'T KNOW
99. REFUSED

P6. What do you see as the main benefits to participating in the *program*? (DO NOT READ. RECORD ALL THAT APPLY, UP TO 3.) [MULTIPUNCH. MAX 3]

1. HAVING A LOWER ENERGY BILL
2. SAVING ENERGY
3. RECEIVING THE ENERGY EFFICIENCY EQUIPMENT
4. RECEIVING THE ENERGY SURVEY RECOMMENDATIONS
5. RECEIVING REBATES ON RETROFIT MEASURES
6. OTHER (RECORD RESPONSE) [OPEN END]
7. DON'T KNOW [EXCLUSIVE]
8. REFUSED [EXCLUSIVE]

P7. Have you noticed a reduction in the amount of your electric bill since participating in the program? [SINGLE PUNCH]

a. YES
b. NO
98. DON'T KNOW
99. REFUSED

P8. Would you say participating in this program has made you feel more favorable, less favorable, or no different about AEP Ohio? [SINGLE PUNCH]

f. MORE FAVORABLE ABOUT AEP OHIO
g. NO DIFFERENT ABOUT AEP OHIO
h. LESS FAVORABLE ABOUT AEP OHIO
88. (Don't know)
99. (Refused)

P9. Have you recommended the AEP Ohio Online Energy Checkup to others since participating? [SINGLE PUNCH]

a. YES
b. NO
98. DON'T KNOW
99. REFUSED

NAVIGANT

P10. On a scale of 0 to 10, where 0 is "Not at All Likely", and 10 is "Extremely Likely", how likely are you to recommend this program to others in the future?
(DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

00. NOT AT ALL LIKELY
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY LIKELY
98. DON'T KNOW
99. REFUSED

[ASK P11 IF P10 ≤ 4 ELSE SKIP TO P12.]
P11. Why might you <u>not</u> recommend the program to others? (DO NOT READ. RECORD ALL THAT APPLY.) [MULTIPUNCH]

a. ENERGY SAVINGS WERE NOT HIGH ENOUGH
b. ENERGY BILL SAVINGS WEREN'T HIGH ENOUGH
c. TOO MUCH OF A HASSLE/TOO MUCH RED TAPE
d. IT TOOK TOO LONG TO RECEIVE THE ENERGY KIT
e. THE RECOMMENDATIONS WERE NOT HELPFUL
f. RESPONSE WAS NEUTRAL/NOT NEGATIVE
g. OTHER [SPECIFY]
98. DON'T KNOW
99. REFUSED

P15. Now I would like you to focus on the Report you received after the online checkup. After receiving the report that contained recommendations for ways to reduce your energy consumption and your utility bill, would you say that you…? (READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

a. Read the report thoroughly
b. Read some portions of the report
c. Just glanced through it, or
d. Did not read the report at all
98. DON'T KNOW
99. REFUSED

NAVIGANT

j.

P16. [ASK P16 IF P15=1. ELSE SKIP TO P18] On a scale of 0 to 10 where 0 is "not useful at all" and 10 is "extremely useful", please rate the usefulness of the recommendations contained in the report.

00. NOT USEFUL AT ALL
01.
02.
03.
04.
05.
06.
07.
08.
09.
10. EXTREMELY USEFUL
98. DON'T KNOW
99. REFUSED

P17. Thinking about all of the recommendations in the report, what is your primary goal in implementing the recommendations? (DO NOT READ LIST. RECORD ONE RESPONSE.) [MULTIPUNCH]

a. REDUCE ENERGY COSTS
b. MAKE MY HOME MORE COMFORTABLE
c. TO MAKE GENERAL IMPROVEMENTS TO MY HOME
d. TO BENEFIT THE ENVIRONMENT

97. OTHER (RECORD RESPONSE) [OPEN END] ______________________
98. DON'T KNOW [EXCLUSIVE]
99. REFUSED [EXCLUSIVE]

P18. Have you participated in any other AEP Ohio energy efficiency programs for your home? [SINGLE PUNCH]

a. YES
b. NO

98. DON'T KNOW
99. REFUSED

P19. [ASK P19 IF P18=1. ELSE SKIP TO D1] Which other programs have you participated in? [OPENEND]

NAVIGANT

P20. Did you participate in this/these programs before or after you completed the Online Energy Checkup? [SINGLE PUNCH]

a. BEFORE THIS ONE
b. AFTER THIS ONE
c. BOTH BEFORE AND AFTER (NOTE TO INTERVIEWER: COULD BE PARTICIPATION IN MULTIPLE PROGRAMS OR PARTICIPATION COULD HAVE TAKEN A LONGER TIME)
98. DON'T KNOW
99. REFUSED
k.

Demographics

D1. How many people live in your household year-round? **[NUMERIC OPEN END. RANGE 1-10]**

98. DON'T KNOW
99. REFUSED

D4. Do you own or rent your home? (DO NOT READ LIST. RECORD ONE RESPONSE.) [SINGLE PUNCH]

a. OWN
b. RENT
98. DON'T KNOW
99. REFUSED

D5. How many years have you lived in your current residence? (RECORD IN YEARS) [NUMERICAL OPEN END. RANGE 000-100]

D6. [OPEN END] **(**DO NOT READ: INTERVIEWER RECORD ANY INFORMATION RESPONDENT VOLUNTEERS ABOUT THE PROGRAM THAT WAS NOT CAPTURED DURING THE INTERVIEW HERE**)**

END. That's all the questions that we have. On behalf of AEP Ohio, I'd like to thank you very much for taking the time to participate in this study.